Models Of Trade And Polity Formation In Bronze Age Northeastern Iran, Ca. 3200-1600 Bce

Kyle Gregory Olson
University of Pennsylvania

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Models Of Trade And Polity Formation In Bronze Age Northeastern Iran, Ca. 3200-1600 Bce

Abstract
A persistent hypothesis in the archaeology of complex societies posits that the acquisition of raw materials for craft production underpins the emergence of first the division of labor, then the emergence of social stratification, and finally, the development of political institutions and ultimately state formation. In cases where such raw materials — especially those needed for the fashioning of status symbols — are not available locally, self-aggrandizing leaders and aspiring elites will seek to create or otherwise manipulate long distance flows of such materials to either acquire the status symbols or to furnish the craft industries which they control. While this theory has for decades been the subject of debate and revision according to theoretical and methodological fashions, its premises have nevertheless achieved a level of disciplinary common-sense. So much so in fact, that interregional trade is seen by many scholars as an unquestionably key variable in polity formation, especially in the case of so-called “secondary” polity-formation. A case study based on the Gorgan Plain in northeastern Iran focusing on the chronological interval between the Late Chalcolithic and the Late Bronze Age (ca. 3200-1600 BCE) shows that the necessity and chronological priority of increases in interregional trade cannot be taken for granted in the process of polity formation. Indeed, cases where the order of operations is reversed are not only possible but do in fact exist. Through an examination of the historiography of macro-historical narratives of the relationship between interregional trade and Bronze Age political geography in Iran, the synthesis of underutilized survey and excavation data, the conduct of a virtual site survey using Google Earth, and the computation of spatial-organizational models, I show that the period in which the Gorgan Plain was most involved in interregional trade actually follows a period of polity formation, and is instead correlated with what all previous scholars have considered to be a phase of polity disintegration and collapse.

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MODELS OF TRADE AND POLITY FORMATION
IN BRONZE AGE NORTHEASTERN IRAN, CA. 3200-1600 BCE

Kyle Gregory Olson
A DISSERTATION
in
Anthropology
Presented to the Faculties of the University of Pennsylvania
in
Partial Fulfillment of the Requirements for the
Degree of Doctor of Philosophy
2020

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Assistant Professor of Anthropology
To those who came before and to those who will come after
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Age (it is not boring!) — she has played a major role in my understanding not only of historical scholarship in general, but of Russophone scholarship on the Middle East in particular.

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As is conventional, all mistakes from here onward are my sole responsibility. To any student reading this, I want to say: to succeed in academia, you need to be part of a gift economy of giving and receiving time, energy, and assistance. Indeed, it takes a network to produce a scholar — my only hope is that I am able to continue paying forward the immense debts that I owe everyone above.
ABSTRACT

MODELS OF TRADE AND POLITY FORMATION IN BRONZE AGE NORTHEASTERN IRAN, CA. 3200-1600 BCE

Kyle Gregory Olson
Lauren Ristvet

A persistent hypothesis in the archaeology of complex societies posits that the acquisition of raw materials for craft production underpins the emergence of first the division of labor, then the emergence of social stratification, and finally, the development of political institutions and ultimately state formation. In cases where such raw materials — especially those needed for the fashioning of status symbols — are not available locally, self-aggrandizing leaders and aspiring elites will seek to create or otherwise manipulate long distance flows of such materials to either acquire the status symbols or to furnish the craft industries which they control. While this theory has for decades been the subject of debate and revision according to theoretical and methodological fashions, its premises have nevertheless achieved a level of disciplinary common-sense. So much so in fact, that interregional trade is seen by many scholars as an unquestionably key variable in polity formation, especially in the case of so-called “secondary” polity-formation. A case study based on the Gorgan Plain in northeastern Iran focusing on the chronological interval between the Late Chalcolithic and the Late Bronze Age (ca. 3200-1600 BCE) shows that the necessity and chronological priority of increases in interregional trade cannot be taken for granted in the process of polity formation. Indeed, cases where the order of operations is reversed are not only possible but do in fact exist. Through an examination of the historiography of macro-historical narratives of the relationship between interregional trade and Bronze Age political geography in Iran, the synthesis of underutilized survey and excavation data, the conduct of a virtual site survey using Google Earth, and the computation of spatial-organizational models, I show that the period in which the Gorgan Plain was most involved in interregional trade actually follows a period of polity formation, and is instead correlated with what all previous scholars have considered to be a phase of polity disintegration and collapse.
# TABLE OF CONTENTS

**ACKNOWLEDGMENTS** ........................................................................................................ III

**ABSTRACT** .................................................................................................................. VI

**TABLE OF CONTENTS** ................................................................................................ VII

**LIST OF TABLES** .......................................................................................................... X

**LIST OF ILLUSTRATIONS** .......................................................................................... XII

**NOTE ON TRANSLITERATION SYSTEMS** ................................................................. XV

**CHAPTER 1. INTRODUCTION** ................................................................................... 1

1.1 Trade and Polity Formation in the Ancient Near East ............................................... 11

1.2 Structure of Investigation ......................................................................................... 23

**CHAPTER 2. THE GEOGRAPHY OF POLITY FORMATION** ....................................... 32

2.1 Frameworks for studying the emergence of political complexity through settlement patterns: the political landscape and political geography .............................................................................................................. 37

2.1.1 The Political Landscape ......................................................................................... 39

2.1.2 Political Geography .............................................................................................. 44

2.2 Community and Polity Geography: Definitions and Analysis .................................. 53

2.2.1 Geographic definitions of community and polity .................................................. 54

2.2.2 Evaluating Tosi and Kohl’s models of regional settlement distributions .............. 64

2.3 Landscape Archaeology and Archaeological Geography .......................................... 71

**CHAPTER 3. THE RELATIONSHIP BETWEEN TRADE, EXCHANGE AND INTERACTION AND POLITICAL GEOGRAPHY IN BRONZE AGE GREATER KHORASAN** ......................................................... 75

3.1 Physical and Cultural Geography of Greater Khorasan ........................................... 79

3.1.1 Physical Geography of The Gorgan Plain in the context of the Iranian Plateau ....... 81

3.1.2 Cultural and Political Geography of Greater Khorasan ....................................... 99

3.2 Longue Durée Patterns of Trade, Exchange, and Interaction in Bronze Age Iran ...... 131

3.2.1 Who participated in third-millennium networks of exchange and interaction? ....... 134

3.2.2 What materials and goods were exchanged, via what channels, and how did this change over time? ................................................................. 138
LIST OF TABLES

Table 3.1 Ecosystem Types and Sites of the North Zone .......................................................... 101
Table 3.2 Ecosystem Types and Sites of the South Zone ........................................................ 101
Table 3.3 Alignment of Regional Sequences ................................................................. 102
Table 3.4 Tosi’s First Periodization of the 4th-2nd millennia BCE in Turkmenistan (1979: 169) 146
Table 3.5 Tosi’s Periodization of the 4th-2nd millennia BCE in South Turkmenistan (1986) 157
Table 3.6 Relative Chronological Chart for Greater Khorasan ........................................ 158
Table 3.7 Summary of the Different Absolute Chronologies for the Kopet Dagh Piedmont 158
Table 3.8 Summary of the Published Absolute Chronologies for the BMAC .................. 159
Table 3.9 Gorgan Plain Absolute Chronology ................................................................. 159
Table 3.10 Matching Tosi 1986 to Adjacent Regions by Absolute Dates .......................... 160
Table 3.11 Results of the Haute Terrasse OxCal Model ............................................... 186
Table 4.1 Example Rows from Rank-Size Shape Output Table ..................................... 232
Table 4.2 (Adapted from Savage 1997) ............................................................... 233
Table 4.3 Schematic of Synchronic Snapshots .............................................................. 243
Table 4.4: Reported Geographical Precision (adapted from Lawrence 2012: 53) .............. 263
Table 4.5: Reported Boundary Certainty (adapted from Lawrence 2012: 58) .................... 263
Table 4.6: Recorded Archaeological Significance (adapted from Lawrence 2012: 64) .......... 264
Table 4.7: Recorded Geographical Precision (adapted from Lawrence 2012: 53) .......... 269
Table 4.8: Recorded Boundary Certainty (adapted from Lawrence 2012: 66) .............. 270
Table 4.9: Recorded Archaeological Significance (Lawrence 2012: 64) ......................... 270
Table 4.10 Revised Chronogram .............................................................................. 303
Table 4.11 Results of the Calibrated and Constrained 14C Sequence at Tureng Tepe ........ 307
Table 4.12 Absolute Dates for Gorgan Plain Culture-Historical Phases ......................... 308
Table 4.13 Absolute Dates Correlated to Three-Age System ....................................... 310
Table 4.14 Correlating Absolute Dates to Cultural Strata (Comparing Abbasi 2011/2016) 311
Table 4.15 Key for Interpretation of the Late Chalcolithic .............................................. 313
Table 4.16 Key for Interpretation of the Early Bronze Age ........................................ 313
Table 4.17 Key for Interpretation of the Middle Bronze Age ....................................... 314
Table 4.18 Key for Interpretation of the Late Bronze Age ............................................ 314
Table 4.19 Revised Era-Date-Strata Table ................................................................. 316
Table 4.20 Aggregate Site Data (All Sources) ............................................................... 322
Table 4.21 Counts of Sites as reported by Abbasi (2011) ............................................. 324
Table 4.22 Counts of Sites as reported by Arne (1945) ............................................... 325
Table 4.23 Counts of Sites as reported by Mortezaei and Farhani (2008) ................. 327
Table 4.24 Counts of Sites as reported by Sauer et al. (2013) ...................................... 328
Table 4.25 Counts of Sites as reported by Shiomi (1976, 1978) .................................. 329
Table 4.26 Comparison between the source surveys in terms of Survey Design .............. 330
Table 6.8 Comparison between the source surveys in terms of Geographic Representation ........................................ 331
Table 6.9 Comparison between the source surveys in terms of Site Description .................................................. 334
Table 6.10 Counts of Sites with Date-Assignments by Source and Positive Identification .................................. 356
Table 6.11 Chronological Information about Bronze Age Sites (Sauer et al. 2013: 114-121, 396) ...................... 362
Table 6.12 Recorded Chronological Determinations by Source and Period ..................................................... 367
Table 6.13 Summary Statistics of Annual Cumulative Precipitation for All Site Locations (mm) ......................... 371
Table 6.14 Summary Statistics of Proximity of All Sites to Rivers (distance in meters) .................................... 371
Table 6.15 Quantification of Site Distribution by Soil Zone ........................................................................... 371
Table 7.1 Tosi’s 1986 Chronological Framework for Proto-Historic Greater Khorasan ....................................... 409
Table 7.2 Bayesian Radiocarbon Chronology for the Gorgan Plain (Late-4th to Early-2nd Millennia) ................. 409
Table 7.3 Correlation Between Gorgan Plain Culture-Historical Framework and Tosi’s model ..................... 411
Table 7.4 Correlation Between Gorgan Plain Culture-Historical Framework and Tosi’s model ..................... 411
Table 7.5 Tosi’s Settlement Organization Predictions ..................................................................................... 412
Table 7.6 Count of Strictly Contemporaneous Sites by Period ........................................................................ 413
Table 7.7 Translation between Modeling Idioms .......................................................................................... 425
Table 7.8 Results of Rank-Size Analysis Using Tosi’s Territorial Predictions .................................................. 429
Table 7.9 Buffer Cluster/Group Counts by Period (N Clusters/Groups with only one site) ............................... 439
Table 7.10 Average Number of Sites Per Cluster/Group (Single-Site Clusters Excluded) ............................... 440
Table 7.11 Average Cluster/Group Polygon Area in km² (Single-Site Clusters Excluded) ................................. 441
Table 7.12 Best Overlaps Between Tosi’s Territorial Predictions and Cluster Model Results ....................... 443
Table 7.13 Buffer Cluster Rank-Curve Shape Counts in Aggregate ............................................................... 450
Table 7.14 Simplified Distribution of Rank-Size Types .................................................................................. 454
Table 7.15 Geographic Distribution of Counts of Rank-Size Curves for By Zone and Buffer-Threshold ........... 455
Table 7.16 Simplified Geographic Distribution of Rank-Size Types (* Indicates 75%+ NA) .............................. 458
Table 7.17 Overall Counts of Rank-size Curve-Shape by Period (Scale Collapsed) .......................................... 459
Table 7.18 Correlations between Size and Area Measurements (Scale Collapsed) ........................................ 462
LIST OF ILLUSTRATIONS

Figure 3.1 The Iranian Plateau (Basemap Source: Wikimedia Commons) ................................................................. 82
Figure 3.2 Satellite image of a typical endorheic alluvial fan .................................................................................. 83
Figure 3.3 The Murghab Delta .................................................................................................................................. 84
Figure 3.4. Topography and Significant Locations of the Region ................................................................................. 87
Figure 3.5 Watershed of the Atrak River and Gorgan Plain River Network .............................................................. 87
Figure 3.6 Schematic Representation of Rainfall Patterns in Southern Caspian Basin (Piller 2012: Fig. 2) .............. 88
Figure 3.7 Main Gorgan Plain River Channel intersecting with one of its tributaries ................................................. 89
Figure 3.8 Iran Precipitation Statistics .................................................................................................................... 90
Figure 3.9 Iran 40-year Climate Classification Map (Beck et al. 2018) ................................................................. 91
Figure 3.10 Land Use Zones in the Gorgan Plain (Shapefiles by Kristen Hopper, 2018) ............................................ 91
Figure 3.11 Terrestrial Eco-Zones of the Gorgan Plain .......................................................................................... 92
Figure 3.12 MODIS Landcover classification of Golestan Province ....................................................................... 93
Figure 3.13 Iran Croplands Distribution ................................................................................................................. 94
Figure 3.14 Geographic Distribution of Growing Season Length in Iran .................................................................. 95
Figure 3.15 Simulated Corridors of Movement in northeastern Iran ........................................................................ 96
Figure 3.16 Historically Attested Routes Across the Region during the 11th-12th centuries CE .......................... 98
Figure 3.17 Map of Physical-Geographic Zones under discussion ........................................................................ 100
Figure 3.18 Regional Interconnections during the Third Millennium (Lamberg-Karlovsky and Tosi 1973) ......... 103
Figure 3.19 Prehistoric Sites in Southern Turkmenistan (Bonora and Vidale 2013: 141) ........................................ 104
Figure 3.20 Map of Bronze Age Margiana (Hiebert 1994b) ................................................................................... 106
Figure 3.21 Map of Prehistoric Northeastern Iran (adapted from Dyson and Thornton 2009: 2) ......................... 108
Figure 3.22 Locations of Central Plateau Sub-Regions ............................................................................................ 110
Figure 3.23 Archaeological Map of the Tehran Plain (Fazeli et al. 2007: 274) ......................................................... 111
Figure 3.24 Map of the Savajbulaq Plain (after Mousavi 2005a: Figure 1) ............................................................ 112
Figure 3.25 Archaeological Map of the Qazvin Plain (Fazeli et al. 2009: Figure 1) ................................................ 113
Figure 3.26 South Central Plateau (after Helwing 2005: Map 3) ........................................................................... 116
Figure 3.27 Southeastern Iran ................................................................................................................................ 120
Figure 3.28 Map of Helmand River Watershed, Southwestern Afghanistan ........................................................ 121
Figure 3.29 Map of the Hamun Basin (After Lamberg-Karlovsky and Tosi 1973: Map 5) ....................................... 122
Figure 3.30 Halil River Map (Majidzadeh 2003: 25) ............................................................................................. 126
Figure 3.31 Bampur Map (Locations of Chalcolithic sites surveyed and a representation of the major shifts in settlement from the fifth to the third millennia BCE, after Mutin et al. 2017) ............................................ 127
Figure 3.32 Map of Southwestern Iran (de Miroschedji 2003: 16) ...................................................................... 128
Figure 3.33 OxCal Code for Haute Terrasse Constrained Model ........................................................................... 186
Figure 4.1 K-Means SSE Simulation Output example ........................................................................................... 219
Figure 4.2 Procedure for creation of Settlement Clusters (3km, 6km) and Settlement Groups (9km) .................. 226
Figure 4.3 Principle of Inclusion for discriminating settlement Groups ............................................................. 228
Figure 4.4 Rank-Size Curve Shapes derived from Actual Examples in Gorgan Plain Settlement Data ................. 231
Figure 4.5 Schematic of Dewar’s Categories ......................................................................................................... 240
Figure 4.6 Abbasi Database Table Schema ......................................................................................................... 259
Figure 4.7 Access Recording Form ..................................................................................................................... 261
Figure 4.8 Master Database Table Schema ........................................................................................................ 265
Figure 4.9 Google Earth Gorgan Plain Survey Restudy “Site-Visit” Recording Protocol ...................................... 268
Figure 5.1 Ceramics Illustrations (Table 5.5) ........................................................................................................... 288
Figure 5.2 Ceramics Illustrations (Table 5.5) ........................................................................................................... 289
Figure 5.3 Ceramics Illustrations (Table 5.5) ........................................................................................................... 290
Figure 5.4 Ceramics Illustrations (Table 5.6) ........................................................................................................... 295
Figure 7.13a T1 Settlement Clusters Lower Threshold (3 km Buffer) .......................................................... 434
Figure 7.13b T1 Settlement Clusters Upper Threshold (6 km Buffer).......................................................... 435
Figure 7.13c T1 Settlement Groups (9 km Buffer) ....................................................................................... 435
Figure 7.14a T2 Settlement Clusters Lower Threshold (3 km Buffer) .......................................................... 436
Figure 7.14b T2 Settlement Clusters Upper Threshold (6 km Buffer).......................................................... 436
Figure 7.14c T2 Settlement Groups (9 km Buffer) ....................................................................................... 437
Figure 7.15a T3 Settlement Clusters Lower Threshold (3 km Buffer) .......................................................... 437
Figure 7.15b T3 Settlement Clusters Upper Threshold (6 km Buffer).......................................................... 438
Figure 7.15c T3 Settlement Groups (9 km Buffer) ....................................................................................... 438
Figure 7.16 How Primate Systems Can Produce Convex Distributions When Pooled......................... 461
I follow the transliteration system of the journal *Iranian Studies*, which uses a simplified version of the *International Journal of Middle East Studies* (IJMES) because the *Iranian Studies* system is closer to modern Persian pronunciation and makes minimal use of unnecessary notations that are common in Arabic-derived systems such as that of the Library of Congress. Certain liberties have been taken in this dissertation, however, following conventional practice in many contemporary monographs in the field of Iranian Studies, which avoids as much as possible the use of diacritic marks, because the non-specialist has no need for such complexities and the specialist will be able to navigate regardless (Zia-Ebrahimi 2016).

**Persian Transliteration Chart (** indicates consonants not found in American English)**

<table>
<thead>
<tr>
<th>پ</th>
<th>j (as in judge)</th>
<th>ق</th>
<th>q*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ت</td>
<td>ch</td>
<td>ک</td>
<td>k</td>
</tr>
<tr>
<td>ث</td>
<td>h</td>
<td>گ</td>
<td>g</td>
</tr>
<tr>
<td>خ</td>
<td>kh*</td>
<td>م</td>
<td>m</td>
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<td>د</td>
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<td>ن</td>
<td>n</td>
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<td>ذ</td>
<td>z</td>
<td>ه</td>
<td>h / -eh, -ah, -oh</td>
</tr>
<tr>
<td>ر</td>
<td>r</td>
<td>و</td>
<td>v / ou or u</td>
</tr>
<tr>
<td>ز</td>
<td>z</td>
<td>ْو</td>
<td>oh or ow</td>
</tr>
<tr>
<td>ز</td>
<td>zh (as in pleasure)</td>
<td>ی</td>
<td>y / i</td>
</tr>
<tr>
<td>س</td>
<td>s</td>
<td>ی</td>
<td>ay or ai</td>
</tr>
<tr>
<td>ش</td>
<td>sh</td>
<td>ْ / ā</td>
<td>a (as in apple)</td>
</tr>
<tr>
<td>ص</td>
<td>s</td>
<td>َ</td>
<td>o (as in oatmeal)</td>
</tr>
<tr>
<td>ض</td>
<td>z</td>
<td>ْ</td>
<td>e (as in education)</td>
</tr>
</tbody>
</table>
Indeed, the only diacritics that have proven worth preserving for many authors are the macron (ā) to indicate the long-a vowel (i.e., ā) and the apostrophe for the glottal stop (i.e., چ).

Following archaeological convention, the macron will not be used in this dissertation except in this section, despite its high desirability in encouraging correct pronunciation of Persian lexical items, toponymy, and onomastics. Potential sources of inconsistency result from the long ی vowel and the ی diphthong, which I chose to render contextually in order to clue the English-only reader toward the correct pronunciation. In this system, for the genitive particle ezāfeh, e is used rather than i (e.g. dast-e chap rather than dast-i chap) and -ye when applicable (e.g. Shāhnāmeh-ye Abu-Mansuri, bimeh-hā-ye ejtemā’i). The tashdid-marker is represented by a doubling of the English consonant, e.g. takhassos. The plural marker (i.e., ā) is added to the noun with a dash, e.g. dast-hā. The silent final -h is written for words that end in two-eyed h, e.g. Shāhnāmeh, lāleh, bimeh. Every effort has been made to use the hyphen to indicate the presence of a half-space in Persian orthography.

There is no need to alter familiar toponyms and proper names such as Tabriz, Isfahan, Ilkhan, Ilkhanid. This convention has also been preserved for commonly-used but out-of-date (and questionably-accurate-to-begin with) transliterations of archaeological site-names such as Tureng Tepe (i.e., Torang Tappeh), Tepe Hissar (i.e., Tappeh Hesār), and Shahr-i Sokhta (i.e., Shahr-e Sukhteh) in order to maintain search-term fidelity. There are thus many similar deviations from the modified *Iranian Studies* system throughout the text for largely the same reason, stemming from three sources: 1) Persian proper-names and toponyms have entered the English lexicon at different junctures over the past three-hundred years, during which time there have been vowel shifts in both languages; 2) the dominance of Arabic transliteration systems in Middle East Studies, which has overdetermined English renderings of terms from
languages using the Perso-Arabic script; and 3) the general lack of familiarity on the part of Anglophone and Anglographic archaeologists with Persian orthography and phonetics.

For transliteration of Russian terminology and names into English, I follow the *Encyclopedia Iranica*’s system, which uses the Cyrillic transliteration table of the Chicago Manual of Style (16th edition), with the following qualifications: Russian е = e/ye, ё = yo, ы = i, and for proper names I use the spelling conventional in the literature (e.g., Rostovtzeff, which ought to be Rostovtsev). The use of a grave accent over е to indicate э as below is entirely unnecessary, however, as the distinction almost exclusively applies to phonemes in the word-initial position, and the other ‘е’ letter would be typically be rendered as ‘ye’ in that case.

**Russian Transliteration Chart** (Source: [http://www.iranicaonline.org/pages/guidelines](http://www.iranicaonline.org/pages/guidelines))
CHAPTER 1. INTRODUCTION

One-hundred years ago, the famous Russian classicist Mikhail Rostovtzeff drew the first connections between the Gorgan Plain in prehistory and the wider world beyond. In commenting on the “Sumerian Treasure of Astrabad,” he noted that the iconography of this collection of gold vessels, stone objects, copper tools and weapons closely resembled objects found in Egypt, Southern Mesopotamia, and Elam. Rostovtzeff argued, however, that despite these resemblances, we should not understand them as imports produced in a distant land and brought to this remote corner. Instead, the distinctive features of these objects indicate that they were created by an independent local culture, albeit one with connections spread as far as the aforementioned regions, as well as to Anatolia and Trans-Caucasia (Rostovtzeff 1920: 23). In subsequent decades, excavations at key sites in the region (e.g., Tureng Tepe and Shah Tepe), as well as at culturally related sites nearby (e.g., Tepe Hissar) have not only reinforced this argument but also produced material that attests to additional diverse regional and interregional material connections. Numerous analyses of these materials have demonstrated that, at different times, the Gorgan Plain was more or less closely connected to both its near neighbors on the Iranian Plateau and Central Asia, as well as to more distant regions, including the Indus Valley, Mesopotamia, and Anatolia (Arne 1945; Childe 1946; Cleuziou 1986; Deshayes 1968, 1969; Dyson 1968a, 1968b; Gordon 1951; Gürsan-Salzmann 2016; Mousavi 2008; Schmidt 1937; Wulsin 1932; Young 1967). The history, nature, and broader significance of these connections, however, remain in need of systematic examination.

In addition to these excavations, multiple surveys of the Gorgan Plain have documented a rich landscape of archaeological sites, comprised of hundreds of tell-settlements known to date to the third millennium BCE on the basis of their characteristic surface finds of grey-ware
pottery. This record of settlement – alongside the evidence for monumental architecture at
Tureng Tepe, advanced craft industries, well-furnished burials, and the regional and
interregional connections first noted by Rostovtzeff – has led scholars to hypothesize that the
region was home to some form of early complex polity, or polities, during the Bronze Age,
particularly between ca. 2500-2000 BCE. Indeed, for several decades, the Gorgan Plain has been
considered a constituent part of a broader social and historical trajectory comprising the
emergence of larger-scale communities and polities in Eastern Iran, the Persian Gulf, and the
Indo-Iranian Borderlands during the second half of the third millennium (e.g., Tosi 1977, 1979,
1986). Yet the inclusion of the Gorgan Plain in discussions of this broader pattern of so-called
“secondary state formation” (Kohl 2007: 214-225) in the “lands east of Sumer” (Potts, T. 1994)
has not relied upon a rigorous examination of either the Gorgan Plain’s record of involvement in
interregional trade and exchange or its settlement geography.

Consequently, any further developments in our understanding of the relationship
between these two domains must carefully evaluate how the social and political geography of
northeastern Iran changed over time and characterize this change in relationship to shifting
patterns of interregional interaction from ca. 3200-1600 BCE. Based on my examination of the
excavation and survey records pertaining to this time period, I argue in this dissertation that,
contrary to expectation, (1) the socio-political geography of this region is far more spatially and
temporally varied than previously assumed and (2) that the period of this region’s greatest
involvement in interregional trade is not only later than has been assumed but also correlates to
a period of political-geographic fragmentation rather than one of polity-formation or political-
geographic consolidation. On this basis, I conclude that our models of Bronze Age interaction
must be revised. In particular, we need to re-evaluate each of the “peripheral” regions whose
societies participated in the Bronze Age “World System” and find new explanations for their economic and political developments and interregional connections.

This study emerges from engagement with a central problem in the archaeology of the Ancient Near East, i.e., how to understand the non-literate, but complexly organized societies with whom Mesopotamia had demonstrable trade and exchange relations (Alden 1982; Barjamovic 2018; Beale 1973; Crawford 2013; Hallo 1992; Hawkins 1977; Hermann 1968; Kohl 1978; Kramer 1977; Lamberg-Karlovy 1972; Leemans 1960; Steinkeller 2013b; Potts, T. 1994). These regions, including the Persian Gulf, the Indus Valley, Central Asia, and the Iranian Plateau, clearly had non-trivial contact with Mesopotamia and each other during the Bronze Age. The nature, frequency, duration, and impact of this contact on political and social developments in these areas have, however, been disputed. For example, Mesopotamian texts suggest that many polities emerged and disappeared in neighboring regions during the third millennium (e.g., Elam, Shimashki, Marhashi, Tukrish, Meluhha, Magan, Dilmun, etc.), but these fragmentary attestations cannot reliably tell us why, how, or to what effect (cf. Laursen and Steinkeller 2017). Archaeologically, horizon-styles such as the Intercultural Style vessels (mid-third millennium) and the suite of objects now known to derive from the Bactria-Margiana Archaeological Complex which are found widely across the Ancient Near East (late-third to mid-second millennium) index not only complex systems of craft production outside of Mesopotamia but also a wide-ranging network of exchange contacts (Amiet 1986; Francfort 2019; Kohl 1975; Lyonnet 2005; Pittman 1984, 2018a, 2018b; Possehl 2002; Potts, D. 2008; Ratnagar 2004). Yet, these sources of evidence alone ultimately tell us little about the way these societies were organized and what the effects of these contacts might have been.
What we do know is that, in addition to external exchange relations, each such region had complex social and political geographies. Yet, in almost all cases, the settlement data available for many of these regions has been under-examined, and consequently either overtheorized or else left out of these discussions entirely. Key questions about regional demography and political geography have thus largely remained a matter of speculation. Moreover, our understanding of the timing of trade contacts between the regions constituting the Ancient Near East’s frontiers is limited due to poor contextual control or incomplete publications at many key sites, particularly Tureng Tepe, Gonur Depe, and Shahr-i Sokhta. As a result, while it is often possible to answer the question of what categories of exotic materials appear at a given site, it is often much more difficult to specify in which contexts they were found, stymying attempts to understand the social processes in which these objects were embedded, much less change over time. Thus, the correlation of trends in trade and interaction to transformations in social and political geography has suffered from a low level of precision.

Given the scope and complexity of the problems in this domain, however, the levels of relative accuracy that some scholars have nevertheless been able to achieve in their description of broad trajectories is quite remarkable. For example, a relatively stable and interdisciplinary consensus has cohered around a narrative that connects the emergence of early complex polities (sensu Smith, A. 2003) in different places at different times between ca. 3200-1600 BCE to the intensity of that area’s participation in interregional trade and exchange. These episodes of polity-formation are directly linked, whether causally or effectually, to phases of reorganization in the networks of interaction that tied the Ancient Near East together. These periods of change are understood to have differentially impacted the social and political formations of distinct regions across the Ancient Near East according to, *inter alia*, their location
vis-à-vis active trade routes, the desirability of the raw materials and/or commodities they produced, the administrative and infrastructural affordances and constraints of conveyance, as well as shifting configurations of social and political ties/conflicts between different groups of actors (Algaze 2005; Amiet 1986; Dales 1977; Lamberg-Karlovsky 1985; Lamberg-Karlovsky and Tosi 1973; Kohl 2007; Potts, D. 2008; Potts, T. 1994; Pittman 2018a; Ratnagar 2001, 2004).

In brief, this narrative posits that these interregional networks were first primed by the expansion of the Uruk cultural sphere in and beyond southern Mesopotamia during the Late fourth millennium BCE (Algaze 2005; Stein 1999). This resulted in the partial adoption of a suite of administrative technologies for the organization and control of primary production including seals, tablets, and a rudimentary system of notation in parts of northern Mesopotamia, Anatolia, and Iran (e.g., Lamberg-Karlovsky 1985). The transfer of this model of production and the exchange of the commodities whose manufacture it afforded is understood to have stimulated the formation of new political institutions in neighboring regions. In the case of Iran, this process began at Susa with the Proto-Elamite phenomenon, which is theorized to have spread this model of managed or administered craft production as far as Tepe Hissar and Shahr-i Sokhta. This event converged spatially and temporally with the formation of another interaction sphere originating in the Kopet Dagh piedmont in southern Turkmenistan. Together these two networks constituted an overland system of down-the-line exchanges between proto-urban centers (Lamberg-Karlovsky and Tosi 1973; see also Caldwell 1964). This period is understood to be one in which some large villages grew into proto-Urban towns and become more hierarchically differentiated through nascent divisions of labor between primary food-producers and administrative/craft-producing specialists.
In the following phase, the Persian Gulf supplanted the Iranian Plateau as the spatial focus of exchange, drawing together a much larger assemblage of actors into a principally maritime network (e.g., Laursen and Steinkeller 2017; see also Edens 1992). This period has been viewed as one in which political authorities, particularly in Mesopotamia, became directly involved in the procurement of commodities from distant sources (Potts, T. 1994). Moreover, this phase has been viewed as one in which early complex polities formed across many parts of the Iranian Plateau and beyond (Kohl 2007; Tosi 1986), indicated both by the increased size and complexity of the central sites in various regions (e.g., Tureng Tepe, Shahr-i Sokhta, Mundigak, Konar Sandal, and Gonur Depe) and the historical record of many named geographic-political entities known from Mesopotamian texts (e.g., Awan, Dilmun, Elam, Magan, Marhashi, Meluhha, Shimashki, and Tukrish, among others).

The final phase is characterized by a complete reconfiguration of trade networks, with a greater emphasis on Mediterranean circuits of exchange. This shift purportedly caused the “collapse” of the polities in the lands east of Sumer and the abandonment of their urban centers, which had formed and thrived during the preceding period (e.g., Kohl 2008; Kohl and Lyonnet 2008). Paradoxically, however, this final phase is marked by the emergence of trans-Caspian trade linking Central Asia to Assyria and Anatolia across the northern Iranian Plateau (i.e., the emergence of the “Great Khorasan Road”, see Barjamovic 2018) and is associated with the emergence of the khanate in Southern Central Asia as an enduring socio-political structure (Hiebert 1994; Hiebert and Lamberg-Karlovsky 1992).

With respect to this narrative, while the evidence for different regions’ participation in such trade networks at various points in time is irrefutable, the role that this exchange played in polity-formation is more often assumed than demonstrated. Indeed, the formation of long-
distance trade networks may turn out to be as much a result as a cause of polity-formation. To untangle these historical knots, the questions that must be asked directly are: (1) what is the evidence for polity-formation in the regional settlement records of these areas? and (2) to what extent can we discern whether interregional trade, driven by Mesopotamia or not, affected the formation and transformation of these polities qua settlement systems? At the risk of undue repetition, the point must be clarified and stressed: for many of the regions that constituted the Bronze Age World System, the evidence required to answer such questions is fragmentary, incompletely published, or both — consequently, our understanding of the organization of the societies and polities that took shape on the Iranian Plateau across this interval has remained limited.

Nevertheless, two primary models are available for understanding the organization of these societies and polities, especially during the Persian-Gulf focused phase of trade, exchange, and polity-formation: Tosi’s “proto-state structures” (e.g., 1977, 1979, 1986) and Kohl’s “secondary states east of Sumer” (Kohl 2007). While each model invokes a range of parameters for discerning the presence of such socio-political units, they both ultimately rely on the same data, yet draw opposite conclusions. In Tosi’s model, the polities of Bronze Age Iran are understood to be as hierarchical, as elite-dominated, and as territorially-controlling as contemporaneous Mesopotamian polities, whereas in Kohl’s model, these units are seen as much less nucleated, less densely populated, and less hierarchical. Crucially for this investigation, both Tosi and Kohl make claims regarding regional settlement distributions to support their models; Tosi argues for strongly centralized and ranked settlement systems, whereas Kohl argues for more heterarchical and decentralized settlement systems. Importantly, both models tie this episode of polity-formation to the respective regions’ increased
involvement in interregional networks of trade, stimulated by Mesopotamian demand for raw materials sourced in the regions where these polities took shape.

I seek to resolve this concrete empirical issue by expanding the evidence-base we can draw upon to understand the history of organizational transformations of these societies. My approach extends beyond the set of spectacular features known from the large “central” sites that have typically been the focus of excavation to examine these processes from a regional perspective. To do so I have drawn on a vast but fractured record of partially-published and under-analyzed survey data to reconstruct the social and political geography of the Gorgan Plain during the Bronze Age. In addition, I examine how the changes in the political geography of this region over the interval of ca. 3200-1600 BCE correlate to changes in the Gorgan Plain’s trade relations with its neighbors near and far. This investigation intersects with a number of literatures on the relationship between spatial and social organization, polity-formation, geographic models of social and political developments in Bronze Age Iran and Central Asia, and narratives of longue durée connections between the various regions of the Bronze Age “World System.” My analysis deploys a set of synthetic methodologies for integrating diverse sets of spatial and culture-historical data, regional ceramic chronologies, archaeological demographic analysis, and spatial modeling. Based on my results, I critique the causal link between elite participation in long-distance trade and polity-formation that is often invoked in the literature.

Thus, the broadest theoretical questions raised in this dissertation pertains to how long-distance trade networks and polity-formation are related to each other. Does incorporation into long-distance trade networks drive the formation of early complex polities? Or is it the case that the causal arrow points the other direction, i.e., that the formation of long-distance trade networks depends upon the emergence of early complex polities? To what extent are the two
processes co-constitutive? Answers to these questions are of wide relevance to the study of early polities around the world.

Concretely and more narrowly, in this study I ask: how did the social and political geographies of the Gorgan Plain change in terms of territoriality and settlement ranking ca. 3200-1600 BCE and how did these transformations relate to the Gorgan Plain’s shifting trade and exchange relations with other regions over this interval? This question can be broken down into two more specific queries that consider the social, political, and historical stakes of the archaeological evidence of the Bronze Age of the Gorgan Plain: (1) what is the evidence in the settlement record for the emergence of “proto-state structures” (i.e., Tosi 1979; 1986) or “secondary states” (i.e., Kohl 2007) in Eastern Iran, Southern Central Asia and Afghanistan during this period? and (2) how did the Gorgan Plain participate or not in broad patterns of trade, exchange, and interaction across the “lands east of Sumer” over this interval (e.g., Potts, T. 1994)?

While there is evidence for the emergence of large-scale communities during the mid-third millennium in the Gorgan Plain, the regional settlement demography of the region is complex and varied across space and time. My work shows that there are distinct sub-regional trajectories in the organization of settlement and that the dominant trend is toward increasing heterarchy over time, supporting Kohl’s empirical model over Tosi’s. With respect to regional settlement demography, understood in terms of the number and aggregate size of sites, as well as the relative degree to which sites of different size-classes contributed to the overall count and aggregate occupied area of sites, I observe growth from the Chalcolithic to a population peak during the Early Bronze Age, a consolidation of trends from the Early Bronze Age to Middle Bronze Age, followed by fragmentation and instability in the Late Bronze Age. Over time, I
document an increase in the relative proportion of the number of large villages (i.e., sites sized between 3 and 8 ha) along with a concomitant increase in the relative proportion of the contribution of large villages to the overall aggregate occupied area of all settlements. I understand this as a greater degree of heterarchy in settlement systems, which are less dominated by large central sites over time. There is also a subtle, but significant shift in settlement location toward the south over time, perhaps related to climate change, shifting patterns of resource use, or a feedback loop involving both factors (see Mousavi 2008).

In terms of trade, broadly, during the early phase of the sequence outlined above (i.e., the “Plateau Network,” ca. 3200-2800 BCE), the Gorgan Plain’s involvement is at best indirect, with its connections mediated by neighbors such as Tepe Hissar and the sites of the Kopet Dagh piedmont. In the middle phase (i.e., the “Gulf Network,” ca. 2800-2200 BCE), the Gorgan Plain’s involvement in this circuit of exchange is difficult to discern, but appears to be similar to that of the preceding period; if anything, the connection to the Plateau appears to weaken as the connection to the Kopet Dagh strengthens. In the final phase (i.e., the emergence of the “Great Khorasan Road,” ca. 2200-1600 BCE), the Gorgan Plain is intensively involved in multifaceted interregional exchanges involving styles of dress and adornment, luxury vessels, metal tools and weapons, and a suite of fine goods and vessels made from semi-precious stones, as evidenced by finds such as the figurines from Tureng Tepe, the Astarabad Treasure, and the Bazgir Hoard (Abbasi 2016; Rostovtzeff 1920). On this evidence, the Gorgan Plain appears to have figured as an important intermediary zone between Bactria and Margiana and all points west, along a route ultimately leading to the Central Plateau, across the Zagros, to upper Mesopotamia and beyond. Curiously, this final phase correlates to a period of political-geographic fragmentation in
the Gorgan Plain, marked by the greatest number and variety of multi-community settlement groups across the plain.

In the remainder of this chapter, I introduce the main themes and conceptual domains that this dissertation engages with to situate these questions and conclusions in a broader framework. Finally, I will provide a roadmap to the substantive chapters that comprise this investigation of the relationship between trade and politics in Bronze Age Iran.

1.1 Trade and Polity Formation in the Ancient Near East

That trade is seen as a constitutive feature of the formation of early complex polities is an idea with a long history; the terms, features, and implications of the debate over this relationship have, however, changed little since their original explicit formulation in the synthetic works of V. Gordon Childe (1950, 1952, 1954, 1956). An illustration of what is at stake can be seen, for instance, in James Scott’s recent history of the earliest states, where he argues that the formation of the earliest city-states in Mesopotamia was only possible “by virtue of products from higher altitudes,” i.e., the Iranian Plateau, which provided the lowland riverine populations with “stones, ores, timber, limestone, soapstone, silver, lead, copper, grindstones, gems, gold, and, not least, slaves and captives” (Scott 2017: 243). My central concern here is not the question of whether trade in raw materials was necessary to support the craft industries that were vital to the emergence of early complex polities, but rather, the degree to which such trade represents a sufficient condition for polity-formation. It therefore behooves us to review Childe’s original formulation of this relation and to sketch out how this framework has been propagated and modified in the decades since its first articulation.

The thesis that links polity-formation to trade is laid out most clearly in Childe’s classic 1950 article The Urban Revolution, in which he presents the famous ten criteria for
distinguishing the earliest cities from older and contemporaneous villages, i.e., the harbingers of a new stage in the economic and political evolution of society in which we are still living today, namely the state system (Childe 1950). Childe’s ninth criterion for discerning the Urban Revolution posits that regular long-distance foreign trade was a necessary feature of early civilizations because the first city-states, located in the southern Mesopotamian alluvium, were dependent upon the acquisition of raw materials to support their craft-industries. But how did these nascent polities come to be dependent upon exotic raw materials?

In a large measure, this dependence was both created by and constitutive of the emergence of the division of labor in society between agricultural producers and non-food-producing specialists of different kinds. This separation and differentiation of social roles began to occur in fits and starts between ca. 3500-2500 BCE, as communities and nascent polities in the southern Mesopotamian alluvium managed to both produce and concentrate an agricultural surplus. It was this surplus that made it possible to support new classes in the population, namely priests, administrative officials, and an array of craft-producers (Childe 1952). The maintenance and social reproduction of these new classes in society was dependent upon the management and circulation of this agricultural surplus through various redistributive mechanisms. The key point here is that while the alluvium is rich in certain resources, namely clay, reeds, and the products of agriculture and animal husbandry, it is poor in stone, timber, metal, and other prized materials that came to serve as inputs in emerging craft industries. Thus, these materials had to be “imported” from neighboring regions where these resources are found in comparative abundance. In Childe’s framework, the need to pay for the importation of necessary raw materials drove the further concentration of the agricultural surplus, which became a self-perpetuating process whereby separation between primary food producers and
non-food-producing specialists increased and solidified (Childe 1952). Moreover, this process resulted in not just a division of labor, but also a diversification of occupations within the non-food-producing classes, including merchants, lumberjacks, miners, and transport workers, who were all required to sustain this system of material flows, whether it was directed by institutional authorities or not (Childe 1954).

For the purposes of his broader theoretical intervention, Childe argues that the division of labor of society into different classes is a hallmark of both urban and state-level society. More germane to our purposes here is the point that the division of labor in early complex polities was intimately connected to the initiation of organized international trade because the craft producers supported by the agricultural surplus required exotic materials to continue producing their specialized crafts (Childe 1957). As this process continued to unfold, what had at first been considered sumptuous exotic luxuries increasingly came to be economic necessities, both for the reproduction of elite status and also for maintaining the division of labor as such, driving the continued concentration of social surpluses. Thus, the accumulation and disposition of surpluses heralded both the first emergence of entrenched stratification as well as class-conflict between primary producers and a nascent elite. This is the equation by which the acquisition of necessary raw materials not available in the Mesopotamian alluvium came to be seen as an essential element in the transformation from a Neolithic to an urban form of life in Sumer, i.e., the basis for the “state” form of society (Childe 1954; see also Wilkinson, T.C. 2018).

With respect to so-called “secondary state formation,” this relationship between agricultural surplus, the division of labor in society, and the acquisition of raw materials not only played a role in Mesopotamian polity-formation, but also played a key role in propagating the “Urban Revolution” outward. That is, once material flows were organized according to the
circulation of concentrated agricultural surpluses as a form of early fungible capital, all of the neighboring communities along the routes by which the materials were conveyed were drawn into this process. In Childe’s formulation, these communities could not themselves produce a sufficient surplus to support their own craft specialists, but rather, used whatever surpluses they had to purchase materials in transit. Childe points specifically to the “lapis” caravan route across northern Iran — i.e., from Giyan to Rayy to Hissar — noting that it was perhaps worth it for the Mesopotamian merchants to bring along manufacturers to service the “barbarians” living in the villages along the route, for no other reason than to offer bribes in exchange for “secure unmolested passage” (Childe 1954).

Childe hypothesized that the process unfolded as follows. First, contact with Mesopotamian traders would create the possibility for a local chief or headman to become a full-time specialist in his own right, i.e., a non-food-producer, no longer dependent on the tribute of fellow tribesmen, but rather having an economic base rooted in participation in this trade and/or the organization of the extraction of raw materials. The local chieftain’s court would thus come to reproduce, albeit on a smaller scale, a center for the concentration of a surplus, and therefore a new center for demand for raw materials. As Childe argues, from 3000 BCE onward, across Iran and other regions adjacent to Mesopotamia, this drove the transformation of some villages into prosperous towns by virtue of their location near sources of raw materials or along trade routes. Though these towns were able to support specialist craftspeople and depended on imported raw materials, they did not develop a system of writing, and therefore were not “cities,” even as they “partook to some extent in the new urban economy” (Childe 1954).
Thus, we see the seeds of both Tosi and Kohl’s models in Childe’s thought, insofar as Childe argues that all of the early Old-World states that formed subsequent to Egypt, the Indus, and Mesopotamia drew upon the capital first accumulated in these primary centers (Childe 1950). To wit, the communities rich in the natural resources desired by the centers could access the fruits of these surpluses of resources and labor-power via exchange. Secondary state-formation in peripheral communities was therefore seen as a kind of hub-and-spoke process, radiating ever-outward as nascent elites in these communities used the forms of proto-capital acquired via exchange with already established polities to support full-time craft and administrative specialists and ultimately their own material surplus. This sequence of acculturation was propagated down-the-line as secondary polities repeated the process, incorporating new areas into this system of exchange (Childe 1957).

The basic premises of this thesis have proven remarkably stable over time. The role of trade and exchange in the formation of archaic states and early complex polities has persisted as an important area of theoretical and methodological elaboration, especially in the areas of interaction studies (Parkinson and Galaty 2010; Schortman and Urban 1987, 1992; Smith, M.L. 2013), peer-polity interaction (Renfrew and Cherry 1986), and world-systems analysis (Edens 1992; Frank 1993; Hall et al. 2011; Kardulias 2007; Kohl 1978; Ratnagar 2001). In a pivotal piece, which is widely recognized as having set the agenda for all subsequent studies of the relationship between trade and polity formation, Colin Renfrew argues that “the evolution of civilization itself, may be understood in the light of the exchanges within a civilization” (Renfrew 1975: 33). More to the point, his article, and the volume in which it appears, represent the conceptual bridge from Childe to Tosi and Kohl (Sabloff and Lamberg-Karlovsky 1975). Renfrew and other contributors to the volume created a consensus which posited that once the
civilizations of Mesopotamia and Egypt had developed their major institutions and technologies, they set in motion processes that would continue until the phase-shift represented by the Industrial Revolution. These institutions, technologies, and processes that characterize our modern industrial world include the rule of law, urban life, city-states, empires, and so on; tellingly, in Kristian Kristiansen’s account the first item in this list is “international commodity trade” (Kristiansen 2018: 1-2; see also Polanyi 1944; Polanyi et al. 1957; cf. Finley 1973).

One of the main substantive contributions of Ancient Civilization and Trade was to provide greater specificity with respect to the social mechanisms underpinning the Childe’s diffusional model. For example, in his contribution, Renfrew argued that the formation of secondary polities was driven by * emulation of more complex neighbors *. Renfrew’s model posited that a “civilization” was comprised of “early state modules,” i.e., a group of neighboring central-places interacting with each other; importantly, one of the main factors in the formation of nascent polities — i.e., these central-places and their territories — was the incorporation of exogenous flows of commodities into the already on-going internal circulation of goods within and between these early state modules. Renfrew argues that insofar as external trade brought into circulation exotic prestige artifacts which conferred status on those who controlled the supply, these conditions afforded the emergence of a certain type of social hierarchy where one had not been previously present, or else, had been underdeveloped. Renfrew’s explanation for this is that because with goods comes information — i.e., a set of social values and behavioral protocols — that these objects, ideas, and practices were more easily assimilated because of the sophistication of the source society’s products and the prestige they bestowed (Renfrew 1975; see also Baines and Yoffee 1998).
Renfrew differs from Childe in one key respect, however, ultimately rejecting Childe’s diffusional distinction between primary, secondary, and tertiary state-formation, preferring to frame the development of “civilization” in terms of the interrelations between cultural sub-systems within a given set of early state modules — i.e., subsistence, technology, social relations, symbolism, and trade (see also Hall et al. 2011; Kohl 2008). Renfrew argues that what is more important are multiplier effects, by which “positive mutual interactions between subsystems” can result in profound growth and deep structural transformations, such as the emergence of cities and, by extension, polities. Renfrew concludes that trade will only be a major force for change in any other domain to the extent that it becomes entangled in a process of mutual positive reinforcement with another of the social subsystems (Renfrew 1975: 36). In Renfrew’s estimation, “civilization” has four constituent components: (1) a highly structured and differentiated society with specialist production, (2) some kind of durable authoritative ruling apparatus, (3) a developed system of explicit beliefs, and (4) (sometimes large) agglomerations of population. Renfrew’s final contribution to the re-working of Childe’s thesis posits that the reciprocal interaction between trade and the other subsystems of such an emergent civilization is only possible “when the traded commodity achieves a value or importance in the social system, often in terms of prestige. This is an instance of the symbolic equivalence of material and social values [...] which lies at the root of many applications of the multiplier effect” (Renfrew 1975: 37; see also Hayden and Schulting 1997).

Another perhaps less appreciated contribution to Sabloff and Lamberg-Karlovsky’s volume comes from Malcolm Webb, who argues that Childe’s distinction between primary and secondary states is really only useful in understanding the temporal relations of the development of early complex polities; in Webb’s perspective, much of the process of growth in
these societies was essentially internal. In his view, the local leaders of these communities took advantage of the varying opportunities (i.e., newly available/exploitable resources) and responded to the various pressures presented by contact with existing states (i.e., direct threat of conquest or subjugation) to fashion for themselves a new avenue to greater levels of power (Webb 1975: 169; see also Frachetti 2012: 19; Renfrew 1986). Thus, Webb synthesizes Childe’s and Renfrew’s theses into a theoretical proposition, that in technologically and economically expanding societies — i.e., nascent early complex polities — the practice of inter- and intra-tribal trade leads to the gradual concentration of economic and political power in a small number of individual officials, who over time become a more permanently entrenched ruling class (see also Flannery 1968; Kardulias 2007; Spencer 1993). This was so because commercial wealth came to serve as a source of power that could override traditional loci of authority. Webb derives the conclusion, contra Renfrew, that trade is effective as a “state-forming mechanism” in the case of secondary states, but only if that trade is in “relatively massive amounts” or “which involved a higher order of luxury and craft production,” that is, in goods necessarily originating in an already existing state (Webb 1975: 179-181).¹ Only under these conditions would the force of capital concentration be strong enough to override whatever pre-existing social mechanisms were in place that had previously inhibited the development of social stratification (ibid; see also Chase-Dunn and Hall 1993: 855).

The mechanism for this is that elites who seek to maximize their power and wealth within a given community often do so by creating trading, marriage, ideological, military and other ties to the elites of other communities (Hayden and Schulting 1997: 51; Kardulias 2007).

¹ Parkinson and Galaty argue that secondary states may also form “as remnants of larger entities that broke up after an initial fluorescence,” i.e., not just “as competing polities that developed at the edge of more mature complex societies” (Parkinson and Galaty 2007: 124).
As all elites seek to distance themselves from ordinary community members, they purposively take actions that position themselves as uniquely capable of acquiring items and accomplishing things that others cannot. One form of this is the acquisition, control, and or production of highly crafted labor-intensive prestige objects that are difficult to obtain. Elites seek out other elites with similar attitudes and goals, thereby establishing symbiotic relations in which each party supplies the others with “exotic materials and esoteric knowledge” used to impress people in their respective communities through feasting and other redistributive processes that enhance their power within their own particular social and political context (Hayden and Schulting 1997: 76; see also Hall et al. 2011: 257). Moreover, at a regional scale, elites form “fraternities,” in which the “ability to acquire and properly use certain symbols and rituals is a prerequisite for membership” (ibid; see also Brumfiel and Earle 1987; Flannery 1968; Freidel 1979; Kardulias 2007; Renfrew and Cherry 1986; Kipp and Schortman 1989; Shennan 1986; Smith, M.L. 2013). Thus, the “Near Eastern model of urban civilization” can be conceived of as a “contagious process,” in which communities and territories were slowly incorporated into this new way of life through the expansion of trade networks, initially driven by the need for exotic raw materials (Wilkinson, T.C. 2018).

Today, even as we have the benefit of several decades of additional research and hindsight, the fundamentals of Childe’s thesis persist in our understanding of state formation in Western Asia. Take for example Toby Wilkinson’s chapter in a recent volume explicitly dedicated to evaluating the legacy of Sabloff and Lamberg-Karlovsky’s SAR seminar (Wilkinson, T.C. 2018; see Kristiansen 2018). As Wilkinson writes, research into the “Uruk Phenomenon” has conclusively shown that trade in search of raw materials during the fourth millennium connected the Sumerian “heartland” to regions far afield in a highly successful urban system.
Nevertheless, the direct footprint of Uruk material culture was limited to Iraq, Syria, Khuzestan, with some smaller “hybrid” outposts in Anatolia and the Iranian Plateau. The distribution of particularly important markers, such as beveled-rim bowls, may be more easily explained by the spread of a bread culture rather than as a complete adoption of an Urukian way of life (Potts 2009; Wilkinson, T.C. 2018: 43). Indeed, until the mid-third millennium (ca. 2600 BCE), most of the peoples living in regions adjacent to Mesopotamia continued to live in smaller scale settlement systems, organized differently than the urban system that was developing in the Tigris-Euphrates interfluve. Wilkinson notes that this was despite the fact that the adjacent regions had access to the same craft technologies as the urban groups – indeed, one major advance in recent scholarship has shown that in some cases the primary innovators of these technologies were actually in the “peripheral” regions themselves, particularly in the case of copper-metallurgy (e.g., Thornton 2009).

Nevertheless, after this juncture, the “urban model” seemingly “suddenly spills over into a whole range of different new regions” including Anatolia, Central Asia, Iran, and the Indus (Wilkinson, T.C. 2018: 43-44; cf. Thornton 2012). Each region had its sui generis characteristics of course, with unique trajectories of and reasons for “urbanization” in each case. Yet, even considering these local particularities, scholars are still wedded to the notion that there was some “global” mechanism that spurred the more or less “synchronized contagion of urban life” during the mid-third millennium across this zone. The answer that Wilkinson proposes for this, differing ultimately little from Childe, is an “explosion in metal consumption in Mesopotamia” (Wilkinson, T.C. 2018: 43-44). This “explosion” is linked to, *inter alia*, the emergence of a bourgeois urban class and/or the use of silver as a regularized medium of exchange, both of which could have “driven the incentive to neighboring communities to intensify their interaction.
with Mesopotamia” and thereby through emulation and attempts to control the flows of these metals adopt the urban model (Wilkinson, T.C. 2018: 43-44).

Wilkinson explains this through the possibilities that the circulation of metals created for the disembedding and abstraction of power relations from older networks of “rights and obligations” through the accumulation of “redeployable wealth in physical form” (Wilkinson, T.C. 2018: 48-49). This mobilization of wealth made possible “investment” in industrial production, at this point primarily the production of woolen textiles, which created new supply and demand dynamics. In Wilkinson’s view, this increased circulation of metals and textiles reconfigured the entirety of interregional trade and of social relations in all of the societies involved, because these materials and the rituals that were involved in their use were focused on the public performance of rank. Thus, the concomitant desire for these “visual tools of social manipulation” drove increasing demand for metals in a centrifugal process that expanded the domain of Near Eastern “civilization” through trade (Wilkinson, T.C. 2018: 49; see also Baines and Yoffee 1998; Chase-Dunn and Hall 1993: 855; Parkinson and Galaty 2007).

My interest in this dissertation is not necessarily to argue that these models are prima facie incorrect, though the persistence of the Childean framework is a complicated matter that deserves its own detailed comparative analysis, especially in light of recent lines of argumentation that have convincingly suggested that Ancient Near Eastern trade networks were not nearly as elite-dominated as previously argued (e.g., Barjamovic 2018; Larsen 1987; Smith, M.L. 2013; cf. Possehl 2002). Nevertheless, a rigorous theoretical examination of the causal factors of “secondary state formation” is only partially possible at present, because so many of the regions that might serve as case studies are so poorly understood relative to Mesopotamia. In order to evaluate models of secondary state formation, we must begin by establishing a
region’s own internal trajectories of development as a first step toward apprehending system-wide dynamics. Here I will focus on evaluating the Gorgan Plain as one of these regions.

To illustrate, while it is true that the Gorgan Plain experienced a period of territorial consolidation into what might be considered polities during the peak of “the Age of Exchange” of the mid-third millennium (Amiet 1986), the nature of the region’s interregional connections is very poorly understood at this time. There are numerous connections to neighboring regions during this time, principally observed in the distribution of exotic materials such as silver and lapis, as well as iconographic and ceramic parallels, but it is not until the very late third millennium and early second millennium that the Gorgan Plain truly becomes involved in the kind of (presumably) elite-driven interregional trade discussed by all of the authors introduced above. Curiously, this interval is a time of political-geographic fracture in the region, with the greatest number of “polities,” which are typically not hierarchically organized, at least in terms of their settlement distributions. One interesting possibility is that ca. 2000 BCE, the Gorgan Plain might have constituted a set of “early state modules” akin to Renfrew’s model of Middle and Late Bronze Age Aegean polities (e.g., 1986), but I contend that this process was more likely related to the Gorgan Plain’s incorporation into the cultural world of the Bactria Margiana Archaeological Complex, rather than to Mesopotamian cultural spheres.

This assessment will likely soon need revision, as we still await the final publication of Jean Deshayes’ excavations of the Bronze Age layers at Tureng Tepe. In many regards, these key records stand to completely revolutionize our understanding of the region, and there is particular promise that J. Bessenay-Prolonge’s work will clarify the early and middle third millennium connections between the region and its neighbors (2018), which at present are principally understood through ceramic parallels or else are the subject of allegation (e.g.,
Cleuziou 1986; Deshayes 1968, 1969a). Either way, one thing is quite certain; under current geopolitical conditions, progress can only be made toward answering these questions through a judicious (re-)use and augmentation of already-available archaeological data.

1.2 Structure of Investigation

Examination of the relationship between trade and political organization in the Bronze Age Gorgan Plain requires a number of distinct considerations, ranging from theories of political landscape and political geography (Chapter 2), to models of interaction in Bronze Age Iran (Chapter 3), methods for reconstructing patterns of political geography using legacy data (Chapter 4), and comparative ceramic chronologies (Chapter 5), as well as regional settlement demography (Chapter 6), and territorial and rank-size modeling (Chapter 7). With respect to the primary terms of the relationship under investigation – i.e., trade and political organization – my primary intervention involves assessing the goodness-of-fit between models and the evidence that they are based upon.

First, I describe, quantify, and analyze landscapes of settlement without seeking to correlate specific spatial and demographic configurations to particular “types” of society, preferring the analytically flexible terms of “community” and “polity” defined as clusters of settlements in the case of the former and groups of settlement clusters in the latter. While this approach has its drawbacks, its strengths are that it both sidesteps theoretically overdetermined concerns about so-called states, chiefdoms, khanates, etc., and avoids distortions resulting from myopic focus on large central sites and long-distance trade as prime movers for the development of so-called “political complexity.” This approach fosters an alternative empirical basis for reasoning about changes in settlement organization over time in relation to the timing
and effects of contact between the different regions of the Bronze Age “World System” (Algaze 2005; Chase-Dunn and Hall 2018; Frank 1993; Kohl 1978, 1979; Ratnagar 2001; Warburton 2014).

I model landscapes of settlement using two sets of tools. The first comprises description and quantification of changes in settlement location and size over time. The second uses multi-scalar and hierarchical cluster modeling alongside rank-size analysis, which I take as indices for territorial and socio-political organization, respectively. I show that while Tosi’s model accounts for some aspects of the Gorgan Plain’s Bronze Age settlement record, his focus on large central sites as the demographic anchors for multi-community forms of social organization distorts our understanding of the number of such units, their size, and the distribution of populations within them. Instead, when we base our understanding of territoriality in movement and the thresholds of routine interaction that could possibly comprise a community or a polity, a different and more diverse picture emerges. Simply, Tosi is more or less correct to have predicted a phase of territorial consolidation in the mid-third millennium, and one of fragmentation in the late-third millennium, but the implications of this pattern need to be rethought in light of their temporal relations to the patterns of interregional connectivity.

Second, I argue that while the Gorgan Plain was involved in interregional flows of materials at nearly every point across this 1600-year interval, it is only at the end of the sequence that there is any solid evidence for direct or intensive participation. Prior to this, the Gorgan Plain appears to have only been involved indirectly, with its interregional contacts mediated by Tepe Hissar on the one hand, and by the sites of the Kopet Dagh Piedmont on the other. During the late third and early second millennium, this situation changes drastically. At this juncture, the Gorgan Plain is still most closely connected to its two adjacent neighbors, but for the first time there is evidence of more than just incidental down-the-line trade in exotic
materials. Thus, it appears that, contrary to expectation, the period in which the Gorgan Plain experiences the greatest volume and intensity of interregional trade correlates to a period of geographic instability and fragmentation, rather than one of stability and consolidation. This result not only stands in contrast to Tosi’s model, but it also raises questions about the entire equation of increased volumes of trade being correlated to increased political complexity discussed above.

The case of the Gorgan Plain has provoked a re-thinking of many domains, whether theoretical, methodological, and culture-historical. This primarily stems from the particulars of the settlement record of the region, rendered largely inaccessible to several generations of researchers between ca. 1980-2005, which has meant that a considerable amount of effort had to be put into data rehabilitation prior to the re-use of these records. More than this, the middle-range theorization and preliminary descriptions and explanations of this record had to be accounted for in both directions, i.e., understanding where these ideas came from (see above) and how the field has and has not progressed in the time since Tosi proposed his model of proto-state structures between 1974 and 1986. To be clear, in working with legacy data, one must also work with legacy ideas. In what follows, I seek to demonstrate what is required to continue unfinished work left behind by prior generations, especially when there has been a break in the chain of disciplinary reproduction, and also to foreground the morass of challenges that face researchers as they attempt to rehabilitate orphaned collections, synthesize legacy data, and answer anthropological questions using information that was not necessarily intended to be used for such purposes.

In Chapter 2, I examine the conceptual underpinnings of two different frameworks for understanding the spatiality of communities and polities through the investigation of regional
settlement patterns: the political landscape and political geography. The highest-order conceptual question I seek to answer in this chapter pertains to how we should understand the relationship between site distributions and socio-political organization. This inquiry is motivated by the deployment of several different indices that are commonly used to detect the formation of early complex polities, versions of which appear in both Tosi and Kohl’s models of polity-formation in Bronze Age Iran. Whether these societies are understood as “proto-state structures,” “secondary states,” “early complex polities” or otherwise, a key piece of evidence that scholars have sought to identify are territorially-expansive settlement systems focused on one or more urban or “proto”-urban centers ruling over an agrarian hinterland. I show that this approach misses the mark on theoretical grounds, and that an alternative framing of the structure of settlement is required as the empirical underpinning of ancient social and political geography. Instead, I seek to identify social and political units using a definition of social and political geography as patterns of settlement grouping at different scales and orient my analytical focus on measuring changes in the spatial organization of these settlement groups over time.

In Chapter 3, I review how the Gorgan Plain fits into the world of the Ancient Near East. As I show, the relative importance of different regions and their relationships to their neighbors over time has been an enduring theme in Near Eastern Archaeology, whether the objective is to correlate known archaeological cultures to textually attested geographico-political entities or to understand the flow of commodities and raw materials across long distances. In the final analysis, I show that the Gorgan Plain is most closely connected to its nearest neighbors in the north-central Iranian Plateau to its south and to the trans-Alborz zone that includes the Sumbar, Atrek, and Kashaf Rud Valleys, the Kopet Dagh Piedmont, and Margiana to its east. While there
is still a tremendous amount of work to be done to clarify the details of particular historical junctures, especially with regard to the mid-third millennium, what I have demonstrated is that it is only toward the end of the ca. 3200-1600 BCE chronological sequence that the Gorgan Plain appears to have intensive and more direct linkages to more distant regions. These connections can be viewed through three key pieces of evidence dating to the final centuries of the third and beginning of the second millennia BCE: traditions of monumental architecture, anthropomorphic terracotta figurines, and hoards of high-quality metal and stone tools, vessels, weapons, and adornments (i.e., Bazgir and the Astarabad Treasure). Considering the past confusions over the dating of these parallels, which typically have placed them several centuries earlier, the intervention I make in this chapter represents a major departure from previous scholarship, but one which will have to wait for the full publication of Jean Deshayes’ excavations to be further substantiated. At any rate, it is significant that the period in which the Gorgan Plain is most intensively involved in interregional interaction, exchange, and perhaps trade, follows rather than precedes or coincides with a period conventionally understood to be one of polity formation.

Chapter 4 discusses the processes by which I digitized and integrated heterogeneous sources of legacy survey data into a relational geospatial database to afford the analyses presented in Chapters 6 and 7. This procedure involved systematic re-analysis of both temporal and spatial variables in the records. With regard to chronology, I corrected the third millennium ceramic sequence of the region in order to date the surveyed sites, and with regard to settlement distributions, I cross-referenced reported site locations in Google Earth imagery to resolve inconsistencies between sources and to re-measure site sizes. This chapter draws on a burgeoning literature within archaeology concerned with synthetic and integrative research,
legacy data rehabilitation, source criticism, and comparative survey. Each of these domains is part of a larger movement in scholarship concerned with Big Open Geospatial Data. I also introduce the specific modeling techniques that I use to analyze the regional settlement record according to the political-geographic model developed in Chapter 2, namely exploratory data analysis, an augmented site-catchment protocol used to identify settlement clusters and groups of settlement clusters, as well as rank-size analysis.

In Chapter 5, I tackle one of the central problems in the archaeology of the Gorgan Plain, i.e., the absence of a coherent and stratigraphically anchored regional chronology for the pre-Iron Age periods. This lacuna in the scholarship has prevented synchronization of the relative chronology of the three key excavations in the Gorgan Plain (i.e., Tureng Tepe, Shah Tepe, and Narges Tepe), as well as their ties to Tepe Hissar, and thus the wider world beyond. In this chapter I re-examine previously published chronograms and perform an analysis of both reported and recorded ceramic parallels, alongside Bayesian radiocarbon modeling. On the one hand, these analyses are important for our general understanding of the third-millennium culture-history of the region, but on the other hand, they are absolutely necessary for dating the published and unpublished surface ceramics associated with the two surveys that present re-analyzable chronological material (i.e. Arne and Shiomi).

In Chapter 6, I use exploratory data analysis to identify trends in settlement patterns in terms of the change over time in site counts, location, and size, as well as the changing proportional contribution of different size-classes of sites to the total count of sites and the total occupied area of sites over time. Through this analysis, I re-evaluated the basic parameters of Tosi’s settlement model within the traditional culture-historical framework based on the Three-Age System and the sequence of cultural strata at Tureng Tepe. In a gross sense, Tosi’s
predictions about the Chalcolithic’s settlement demography appear to have been more or less correct, but his model mischaracterizes the following three periods. I show that the peak period of settlement, in terms of number of sites, aggregate occupied area, and greatest number of “centers,” occurs during the Early Bronze Age, i.e., one phase and several hundred years earlier than predicted. By contrast, the Middle Bronze Age represents the beginning of a demographic shift away from the dense occupation of the Early Bronze Age, with a major reduction in the number of sites and the overall occupied area, but the beginning of a trend of a greater proportion of the population living in large villages (i.e., sites sized 3-8 ha). Moreover, the Late Bronze Age, far from being a period of collapse and dispersal appears as a continuation of trends established in the Middle Bronze Age. Nevertheless, as introduced in Chapter 5, there are some serious problems with both the precision and accuracy of this chronology, which will need to be re-examined in the future; only with reference to the surface ceramics of the University of Hiroshima survey will any of these issues be properly resolved.

In Chapter 7, I model patterns of regional settlement using two different clustering methods alongside rank-size analysis. First, I employ Kintigh’s reformulation of Dewar’s model of simultaneous settlement to identify phases of “strict contemporaneity” of settlement at the interfaces between two periods (Dewar 1991; Kintigh 1994). I argue that such a temporal framework is fundamental to the felicitous identification of regional-scale trends in settlement and occupation because it allows us to avoid the palimpsestic conflation of synchrony and diachrony in long culture-historical periods defined on the basis of changing surface ceramic types. I evaluate Tosi’s model of settlement, showing that his center-focused model of political geography results in two fundamental problems. The first problem is that using his territorial parameters, the majority of settlement clusters and groups exhibit a primate rank-size
distribution, and the second is that his parameters leave a plurality of sites out of the equation, resulting in a distorted picture of overall settlement dynamics. The parameters in Tosi’s model that create these issues are: (1) the size thresholds used to designate sites as “centers,” which are too large for this case, and (2) the distance thresholds that Tosi uses to delineate these center-focused territories. Another concern regards translating Tosi’s narrative description of settlement distributions into rank-size graphs. It is quite clear to what he is referring by his descriptions of the patterns predicted during the earliest (i.e., primate) and latest (i.e., convex) phases of the sequence, but as regards the Early-Middle Bronze Age transition there is still some ambiguity as to what his descriptions correspond to, though they seem to be primate-type variants.

Finally, I present an alternative model of territoriality and rank-size dynamics that defines settlement clusters and groups based not on the spatial proximity of sites to “centers” as in Tosi’s framework, but rather on the proximity of all sites to each other. In other words, where Tosi’s model is top-down, mine is bottom-up, seeking to identify settlement groups at scales that correspond to the limits of “community” on the one hand, and to “polity” on the other. The results of this analysis show that the number of the smallest-scale “communities” is fairly stable over time, despite their differing spatial configuration and group membership over time. This contrasts with the meso-scale definition of “community” as understood within the model, where the count of such groups is also stable between the first two phases, and then increases dramatically into the final phase. With respect to the level of settlement grouping that I have defined as corresponding to “polities,” there is a drop in the count from the first phase to the second phase, followed by a precipitous increase to the third phase. Comparing these trends to the average area of settlement clusters further supports the conclusion that in territorial
terms, the broadest trend is one of consolidation-integration between the first two phases and fragmentation between the last two phases. While this supports Tosi’s narrative on the whole, this observation should not be taken to mean that the final phase represents a “collapse” of some kind, but rather a period of diversity characterized by a greater number of possible polities which are typically more heterarchically organized.

Taken together, the results of these three interventions support Kohl’s contention that the secondary states east of Sumer were less nucleated, less hierarchical, and less centralized than Tosi predicted, and much less so than contemporaneous polities in Mesopotamia. Key take-aways are the variation observed across the three phases of the chronological sequence under investigation, particularly with regard to the distinct territorial and rank-size trajectories identified in the three spatial zones of the Gorgan Plain. This result in particular should be the subject of further investigation, as should the change over time in the “life-cycle” of individual settlement clusters/groups. On a broader theoretical level, I argue that territoriality and rank-size models are best understood in a multi-scalar framework.
CHAPTER 2. THE GEOGRAPHY OF POLITY FORMATION

In the preceding chapter, I introduced the motivating theoretical problem that this dissertation will address, i.e., the relationship between long-distance trade and the emergence of political complexity in formative contexts. Given that the most robust dataset with which to study social and political organization available for this dissertation’s study area comprises its record of settlement, this chapter addresses a central concern in regional settlement archaeology: how do site distributions relate to social and political organization? The simplicity of this question flatters to deceive, as it represents perhaps the core theoretical and practical problem motivating many forms of archaeological survey and site-prospection. This question is particularly central in the study of the constitution of larger-scale human societies, i.e., the emergence of political complexity and the origins of the state (Smith, A. 2003: 19), one of archaeology’s “evergreen challenges” (Kintigh et al. 2014; see also De Montmollin 1989; Scott 2017; Yoffee 2005). Regional settlement distributions have served as key pieces of evidence in both processual and taxonomic argumentation over how and why such social groups formed, what organizational shape they took, and how they transformed over time, both generally (e.g., Adams 1966; Carneiro 1970; Willey 1953; Wright 1977) and in the context of my specific study area, the Gorgan Plain of northeastern Iran (e.g., Tosi 1979, 1986; Kohl 2007).

In this chapter, I examine two different frameworks for the study of polity-formation at a regional scale: political landscape (Smith, A. 2003) and political geography (Agnew 2017). These two approaches to the question of polity formation both have their uses, but ultimately direct our attention to different empirical problems. In the case of the political landscape, we are hailed to attend to the production and maintenance of sovereign political authority and how such authority works through the natural and built environment to constitute the polity. In the
case of political geography, we are led to concentrate on territory, boundaries, and variation in
the spatial organization of settlement. Naturally, accounting for both sets of features will be
necessary for a full engagement with the political writ large, but in this investigation, due to the
particulars of the record under examination, I draw more on political geography than on political
landscape.

I also discuss the vast literature on “secondary” state formation in the “Ancient Near
East” (Sasson 1995; van de Mieroop 20015). This concerns those political communities that
formed subsequently and in relation to the earliest complex polities in Western Asia, which
were connected to each other in different ways at different times by an expansive system of
interregional exchanges, i.e., the Bronze Age World System (Kohl 2007; Parkinson and Galaty
2007). My investigation is inspired by and speaks to a persistent effort to understand how the
peripheral regions that made up this system, e.g., the Aegean, Iran, Central Asia, the Persian
Gulf, and the Eurasian Steppe, related to its core areas, principally Mesopotamia, Egypt, and the
Indus (Algaze 2005; Frank 1993; Kohl 1987; Kardulias and Hall 2008; Lamberg-Karlovsky 1986;
Laursen and Steinkeller 2017; Possehl 2002; Ratnagar 2001; Stein 1999). Polity formation in
these peripheral areas has often, if not primarily, been understood in relation to patterns of
trade and exchange — as we saw in the introduction. Here I will expand this discussion.

In part, this framing of polity-formation has been conditioned by the nature of the
evidence available, which can be grouped into two broad sets of sources. The first set stems
from the etic evidence for long-distance contacts between these societies, manifest in the
widespread distribution of exotic materials from restricted and far-flung sources (e.g., lapis
lazuli) as well as from partially shared repertoires of visual culture across great distances (Amiet
1986; Foster 1993; Olson in press; Pittman 1984; Potts, T. 1994; Tosi 1974b). The second
emerges from emic evidence, represented by the knowledge that the world’s earliest institutions of literacy had of the wider world in which they were situated (e.g., Crawford 2013; Kramer 1968; Laursen and Steinkeller 2017; Michalowski 1986; Oppenheim 1954; Postgate 2013; Steinkeller 2013b). Contacts with particular named geographic-cultural entities are well known through examples such as the myth “Enmerkar and the Lord of Aratta” and the toponymy preserved in, among other places, the Ur III administrative archives (Kramer 1968; Postgate 2013). These and other lines of evidence have formed part of the empirical basis for the model of the Bronze Age World System (Kohl 1978; Ratnagar 2001), which is understood to be roughly analogous in its geographic dynamics to the modern capitalist World System, including but not limited to core-periphery relations and geographically uneven development, both arising out of early forms of commodity exchange and extractivism at a variety of scales (see Vandkilde 2016).

Anticipating the subject of Chapter 3, two questions have been particularly important, particularly as regards the Iranian Plateau’s role in the overall system: (1) which of the named geographic-cultural entities that appear in third-millennium Mesopotamian texts can be confidently identified in the archaeological record?, and (2) how were these archaeological entities – known to Mesopotamian scribes or not – organized socially and politically, i.e., were they proto-states, secondary states, archaic states, or early complex polities? With respect to the first question, a number of archaeological units may be identified with textually-attested political-geographic toponyms, an issue that I will return to at length. In terms of the second question, the typological debate over which analytical category these entities belong to has been, as I will demonstrate, heavily theoretically overdetermined in past scholarship. It is therefore much more interesting to invest in empirical description of these polities and
investigations of their organizational trajectory over time (Smith, A. 2003). It is toward this objective that much of the following discussion is oriented.

Fortunately, most previous studies specifically focused on this subject – i.e., the question of polity formation in the lands “east of Sumer” – are similarly descriptive in nature, providing a useful point of departure. The major obstacle to overcome is that these models of political organization have tended to be over-reliant on evidence from large central sites; consequently, systematic analysis of regional-scale distributions of settlement has lagged far behind in both empirical rigor and methodological sophistication, notwithstanding the notable exception of the Kur River Basin (e.g., Sumner 1972). Excavations at major sites on and near the Iranian Plateau – e.g., Tureng Tepe, Namazga Depe, Altyn Depe, Gonur Depe, Mundigak, Malyan, Shahr-i Sokhta, Shahdad, and Konar Sandal – have provided suggestive evidence of institutional forms that resemble those of known polities that took shape at various places and points within the chronotope of the Ancient Near East. On the one hand, the appearance of large central sites featuring monumental architecture, administratively managed craft production, demographic agglomeration, and social stratification, has been taken as evidence of “proto-state” formation (Tosi 1979, 1986). On the other, the same evidence has been used to argue for the emergence in these regions of “secondary states” (Kohl 2007). In both cases, regional settlement distributions have formed a relatively small but not unimportant part of the evidentiary basis supporting an argument for the emergence of early complex polities in these places during the 3rd millennium BCE (sensu Smith, A. 2003).

The principle difference between Tosi and Kohl’s models with respect to regional-scale settlement patterns and their relationship to social and political organization concerns the degree of population nucleation and differentiation. Tosi’s model posits that large central sites
such as Altyn Depe and Shahr-i Sokhta dominated their hinterlands in a hierarchically organized political landscape, either absorbing the previous extensively distributed agrarian population into the “proto-urban” social fabric of these settlements (e.g., Altyn Depe) or else exercised centralized control over a rural hinterland network of small settlements (e.g., Shahr-i Sokhta). Kohl posits instead that these societies were less nucleated, less densely populated, and less socially differentiated, and considerably less so in all three domains compared to contemporaneous socio-political formations in Mesopotamia (Kohl 2007: 218). Thus, Kohl theorizes a more decentralized and heterarchical settlement system as the basis for his model of polity formation. Nevertheless, both agree that some form of supra-community social organization took shape in these places between ca. 2500-1500 BCE. My investigation therefore focuses on precisely this issue and asks: is this actually the case; if so, how many polities were there; how were they organized; and, how did they change over time?

Getting back to the question of polity formation and its relationship to regional-scale settlement animating this chapter, there are several problems to address here, theoretical and otherwise. The first is that archaeological models of polity formation are presently undergoing revision, as exemplified in the responses to James Scott’s Against the Grain (2017) in a special issue of Cambridge Archaeological Journal (Leppard 2019), which is particularly illustrative of the state of the field. Among other critiques of Scott’s history of the origin of the earliest complex polities (Scott 2017), Robert Drennan argues that many if not most regional trajectories of polity formation worldwide do not much resemble those of Mesopotamia, insofar as the “coalescence of temple, administration, writing and taxation that characterized early Mesopotamian states was quite unusual, both for regions where no pristine state emerged as well as for the world’s other pristine states” (Drennan 2019: 701; see also Martin 2016). Additionally, Drennan points
out that Scott’s emphasis on coercion as a key force in drawing people together into larger communities, while perhaps appropriate for the Mesopotamian context, is not a necessary feature; other centripetal forces include ritual, ceremony, and economic interdependence. Finally, regional polities vary considerably in their modes of growth and what forces drove demographic expansion (ibid; see also Drennan and Peterson 2006; Frangipane 2018; Ristvet 2017). Consequently, while they cannot be ignored, I ultimately consider theoretically-overdetermined typological debates over whether these collectivities were proto-states or secondary states to be of little consequence at this stage in the research into the political geography of Bronze Age Iran, as advancing our understanding of the archaeological record is more likely to come from articulating what exactly constitutes the evidential record.

Consequently, I address my theoretical investigation in this chapter to the following questions: (1) what conceptual frameworks are most useful for understanding the formation and transformation of social and political groups through regional settlement patterns, and, (2) given the particulars of the archaeological record of these regions, how can we empirically describe the geographic organization of the social and political groups that took shape in places such as the Gorgan Plain of northeastern Iran during the Bronze Age? With suitable answers to these two questions, we can not only re-evaluate both Tosi and Kohl’s models of polity-formation in this particular context, but we will have a basis upon which to address the most expansive questions raised by this investigation overall.

2.1 Frameworks for studying the emergence of political complexity through settlement patterns: the political landscape and political geography

Settlement pattern analysis has been central to the study of early complex polities for more than half a century (Pollock and Bernbeck 2018). These two domains of study, while
having distinct intellectual genealogies, have been consistently braided together as archaeologists have attempted to understand regional-scale social and political processes in a variety of formative contexts across the world. On the one hand, settlement pattern analysis owes a great deal theoretically and methodologically to archaeology’s various encounters with locational geography (Hill 2015; Renfrew 1983); on the other, state-formation theory in archaeology is indebted to different degrees to the discipline’s engagements with evolutionary and political theory (Forest 2004). Thus, an archaeologist interested in the intersection of these domains can draw on a diverse array of conceptual and empirical tools in designing a given inquiry.

In this section, I demonstrate a key point that must be borne in mind throughout the remainder of this study, namely that this dissertation has been conducted under a fairly major constraint with respect to the kind of theoretical interventions that can be made. Simply, the most advanced theoretical frameworks available in archaeology for understanding the relationship between site distributions and socio-political organization depends on the availability of certain kinds of data. Where a robust archaeological record with a diverse evidence base is available, the framework of the “political landscape,” will prove quite illuminating, insofar as polities – whether early, archaic, antique, complex, states or empires – produce and maintain their sovereign authority through an ordering of experienced, perceived, and representational space (Smith, A. 2003; see also Lefebvre 1974; Massey 1995; Soja 2011[1989]). In cases where scholars are working with a record of settlement consisting of little more than dot-distribution maps representing the three variables of location, size, and time, however, a different approach will be required (Drennan et al. 2015). Under such circumstances,
political organization \textit{qua} the constitution of political authority will be a more difficult topic to access empirically.

Nevertheless, it is possible to reconstruct the outlines of the political geography of a given region by studying the location of settlements and constructing simple models of territorial and spatial organization. I therefore root my theoretical middle range in concepts derived from political geography to delineate the scope of the present investigation. Finally, I introduce the distinction between community and polity that will be mobilized throughout my analysis and explicate how I propose to evaluate Tosi and Kohl’s models of Bronze Age polity-formation through patterns of territoriality on the one hand and indices of hierarchy/heterarchy on the other.

2.1.1 The Political Landscape

Both Tosi and Kohl’s models of polity formation subscribe to what Smith terms the “temporocentric story of politics,” in which the original autochthonous political formation known as The Pristine State takes shape and, subsequently, through a variety of interactions, stimulates “secondary” State formation (Smith, A. 2003: 17-18). Similarly, while at odds over the particulars, Tosi and Kohl share the assumption that a given society’s position in an evolutionary matrix of social types determines its spatial form (Smith, A. 2003: 19). Smith’s critique of both of these notions has led him to dismiss the State as a “real object of inquiry” in archaeological analyses of political life. Instead of investigating the origins of the State, Smith reorients the study of politics in the ancient world around the practices and institutions that constitute the (re)production of sovereign authority (Smith, A. 2003: 102; see also Jessop 2015). The central question then becomes: “how did early complex polities actually create and maintain sovereignty and maintain their power and legitimacy?” (Smith, A. 2003: 25). In a large measure,
this process is inseparable from the production of specific political landscapes (Smith, A. 2003: 20). This section is therefore dedicated to the explication of Smith’s related concepts of *early complex polities* and *the political landscape* as a way to advance our understanding of the spatial dimensions of Bronze Age social and political organization. As we will see, however, the empirical requirements for a full realization of Smith’s conceptual framework in the context of the “northeastern frontier of the Ancient Near East” cannot be met. This will entail a doubling back to a cluster of geographic concepts that Smith’s landscape-oriented framework was designed to supersede, to be addressed in the following section.

Smith defines an early complex polity as an ancient political formation which has three key features: (1) authority predicated on social inequality, which is (2) legitimated through perduring representations of order, and (3) invested in institutions of centralized governance (Smith, A. 2003: 30). Particularly in the case of Mesopotamia and in the empirical domain under consideration here, the emergence of early complex polities can be observed archaeologically through a spectrum of spatial transformations, e.g., shifts in settlement patterns, the advent of urbanism, the formation of new traditions of monumental and quotidian architecture, and “increasingly politicized landscape aesthetics” (Smith, A. 2003: 34-35).

While this term “early complex polity” may appear to be a pointless neologism, for Smith, the term has a number of conceptual advantages over the archaic state (e.g., Feinman and Marcus 1998; see also Yoffee 2005), which inhere in each of its three lexical components. First, *early*, denotes a temporal horizon in which the class of objects under study is one that must be primarily investigated archaeologically through the study of material culture, though which does not exclude examples in which early forms of literacy are present. Second, *complex* points toward a general set of differentiated sociocultural features including inequalities in
resource access, variably structured divisions of labor, stratification of decision-making bodies, institutional permanence, and a recognizable repertoire of symbols, meanings, and practices that inhere and compose the collective (Smith, A. 2003: 103-104). Finally, polity refers to a capacious and porously bounded domain of social action otherwise known as the political, consisting of four sets of relations that comprise “public forms of civic action”: 1) inter-polity ties (i.e., geopolitics); 2) relations between regimes and subjects; 3) ties between elites and their “bases” that constitute regimes as such; and 4) relationships among governmental institutions (Smith, A. 2003: 104). The polity, then, is an authoritative political apparatus, constituted through a dynamic and flexible set of recursive relationships that produce, maintain, and transform sovereign authority over a population.

Returning to the spatial, Smith contends that polities must be understood in terms of the particular places and spaces they create, insofar as polities not only occupy land but also operate by and through landscapes (Smith, A. 2003: 78). At a basic level, we can define the political landscape as “that component of the landscape that has been largely structured or influenced by the political economy” (Wilkinson, T.J. 2009: 152). For Smith, however, the political landscape is a more capacious concept, insofar as it not only encompasses the forces and relations of production, but is also constituted in the places that draw together imagined civil communities in a perceptual dimension of space, in which built forms elicit affective responses central to the experience of political belonging (see also Renfrew 1983: 320-321). By this definition, the political landscape at a broad level consists of the sets of spatial practices that are critical to the emergence, maintenance, and overthrow of geopolitical orders, polities, regimes, and institutions. These general spatial practices fall under the headings of experience,
perception, and imagination, which used by political authorities to link together place, space, and signification in the creation and maintenance of their own order (Smith, A. 2003: 73-74).

Concretely, the political landscape denotes a number of archaeologically observable phenomena, including but not limited to: the physical ordering and affective engineering of the created environment by political forces on the one hand, and on the other, the semiotics of politically generated signs shaping senses of place through an ordered iconography that aspires to represent and condition the imagination of political life. Such landscapes and their features are not merely an expression or reflection of political organization, instead they themselves constitute the political order (Smith, A. 2003: 77). Thus, while the polity is not reducible to territoriality or the built environment, it is not separate from these two domains either; rather, the polity constitutes a horizon of action or a field of political practices that produce boundaries, frontiers, and places within a landscape that coheres as a locale of sovereign authority (Smith, A. 2003: 154-155).

It follows, then: to the extent that sovereignty refers to the establishment of a governmental apparatus as the final authority within a given polity and is thus profoundly constituted in the ordering of landscapes, it is important to recognize that such sovereign authorities do inhere territorially (Smith, A. 2003: 76). Indeed, the formation and maintenance of sovereign authorities require the “integration of discrete locales into a singular political community,” beyond the spatial limits of which “commands go unenforced and unheeded” (Smith, A. 2003: 155). This statement aligns with Smith’s relational ontology, insofar as he locates the proper study of the production of spatially delimited political communities in the examination of relationships between regimes and subjects (Smith, A. 2003: 152). From this perspective, territoriality is better understood as a strategy, a product of social context, rather
than as a thing, such as a catchment or a community of sentiment (Smith, A. 2003: 154; see also Sack 1986; Smith 2001; contra Grosby 1995). At the same time, however, the central spatial problem for the constitution of political authority appears to be the “delineation of a bounded territory within which a sovereign regime rules a community of subjects integrated by a shared sense of identity that binds them together in place” (Smith, A. 2003: 151). As I will show, the demarcation of these spatial limits constitutes a point of both theoretical and practical articulation between Smith’s model of the early complex polity and the definition of polity that will be used in my analysis.

The approach described in the preceding paragraphs represent a fundamental departure from how archaeologists previously studied the spatial order of early complex polities. Much research in this domain can trace its roots back to the use of locational theory within a neo-evolutionary framework (Smith, A. 2003: 40; see also Adams 1965). What locational theory provided neo-evolutionists was a set of tools in order to operationalize the advent of social evolutionary stages in the archaeological record (e.g., Johnson 1973). These approaches classically involve identifying breaks in site-size histograms, rank-size plots, Thiessen/Voronoi lattices, and Central Place modeling in order to identity regularities in spatial patterning. These regularities, forms, and signals were understood to either correspond to, or to express in some fashion, the fundamental mechanics of sociopolitical evolution (Smith, A. 2003: 42; see also Drennan et al. 2015). Locational theory and its geometric methods seek to uncover the spatial logic of social distributions and presume that political systems will be characterized by well-ordered landscapes, rationally calibrated to a particular logic, whether economic or otherwise (Smith, A. 2003: 43). The principle problem with locational analysis is that it displaces spatial analysis from real into abstract space, rendering only two variables operable: location
and size (Smith, A. 2003: 45). Thus, in Smith’s view, the use of such methods evacuates the social from analysis and precludes us from engaging in much more than formal description (Smith, A. 2003: 72).

While I am sympathetic to this argument, and generally find Smith’s critique of locational analysis quite compelling, I fear that uncritical adoption of this stance may lead to some babies being thrown out with the bathwater. As alluded to in the introduction to this chapter, our theories and methods have to be calibrated to both the empirical record under consideration and the state of the field’s understanding of this record. In the case of much of Bronze Age Iran, the sort of evidence that Smith’s political landscape approach requires is simply not available, nor are the theories which have been developed to explain these data easily put in productive conversation with Smith’s framework. Much of the work that needs to be done here is to update this record and our understanding of it such that future researchers may be able to investigate the development of the Gorgan Plain’s political landscape. For now, however, because the only variables available to work with at a regional level are site location, site size, and site chronology, and equally importantly, because of the assumptions and argumentation that previous scholars have brought to bear on the question of polity-formation in this region, it is necessary to take a simpler approach. Consequently, in this study I draw more heavily on concepts from political geography to design my examination of regional-scale settlement patterns and their relationship to polity formation.

2.1.2 Political Geography

Like Smith’s concept of the political landscape, what I regard as political geography broadly concerns the spatiality of power. To wit, political geographers investigate how and why
power concentrates in some places and not others, what the effects of such concentrations are, and how the spatially differentiated distribution of power concentrations changes over time. While political geography is a large and diverse field that sits at the intersection of political science, sociology, geostatistics, climate science, and history, there is a persistent emphasis in this domain on the territoriality of and boundaries between different kinds of political formations, particularly the nation-state (Agnew 2017: 12; Cox 2003; Jones et al. 2004: 2). In a large measure, this means that the object of analysis in this field is the process by which social groups and communities orient themselves in and through territorial space for political purposes (Agnew 2017: 1). In addition to the study of territory, there is another important strain of political geography which is concerned with locational analysis. Indeed, locational analysis has been an especially important contact zone between political geography and archaeology, particularly in the form of Central Place modeling (Hill 2015; see also Crumley 1976).

While there are many other forms of distributional and locational analysis, Central Place theory has been widely discussed in archaeology as a method for identifying and describing different types of settlement patterns. Central Place theory was originally developed to explain the number, size, and location of human settlements in a given industrial system, with a focus on the spatial distribution and systemic functions of urban settlements in relation to their outlying and dependent towns and agrarian villages. In archaeology, Central Place modeling and its related concepts have often been used in the study of so-called “settlement hierarchies,” and has been deployed in a range of contexts to argue for or against the presence of particular socio-political forms in specific places and times. A classic example of its application in Near Eastern archaeology is Gregory Johnson’s study of local exchange and early state development in southwestern Iran (1973), in which he sought to correlate different size-classes of
archaeological sites to their functional position within a hierarchical lattice of central-place administrative functions; as we will see, Tosi was keen to differentiate his own theories from those of Johnson in particular (e.g., Tosi 1984: 30-31; cf. Wright and Johnson 1975). Consequently, in this section, I will examine political geography primarily through the lens of territoriality on the one hand and through Central Place modeling on the other.

Territory is not an unambiguous term. While it typically refers to some division of space occupied by individuals, social groups, institutions or polities, territory may also be considered as a social process in which space and action are difficult to separate analytically (Paasi 2003: 109). Thus, there is a conceptual tension between seeing territories as essential, prior, or fixed units of secure sovereign space and the understanding of territory as the active terrain of socio-political contestation and negotiation (Agnew 1994; Osborne and Van Valkenburgh 2013; Paasi 2003: 110; Smith, A. 2003; 2015; Smith, M.L. 2005, 2007). A thorny and difficult to resolve issue in this domain is the “territorial trap,” in which state power and territorial sovereignty are implicitly and unproblematically seen as coterminous (e.g., Agnew 1994). Particularly in the case of the study of larger-scale social formations, the conceptual relationship between territory, boundaries, spatial organization, and political authority is particularly entangled, especially beyond a certain demographic threshold, i.e., those associated with polities and states (Agnew 2017). Indeed, the spatial reach of a particular individual or institution’s authority is often understood as a rough proxy for their place within a given political hierarchy (Bevan 2011: 30; see also Johnson 1973; Wright and Johnson 1975). Robert Sack (1986) points to three key interrelated relationships that constitute territoriality: (1) the classification by area (i.e., categorization of people/groups by location), (2) the communication and maintenance of boundaries, and (3) the attempt to enforce control over movement into/out of and over activity
within a given area (Paasi 2003: 112). While this is a useful framing, it also leaves open the temptation to slide into a concept of territory that serves more as a “container” of society, rather than as a space of struggle (Paasi 2003: 117).

Given the conceptual problems that the privileging of the nation-state as a unit of analysis causes for political geographers studying modern-day phenomena, we must take extra care when studying the geography of ancient polities (e.g., Martin 2016: 250-251). In parallel to Agnew’s territorial trap, archaeologists often get caught on the presentist assumption that control of territory is an inherent and essential component of the functioning of complex polities, occluding variability in patterns and processes of territoriality (Casana 2013; Ristvet 2008, 2011). We should instead view territorial control as just one among potentially many modes of authority, and moreover, as a dynamic configuration of space (Van Valkenburgh and Osborne 2013: 1-2). Highlighting this dynamism, Van Valkenburgh and Osborne direct our attention to the following dimensions and features of the territories of ancient polities: (1) their variable boundedness, (2) their variable geographic continuity, (3) their variable emplacement in actual physical landscapes, (4) their variable dependence on non-territorial forms of power, and (5) their variable degree of consequence for social life in general (Van Valkenburgh and Osborne 2013: 11-14).

Yoffee challenges us further to see territory as a highly contingent process. He poses a series of questions, including but not limited to the following (Yoffee 2013: 191): what are the actual methods by which political authorities attempt to establish and enforce boundaries and how effective were they in such endeavors, what kind of goals did authorities have and how did they attempt to legitimate their territorial ambitions, and what effect did attempts to extend territorial control have over the peoples and areas in question? These questions echo the
concerns of Ferguson and Mansbach who argue that every process of political integration (i.e., polity formation) carries the seeds of its own destruction; with regard to territory, the creation of a central authority and its extension of controlled territory produces profound and unintended economic and social transformations, often ultimately leading to difficulties in governing a polity’s constituent groups as fractionation and shifting social coalitions put competing demands on the central authority (1996: 39). These perspectives align well with Smith’s contention that space is not prior to political relationships but is instead part and parcel of their creation. Consequently, this directs our attention to spaces as political activities and our inquiry to into the constitution of political authority in terms of the spaces that it assembles (Smith, A. 2003: 77).

In archaeology, the analysis of political geography qua territory is most often found within the domain of regional settlement pattern studies (De Montmollin 1989; Drennan et al. 2015; Evans 1982; Hodder and Orton 1976; Johnson 1977; Parsons 1972, 2009; Renfrew 1983; Smith, C. 1976; Thurston and Salisbury 2009: 3). This typically entails the analysis of settlement location, settlement morphology, and the forces shaping variation in these two domains, combined with a suite of locational models used to infer different forms of socio-political organization (Kowalewski et al. 1983; Smith, A. 2003: 42-44). Such analysis shares much in common with Smith’s landscape approach discussed above insofar as any given human group produces its own spatial order, archaeologically observable through partially preserved residues of human activities and settlement within a given zone (Lefebvre 1974; Massey 1994; Soja 1989; Smith, A. 2003, 2015). Questions aimed at reconstructing this socio-spatial order focus on the distribution of different kinds and sizes of settlements to reconstruct the demographics and
spatial organization of communities and polities at a variety of scales (Drennan et al. 2015; Lawrence and Wilkinson 2015; Montmollin 2004; Wilkinson et al. 2014).

Reconstruction of patterns of territoriality in the past most often focus on the spatial relationships between sites of different kinds and/or combines spatial relations with measures of inter-site cultural connectivity (Kindon 2002: 60; Mills et al. 2015). In general, purely spatial analysis of settlement distributions in archaeology investigates the (co-)variation between site location and attributes. Questions range in complexity from determining how many sites of a particular type are located in a given area (Neely and Wright 1994) to modeling and simulation of the spatial variation of clustering and dispersion of settlement over time (Crema 2013). In the domain of territoriality, this often takes the form of Thiessen polygon models (Colburn and Hughes 2010), modified lattice models such as X-Tent (Stoner 2012), site catchment analysis (Roper 1979; Ullah 2011), and various forms of cluster analysis (Bevan and Conolly 2006; Palmisano 2017). Lines of inquiry are rarely limited to the spatial in isolation, however. Some measure of connectivity within a regional settlement distribution is required to overcome the limitations of the friction of spatial distance framework (Hodder 1978). These measures may be grounded empirically in the degree of similarity between sites in terms of a number of factors including but not limited to subsistence strategies, material culture assemblages, and traditions of architecture or symbolism, as well as their relative position in travel networks (whether modeled or observed). Under the right circumstances, connectivity between settlements can be attested in written records (Barjamovic et al. 2017; Birch 2012; Birch and Hart 2018; Hill et al. 2015; Mynářová 2015; White and Surface-Evans 2012).

In addition to investigating the relations between sites, spatial and cultural measures of connectivity can be used to pose questions about the presence of and boundaries between
differentiated sub-regional settlement communities. Further investigation of such groups could examine the following: the spatial arrangement and demographic profiles and trajectories of settlement groups at different scales (Drennan et al. 2015); the distribution of particular subsistence and productive activities within and between different settlement groups (Blanton 2005; Chang 1992); the degree, scale, and medium of interaction between different settlement groups (Duffy et al. 2013; Lindsay and Greene 2013); the relative isolation/integration of different settlement groups (Parkinson 2006; Yanchar 2013); the correlation between settlement groups and groups identified through other measures of material connectivity (Hill et al. 2015; Mills et al. 2013, 2015); and changes in all of these domains over time (Rossignol and Wandsnider 1992).

Settlement patterns cannot, however, be used as an unproblematic or direct analogue for prehistoric territoriality for several reasons (Duffy 2015; Hodder and Orton 1976; Savage and Falconer 2003). First and most importantly, ancient communities and polities often did not have clear or contiguous boundaries that can be read directly from the distribution of settlement (Ristvet 2008; see also Casana 2013; Stoner 2012). Moreover, archaeologists do not directly study past settlement systems, but rather, what remains of them (Kouchoukos 1999: 21; Rouse 1972). Because of this, two primary challenges must consequently be confronted. The first concerns the unresolvable uncertainties, ambiguities, and blind-spots resulting from both taphonomy and survey methodology that characterize the relationship between past settlement systems and their present-day remains (Alcock and Cherry 2004; Cowgill 2009; Fish and Kowalewski 2009). The second emerges from disjunctures between past and present social reality, in which the temptation to project today’s categories onto prehistory must be resisted.
(Ferguson 2002: 93-94). The study of social and political organization through the analysis of settlement patterns must therefore address these two challenges directly.

In addition to the reconstruction of the spatial configuration of human settlement from fragmentary remains, archaeological inference must ask a series of questions to assess to what extent these patterns have resulted from distortions introduced by a variety of taphonomic processes and biases in recovery procedures (Clarke 1977; Hodder 1978; Hodder and Orton 1976). They ask: are certain categories of settlements disproportionately over- or under-represented in the archaeological documentation of a region (Kouchoukos 1999; Wilkinson 2003)? Can we be sure that we are not over- or under-counting sites of a given period (Ammerman 1981; Weiss 1977)? How many sites would have been simultaneously occupied during a given period (Dewar 1991, 1994; Kintigh 1994; Lucas 2015; De Montmollin 1989; Schacht 1984)? What other spatiotemporal factors and social practices could have influenced settlement dynamics (Duffy 2015; Harrower and D’Andrea 2014)?

In addition to concerns relating to territoriality, there is also the problem of hierarchical and heterarchical structures of authority and their spatial expression. In terms of the structure, De Montmollin identifies two forms of regimes, pyramidal and hierarchical, both concerning the relations between different offices and levels of authority within any given larger-scale form of social organization. In the pyramidal form, a “full set of similar political functions is repeated in the offices at each hierarchical level” (De Montmollin 1989: 22). By contrast, in the hierarchical form, the political functions of different offices are differentiated according to level in the system, and generally speaking, a wider scope and variety of functions is found at the apex of the system (ibid). Spatially, the distinctions between pyramidal and hierarchical structures are often but not elided and the identification of the “levels” of office/decision-making/authority is
the objective of study. In the case of Johnson (1983) variations in site surface area within a region were correlated to the levels of office within the polity (see discussion in Smith, A. 2003: 41-44).

Much of the identification of hierarchical and heterarchical structures in settlement distributions is predicated upon either the analysis of rank-size distributions as part of Central Place analysis (Crumley 1976) or else through seeking breaks in site-size histograms (Adams 1981; Drennan et al. 2015). It has long been recognized, however, that attempts to identify settlement hierarchies through locational or distributional analysis are highly fraught (e.g., Adams 1981: 75-76; Crumley 1976). Moreover, it should be noted that “heterarchy [...] is not the opposite of hierarchy; it simply means that different functions can exist in a system without their arrangement being hierarchical. Archaic states were both heterarchical and hierarchical” (Marcus and Feinman 1998: 11).

Despite the great caution that is exhibited by most scholars, there is a persistent association between primate and log-normal type rank-size distributions and hierarchy, or at the very least well-integrated systems on the one hand, and between convex rank-size distributions and heterarchy, or poorly-integrated systems on the other (e.g. Savage 1997: Table 1; Falconer and Savage 2009: 134). While the middle-range links between rank-size distributions and their social correlates are highly contested in the literature (contrast Berry 1961 with Wossink 2009), what they give us a sense of at the very least is a rough proxy of the ratios of different size-classes of settlements within a given system and thus a convenient shorthand for categorizing different configurations of settlement, so that we don’t have to write out “a system dominated by a single large center” (e.g., primate), or a “system characterized by many sites of similar size” (e.g. convex) or a “system with several large centers and many small sites” (e.g. convexo-
primate) and so forth. The real key in rank-size analysis, especially when multiple time periods and geographic units are concerned is to identify and describe variation. Rank-size analyses will point to certain processes, but they must be combined with other data in order to fully understand the implications of the observed patterns (Wossink 2009: 63-64).

Given these concerns and our relative (in)ability to mitigate such confounding factors under a range of conditions, many scholars are pessimistic about the possibility of modeling territoriality and hierarchy/heterarchy on the basis of settlement patterns alone. I should be clear; I am among them. Nevertheless, given the limitations of the data available, there are few other options available to speak to the kinds of questions that I am concerned with other than simple models of territory and indices of spatial organization such as rank-size analysis. While there can often be no straightforward inference of territory, boundaries, or spatial structure from dot-distribution maps of ancient settlements, this does not mean that we should not attempt to use the data and tools at our disposal to begin to model social and political organization. The following section is devoted to identifying methods by which this may be accomplished, even with relatively limited data sets and simple tools.

2.2 Community and Polity Geography: Definitions and Analysis

Even with all of the caveats introduced above that complicate our ability to reconstruct the constitution of authority within early complex polities there are still a number of analyses that allow us to model the basic material-spatial parameters of political organization. Even if we cannot directly study the experiential, perceptual, and imaginative dimensions of the political landscape or capture the four dimensions of the political introduced above we can still outline the framework within which these dimensions and relations could have occurred given the available record. Even with only three variables at our disposal (i.e., location, site-size, and
temporality) we can still examine settlement geography, *qua* patterns of territoriality and settlement organization, at different scales using some simple models.

For the purposes of this study, I develop a geographic definition of both community and polity, which despite lacking some of the sophistication of Smith’s approach, allows us to operationalize these concepts in this study’s particular empirical context. I define both community and polity in behavioral and possibilistic terms, viewing *community* as a settlement cluster and *polity* as a group of settlement clusters (see Kowalewski 2003: 109; Wilcox et al. 2007). While not unproblematic, this definition allows me to create hypothetical models of possible configurations of the territory of settlement clusters and groups based on location and distance alone, i.e., the only relevant settlement data available in the context of this study for such modeling. With such hypothetical territorial groupings defined on this basis, I deploy a proxy for spatial organization, i.e., rank-size analysis, which also operates entirely on a single variable, site size. These simple measures are chosen purposively so as to not theoretically overstretch the thin empirical record under examination.

### 2.2.1 Geographic definitions of community and polity

Community is a slippery term, often either vaguely defined or else definitionally taken for granted. Nevertheless, this slipperiness is part of the term’s staying power, both in quotidian and specialist senses (Amit and Rappoport 2002: 13). Communities clearly are social units of some kind; beyond this, however, there is little consensus. A common understanding in archaeology that a group of inhabitants co-residing in a settlement constitutes a community (Gerritsen 2004: 144). The assumptions implicit in this understanding can be traced back to different points of origin, including classic social theory, the Chicago school of social geography, and a range of early ethnological/ethnographic studies (Mac Sweeney 2011). The ultimate root
is with Tönnies’ concept of *gemeinschaft*, or so-called traditional/natural social groupings based on feelings of togetherness and mutual bonds, i.e., similar to Ibn Khaldun’s concept of *asabiyya* (e.g., Ibn Khaldun 1958). This definition was used by both Durkheim and Simmel, who along with Tönnies, romanticized the bucolic, with the rural community representing natural social units (Mac Sweeney 2011).

This view persisted into the 20th century, where “community” has often been considered to be a naturally-occurring, traditional, small-scale, spatially bounded form of social organization or common culture, in other words, a fundamental cross-cultural social institution, strongly associated with a sense of place and linked to group identity (Barnes 2011: 674; Gerritsen 2014; Knapp 2003: 566). Part of the definitional problem is that the term has multiple valences, capable of being used to refer to social responsibility and civic engagement on the one hand, but to pick out ethnic, religious, minority, and geographic groups as distinct entities on the other. In most cases, however, the key characteristics of “community” seem to be interpersonal relationships, especially those born of close and frequent interaction and exchange in a particular locale. Importantly for the discussion that follows, in the canon of Western social thought, the idea that external observers could identify a community using objective methods has persisted, especially if these observers could discern a coherent spatial focus defined by the limits of regular social interaction (Mac Sweeney 2011: 13).

Many archaeological studies implicitly or explicitly invoke George Murdock’s definition (1949), conceiving of communities as “relatively static, conservative, closed and homogenous social units maintained by residential proximity, a shared normative culture, and the daily experiences common to its members.” Despite many and diverse critiques of this community-concept, Canuto and Yaeger note that it has endured; they ascribe this to the fact that this
definition can be operationalized archaeologically relatively easily through the identification of “discrete spatial patterning of activities, residential nucleation, and shared material culture,” and because communities are often assumed to be coterminous with the “site” (Canuto and Yaeger 2000: 3). Among the problems with this definition of community-concept is that it can lead to an emphasis on identification over analysis, allowing the concept to remain unproblematized, because the object of study appears to arise organically from the data. It is now commonplace to recognize that this community-concept runs roughshod over social action, identity, meaning, structuration and symbolism in our models of the past (Canuto and Yaeger 2000: 5 see also Blanton 1994; Brumfiel 1994; Harris 2014; Hayden 1990; Johnson 1989; Jones 1997; Saitta 1994).

In archaeology, communities are often positioned as principle social actors, i.e., “it is in communities that hierarchies and social differentiation are first constructed, it is communities that trade with each other and engage in cultural interaction, and it is communities that mediate the experience of state emergence” (Mac Sweeney 2011: 3). Typically, communities are thought of as social building blocks, as coherent entities, as correlated with individual sites, and/or as social collectives produced naturally by physical co-residence and frequency of interaction. These understandings tend to ignore internal divisions within communities and to downplay the role of individual and subgroup action (Mac Sweeney 2011: 5). Thus, many attempts to define or theorize the community in an archaeologically specific way have fallen short. Even with all of these caveats in mind, I start from the recognition that regardless of the content and modality of routine social interaction, the spatial structure of local communities both inheres in and reflects intense patterns of daily patterns among their inhabitants (Drennan and Peterson 2012: 72-73). How people are dispersed across the landscape in terms of their
residences and activity areas, then, gives at least some sense of the domain of possibility where such intense daily interaction that would constitute a community as such, regardless of the content of that interaction, could and/or did occur (Canuto and Yaeger 2000: 6; Peterson and Drennan 2005).

Consequently, I adopt a combination definitions to clarify my analytical object as follows. While somewhat old-fashioned, the definition of community I’ use considers it to refer to “a population located with regard to a territory” (Olsen 1976: 22). This is similar to Kolb and Snead’s definition of community as “a minimal, spatially defined locus of human activity that incorporates social reproduction, subsistence production, and self identification” (Kolb and Snead 1997: 611). Olsen’s definition is also in line with a more recent formulation, which conceives of a community as “a group of people living in a particular place, an area of common life, and in political discourse, a powerful organizing ideal” (Birch 2013: 6). Based on these definitions, the study of community dynamics then becomes the identification and description of these populations, their boundaries, and their changing relations to other communities at varying spatial scales (Nelson 1994: 3; Olsen 1976: 24). I do recognize, of course, that many communities may not have a geographic or territorial component and the equation of a geographic unit with a coterminous social unit has long been seen as theoretically unsound (Tringham 1972; see also discussion in Harris 2014: 78-84). Despite this, there is a persistent association between individual settlements, groups of settlements, and community, even if this association is not always straightforward (Kolb and Snead 1997; Schwartz and Falconer 1994).

This conception of community would appear at first glance to ignore the major trend in social thought on the “community-concept” over the past 40 years, i.e., the imagined or symbolically constructed community (e.g., Anderson 1983; see Harris 2014; Mac Sweeney 2011).
This formulation of community pushes back against the long genealogy of the natural/traditional community-concept, locating community as a dynamic and socially constructed group, rather than as a social group arising organically out of residential proximity (Mac Sweeney 2011: 14; see also Cohen 1985). In this view, community is a mental construct, an idea in the minds of its members, concerned less with intra-group interaction and more with the construction of insider-outsider relations and the maintenance of group boundaries. This community-concept locates the creation and maintenance of community in a process of “constant social and cultural negotiation,” entailing a focus on how communities are given social meaning, realized, and maintained (Mac Sweeney 2011: 18). Mac Sweeney argues that while communities certainly may be imagined, they must be realized and emplaced in the world to have any impact (ibid). Thus, communities have an implicit geography, insofar as they are set within a certain geographic area and have a certain spatial focus; moreover, community members must consciously identify themselves with that place and with each other (Mac Sweeney 2011: 20). Therefore, a geographic community is both imagined and spatial, insofar as it is created through and in social practice and lived experience, both of which are facilitated by residential proximity and regular direct interaction (Mac Sweeney 2011: 21).

Others caution us against defining community in arbitrary spatial terms, insofar as distance thresholds were not likely to have been operative or salient markers of social/cultural difference (Kintigh 2003: 102). Nevertheless, the practical and doxic elements of communities – i.e., their constitution through practices of affiliation, maintenance through group decision-making and processes of social integration, their coalescence, promotion, and emplacement (Abbott et al. 2006; Murakami 2016; Pauketat 2007; Rautman 2000, 2013; Yaeger 2000) – are all profoundly spatial processes, dependent upon the existence and practical use of community
spaces, i.e., the key places where community identity is created and around which it is focused (Mac Sweeney 2011: 33). However, there may not be a strong record of community spaces presumed to have a socially-integrative function, e.g., ballcourts, platform mounds, kivas, etc. For Breternitz and Doyel (1987: 184), a community “is identified by establishing contemporaneity among a spatial cluster of sites, within which there should be a hierarchy of site types referable to different functions within the community.” Indeed, identifying this functional differentiation between residential localities has proven more difficult than identifying spatial clusters (Wills and Leonard 1994: xiv). As such, scholars may need to look to inter-site differences in artifact inventories that might suggest practical differentiation between residential sites. It is also possible, however, that inter-settlement organization could exist without the need for a communal structure (Wills and Leonard 1994: xiv-xv). In either case, such communal structures are most likely to emerge among groups of people who interact frequently with each other, especially those living in close co-residential proximity.

To step back to a more abstract level, the spatial and demographic scales of these communities are highly variable, and there may be as few as one or as many as dozens in a given culturally meaningful region (Wills and Leonard 1994). In many cases, the only archaeological domain in which the formation and transformation of such social units is observable is in regional settlement patterns (De Montmollin 1989; Drennan et al. 2015). In the case of the present study, we can only study the emplacement of community through a study of the nodes of interaction/activity constituting a community (e.g., settlements) and through that community’s territorial extent (e.g., boundaries between groups of settlements).

By way of transition, it should also be noted that the formation of larger-scale social entities beyond the level of the residentially-proximate local community involves some degree
of organization that by definition both encompasses and integrates multiple communities, interacting with each other in “shifting, fluid patterns of obligation and reciprocity” (Wills and Leonard 1994: xiv-xv). This highlights an important aspect of community, with respect to the fact that a community is ultimately a human group, not just a site or a place (Nelson 1994: 4). Indeed, a community can be conceived of as an integrative institution that knits together social groups into variably bounded territorial units (Fish and Fish 1991: 162). While some find this building-block approach wholly inadequate to explain how and why such larger-scale social units form (e.g., Pauketat 2000; Pauketat and Emerson 1999), in an interactional sense, these are differences of degree rather than kind. In any case, a community of any kind, at any scale, represents a social aggregate (Birch 2013: 2; Gyucha 2019).

Thus, many of the same problems that plague the study of “community” through analysis of settlement patterns also obtain in the study of “polities” via the same media. Multi-community groups may be referred to by a number of different terms, many of which are either lexically cumbersome (e.g., supra-local community) or theoretically suspect (e.g., chiefdom, archaic state), leading to a preference for relatively neutral terms, such as a “district,” or in this case, a “polity” (Drennan and Peterson 2012: 73). A polity is in some sense an autonomous political entity, with or without a complex state-like structure, usually the highest-order socio-political unit in a given region (De Montmollin 1989: 7; Renfrew 1986: 2; see also Feinman and Marcus 1998). I consider a polity to be a political community, in other words, “a set of individual residential sites assumed to be linked through inter-settlement mechanisms for making social and economic decisions” (Abbott et al. 2006: 298).

A political community can be understood as a “minimum of two residential settlements whose members interacted to satisfy a wide range of socioeconomic functions including mate
exchange, risk management, labor procurement and craft specialization” (Wills and Leonard 1994: xiii). Such a territory-based definition of polities is not without its critics. While many agrarian societies exhibit territoriality at the local level based on claims to agricultural land, the extent of territoriality as a defining trait of polities is more variable (Brück and Goodman 1999; Ristvet 2011; Tomaszewksi and Smith 2011).

The emergence of such political communities tends to be episodic and involve regional demographic surges (Smith, M.E. 2012: 118). While there are many different trajectories that can characterize community growth, the creation of larger-scale social formations tends to involve the amalgamation of smaller, previously distinct communities, whether through a process of encompassment or subsumption (Smith, M.E. 2012: 119-127; see also Birch 2012). Pauketat argues that the formation of political communities of this kind were agentive strategies, insofar as people had to make them, promote them, and physically construct them; in his framework, focus should be trained on the actual histories by which people coalesced or were gathered, on the ways that communities, and especially political communities were projects (Pauketat 2007: 177, 199). Thus, in line with Smith’s framework introduced in the previous section, a polity is a relational form, a structure of ties between an authority and its subjects. A polity’s subjects include the persons who identify with it and contribute their resources to it: “loyalties, in turn, provide the only firm foundation for the exercise of authority. Each set of loyalties is a social network, with territorial and functional dimensions, in which participants perceive one another as sharing some trait(s) or quality(ies) that place them in a common situation of actual or potential advantage or disadvantage” (Ferguson and Mansbach 1996: 36). Restated, this concept of a polity could potentially trouble our efforts to examine the
territorial dimensions of polities through spatial models alone, because there is no simple
threshold that a group passes to become a polity (Ferguson and Mansbach 1996: 23).

These concerns are important to consider, but not particularly actionable in the present
investigation, as fully addressing them would require a dataset simply not available. Indeed,
many of the dimensions of organizational variability in polity-structure are not easily
operationalizable through the settlement record of the Bronze Age Gorgan Plain. For example,
organization of polities may be conceived of along a number of dimensions: in degree of
hierarchy, centralization of authority, institutionalization, mobilization capacity, homogeneity,
and size (Ferguson and Mansbach 1996: 37). Similarly, De Montmollin posits that the core
features of the study of polities and their organization are scale, integration, and complexity;
alternatively, we can gloss these terms as size, and the interdependence and functional
differentiation of constituent units (De Montmollin 1989: 17). These dimensions are often
considered to constitute an institutional continuum of “state-ness” or “polity-ness” (De
Montmollin 1989; Scott 2017).

In the case of the present study, we can really only focus on scale, size, and spatial
structure. With respect to scale and size, this depends on the identification of boundaries, which
is no simple matter (De Montmollin 1989: 13). It is possible, however, to investigate potential
spatial configurations of settlement that might correspond to the territory of polities in much
the same fashion as can be done for the spatial organization of communities (Falconer and
Redman 2009; Kindon 2002; De Montmollin 1989v; Upham 1982). This ideally requires multiple
lines of spatial and material evidence to reconstruct. These typically involve some form of
cluster analysis, whether in Euclidean, isotropic, or anisotropic space (Falconer and Savage 2009;
Osborne and Van Valkenburgh 2014; Yanchar 2013). Such clustering analysis identifies groupings
of settlements, whose spatial distribution can be used to draw polygonal domains in a variety of ways, which can stand in for a rough measure of territory.

Archaeologists have also sought to identify spatial and morphological distributions of different classes of settlements that comprise a given polity (Johnson 1973; Lawrence and Wilkinson 2015; Renfrew and Level 1979), including Central Place models and rank-size analysis (Crumley 1976; Falconer and Savage 2009; Johnson 1980; Wright and Johnson 1975). In better documented archaeological contexts, such studies might also incorporate measures of settlement scaling and degrees of urbanization (Bettencourt 2013; Jennings and Earle 2017; Ortman et al. 2016) and quantifications of the geographic segregation of specialized production activities (e.g., Ossa et al. 2017; Seligson et al. 2017). But these forms of analysis require an intra-site record that simply isn’t available in this context. Ideally, in order to study the authority-subject relation that constitutes the polity, archaeologists would want to be able to formalize models of economic distribution, e.g., through the spatially differentiated spread of administrative activity and the products of centrally-controlled productive industries, as well as infrastructural capacities, such as the emergence of road networks and travel infrastructure (Nichols et al. 2017; Ratnagar 2016; Smith, M.E. 2004, 2012; Ur 2003).

To conclude this section, my operating definition of a community is that of a spatially defined locus of human activity, comprising one or more settlements (in the case of this study, primarily tells) and the territory that they occupied, understood as the spatial range of intensive face-to-face quotidian interaction within which practices of affiliation and group decision-making could have occurred. My operating definition of a polity is an extension of the community, insofar as I conceive of a polity as a multi-community unit with a leadership structure that afforded some degree of control over the communities which constituted it (see
Hally and Chamblee 2019: 422). While neither of these definitions is fully satisfying, they are defensible and useful in the present context because they can be operationalized in such a way as to support a re-analysis of Tosi and Kohl’s models of polity-formation, both in terms of territory and spatial structure.

2.2.2 Evaluating Tosi and Kohl’s models of regional settlement distributions

In many parts of the world, archaeologists can draw on an extensive record of prior research, in which basic exploratory space-time systematics have been accomplished and where the broad outlines of a given cultural sequence are known (De Montmollin 1989: 42). Unfortunately, even in such contexts, there is no particularly straightforward way to instrumentalize settlement evidence in problem-oriented research. As will be discussed in more detail in Chapter 4: “there are many methodological difficulties concerning how well the settlement record reflects processes of short-term change (contemporaneity) and whether the same settlement forms always reflect results of the same developments (equifinality)” (De Montmollin 1989: 51). The “Turanian Basin” just so happens to be a region where space-time systematics are poorly worked out (or at the very least, under published) at the regional level, the Gorgan Plain being no exception. This complicates our ability to conduct problem-oriented research. Nevertheless, with the record available, spatial analysis of the record of settlement for the Gorgan Plain from the Late Chalcolithic to the Late Bronze Age is still possible.

Spatial analysis in archaeology consists of: “the retrieval of information from archaeological spatial relationships and the study of the spatial consequences of former hominid activity patterns within and between features and structures and their articulation within sites, site systems and their environments” (Clarke 1977: 9). Spatial analysis is concerned with human activities at every scale and the traces left by them; particular spatial analyses will focus on a set
of elements of interest and the relationships between them. As has been discussed in previous sections, the archaeologist’s dilemma is the choice between an archaeologically feasible, but theoretically inexplicit or deliberately naïve conceptual foundation, or, an explicit and theoretically sophisticated framework derived from another field which may or may not be suitable or reasonable for archaeological analysis (Clarke 1977: 16-17).

As defined above, for the purpose of evaluating Tosi and Kohl’s models of settlement, I have defined a community as a cluster of settlements, and a polity as a group of settlement clusters. This raises the question of how a cluster of settlements and a group of settlement clusters is to be defined. Kintigh points us in a useful direction that articulates well with the perspective I’ve developed above. Citing Mahoney (2000), Kintigh argues that: “it would be difficult to maintain the regular interaction entailed by most definitions of community beyond the 7 kilometer-radius that, ethnographically, is the typical limit of the extent of extensive farming.” Kintigh, following Mahoney, thus concludes that “this represents a reasonable upper bound for size of a residential community” (Kintigh 2003: 105-106). Key to recognize is that this is an upper boundary, rather than a typical size. Indeed, it is much more likely, especially in areas with relatively intensive agricultural practices (as opposed to extensive), a 2-3 km radius would be expected.

Between these two estimates, both based in a wide range of ethnographic observation and behavioral correlates, we have some sense of the territorial scale of community (Kintigh 2003: 105-106). On the polity side, James Scott, drawing on Hansen (2000), argues that fourth-millennium peer-polities in Mesopotamia were small enough that “one could walk from the center of most to the outer boundary in a day” (Scott 2017: 119).² If we accept this

² Palmisano (2017: 221) also recognizes this as a key threshold.
proposition, the question then becomes: what is the distance of a day’s walk? Estimates range widely and depend on a number of human and non-human factors such as age, gender, load, fitness, terrain, climate, and so on (e.g., White 2012). In terms of operationalizing a “day's walk,” we could do worse than to draw on Wilcox and colleagues’ formulation of the outer limits of daily interaction, one-day roundtrips, and overnight travel, i.e., 3 km, 9 km and 18km radii respectively (Wilcox et al. 2007). Kintigh warns that: “although there may [be] heuristic value to these radii, I think the logic connecting any of these distances to social boundaries is less than compelling, and I worry that once one begins to draw these circles, it is easy to "see" more than is really warranted” (2003: 105-106). There is precedent, however, for understanding the territorial and interactional patterns of landscapes of tell settlement according to similar procedures – e.g., the definition of a tell-based settlement cluster as all of the settlements within a day’s round trip, with a settlement region comprising all of the settlements within an additional day’s round trip from the first cluster thus defined (e.g., Duffy et al. 2013). Given the limits of the data available, this is not an unreasonable approach. But, it must be noted that when this approach is adopted, it must be kept in mind that modeling social units from settlement locations alone is always going to be an exercise in identifying the parameters of the possible, rather than in a direct reconstruction.

At any rate, Tosi and Kohl’s settlement models can be evaluated along a number of lines. In the identification of settlement “hierarchies,” two main approaches have been debated. One approach is to plot site size on a histogram and to attempt to discern breaks in the distribution (Johnson 1973). If breaks could be determined, this was seen as equivalent to “tiers” of a site size hierarchy, and the number of tiers was correlated to the level of hierarchical differentiation, tied to a social evolutionary framework in which different types of societies (e.g.,
band, tribe, chiefdom, state) were associated with different numbers of levels (Smith, A. 2003: 41). It has long been recognized that the unambiguous identification of “tiers” in the hierarchy, especially when dealing with sites primarily under 10 ha, is nearly impossible (Adams 1981: 75). Moreover, it is not entirely clear that the tiers correspond to levels in an administrative hierarchy, especially as long as the tiers are defined entirely on the basis of site size alone (Drennan et al. 2015: 78).

The other approach is rank-size analysis, a form of modeling derived from Central Place Theory, which produces a rough index of the manifestation of hierarchy/heterarchy in the spatial organization of settlement distributions. This index is primarily understood in terms of deviations from log-normality in the ordering of site-sizes from largest to smallest (e.g., Crumley 1976). Rank-size modeling can be thought of as a measure of the evenness or unevenness of a given population’s distribution across settlements in a region. In a given region, there will be variation in the size of settlements; rank-size analysis is a method for characterizing the extent to which population is concentrated in large settlements or spread more evenly across a number of smaller more equal in size settlements. The rank-size graph is used to characterize this distribution, plotting settlement rank on the x-axis, with the largest settlement placed at rank 1, the next largest at rank 2, and so on, and settlement size on the y-axis. Both axes are plotted logarithmically, and the resulting distribution of observed settlement sizes is compared to the “rank-size rule,” which predicts that the size of rank 2 settlement will be one-half as large as the rank 1 settlement and the rank 3 settlement will be one-third as large as the largest settlement, and on down the line. Archaeological settlement distributions rarely if ever conform to this log-normal distribution, and consequently, it is the deviations from log-normality that are of primary interest (Drennan and Peterson 2004: 533). At the most basic level, these deviations
can be grouped into two categories: where the population is concentrated in the largest settlement, the distribution will drop steeply from left to right below the log-normal line (i.e., primate), whereas when there are many settlements of a similar size, the observed distribution will remain above the log-normal line (i.e., convex).

These rank-size patterns, as well as their common variants, have been observed widely across archaeological case studies. While a range of descriptive explanations have been proposed to account for these regularities, there is considerable debate over the theoretical significance of these patterns and whether they have any predictive value or are merely empirical descriptors. Nevertheless, there is some consensus that particular rank-size distribution morphologies do correlate to some identifiable set of social, economic, and/or political factors (e.g., Berry 1961; Crumley 1976). Minimally, scholars see these indices as useful for basic description and characterization of settlement distributions and as a kind of middle-range abstraction that can be used to obliquely track the “interplay between sociocultural form and settlement structure in particular” (Pearson 1980: 453). We must be careful in our interpretations, however, as a site-size hierarchy need not necessarily imply a regional-scale political hierarchy; indeed, equifinality is a major problem in this domain of analysis (Duffy 2015: 96).

The principal theoretical problems with rank-size analysis in archaeology were recognized long ago. The first relates to the fact that Central Place modeling was developed to characterize the economy of modern, industrialized urban society, and the second concerns the fact that settlement hierarchies are difficult to discern through any measure. One way around these two problems is to reorient the frame of analysis, to use Central Place indices such as rank-size measures as a reflection of a settlement system’s degree of urbanization, rather than
seeking statistically meaningful breaks in a distribution as evidence of “tiers” of a settlement hierarchy. Crumley, building on Berry (1961), made just such an intervention, proposing that rank-size measures were most useful in a processual framework; her insight was that these processes are stochastic and that rank-size measures are most interesting and useful in a diachronic model (Crumley 1976: 64-66) As she argues, the classic Central Place model of the economic geographers represents an idealized description of a system of rural-urban interaction; given that the environmental, economic, social, spatial, and political complexities of such a settlement system are manifold, there is significant potential for systemic change over time, and that primateness and concavity may represent only stages in the temporal unfolding of a dynamic system.

However, this should not be taken to suggest a unilineal model of the evolution of complexity in settlement systems peaking in the modern industrialized present. While the condition of “primacy,” i.e., “when the largest city rises well above the general slope to which the lesser cities and towns conform,” is generated by forces of either population growth or relocation being not evenly distributed through the system but concentrated at its center, the meaning of this distribution can only be understood in relation to prior and subsequent spatial configurations. Thus, whether primacy indicates either an excess of centrality in terms of regional services or a role for the primate city that extends beyond its regional hinterland cannot be resolved through synchronic locational analysis alone. Adams argues that primacy should instead be thought of as a particular type of urban size distribution rather than as a necessary stage in the evolution of all urban settlement systems (Adams 1981: 72). But the problem here again is that there is no simple relation between the type of city size distribution and the relative degree of economic development.
From another perspective, however, site-size distributions can be theorized as reflections of the degree of system integration at a regional scale. Following Wossink (2009), we might recast primacy and convexity as measures of competition and cooperation; to wit, “If there is competition between communities, integration between these communities would be low, and a convex site size distribution may be expected” (Wossink 2009: 64). Put differently, primacy or convexity could indicate the degree to which settlement systems function independently of each other. While a great number of totally independent and potentially competing communities in a region would produce a convex distribution, under conditions where these communities are more cooperative and interlinked with each other, the rank-size distribution might approach log-normality and become “integrated.” Whether or not we agree with this particular assessment, it is clear that convexity and primacy point to two very different sets of social processes which are manifest in the settlement record. At best, rank-size analysis can indicate which of these gross trends may be operative in a given circumstance, but such measures must be combined with other forms of data in order to fully understand the record under examination (Wossink 2009: 64).

To summarize, what I have argued for in this section is a radically simplified definition of what constitutes a “community” and a “polity” in terms of location alone. I have adopted these definitions for the purpose of this study for two reasons: 1) the empirical record under investigation here cannot support more theoretically sophisticated definitions, and 2) these definitions fit well enough with those used by scholars who previously investigated this dataset and affords a more straightforward examination of their specific evidentiary claims. This move is also in keeping with recent trends in the field, in which “community” and “polity” are gaining purchase as analytical terms for describing social organization which are less tainted by the
theoretical baggage of the neo-evolutionary paradigm (e.g., Crabtree et al. 2017; Reese et al. 2019).

With regard to the identification and analysis of these units, I have outlined a simple investigatory framework. In the first instance, I propose to model the possible territories of such social and political units based on spatial thresholds for the kinds of behaviors that scholars have argued constitute such human collectivities. In the second, I contend that rank-size analysis of the settlement size distributions within these territorial units will give us a rough measure of their spatial-structural organization and give us a basis on which to discern whether Tosi or Kohl’s predictions in this domain better characterize the political geographic dynamics of the Bronze Age societies of the Gorgan Plain.

2.3 Landscape Archaeology and Archaeological Geography

A final word on the preceding theoretical discussion which is of broader relevance: I have intentionally bracketed a wide range of potentially germane authors and perspectives in the foregoing analysis, namely those associated with landscape archaeology. Partly because of my own intellectual formation and partly because of the nature of the record I am working with, I have chosen to focus more on concepts and approaches belonging to what is more properly referred to as “regional archaeology.” While sharing many concerns – practically in terms of data collection, survey methodology, and scale, conceptually in terms of formation processes and taphonomy, topically in terms of transformations of patterning in settlement, demography, land-use, communication, and meaning-making – landscape archaeology and regional archaeology differ in a few key respects (Crumley and Marquardt 1990; Knapp and Ashmore 1999; Wandsnider 1998; Wilkinson 2000).
Landscape archaeology emphasizes how the landscape was created, experienced, perceived, imagined, and mythologized (Ferguson and Colwell-Chanthaphonh 2006). Landscape archaeology treats the landscape in total as the object of study, i.e., as a large palimpsestic artifact in its own right (Thurston and Salisbury 2009: 7). Regional archaeology, on the other hand, is principally concerned with understanding social systems through the use of locational analysis (Fish and Kowalewski 2009). Regional analysis is not uninterested in ecology and ideation, but its principal concern is understanding the constitution and spatial organization of interacting social groups within and between particular scalar boundaries. Thus, whether our interest is in questions related to the environment and land-use practices, or whether our interest is in demography and social organization, to be able to grasp the full range of nuance possible therein, a range of spatial, temporal, cultural, and ecological variables need to be accounted for. Due to the history of archaeological knowledge production in general, however, at a global scale this information is unevenly distributed in “the archaeological record” (Lucas 2012).

This study concerns one area of the world (the Gorgan Plain) which is known to be exceptionally rich archaeologically, but which, for a variety of reasons, has a relatively underdocumented paleoenvironmental record for the mid-Holocene (cf. Leroy et al. 2019). The dearth of ecological and geomorphological information calibrated to this period is particularly troublesome, as it is known that a number of macro-scale processes would certainly have been affecting the region between ca. 5.5-3.5ka, particularly continental-scale aeolian loess accumulations (Dulić et al. 2017; Vlaminck et al. 2016) and the 4.2ka climate event (Weiss 2012), as well as more localized factors including potential deforestation (Mousavi 2008), transgression-regression cycles of the Caspian Sea (Kakroodi et al. 2012; Kislov et al. 2014;
Ramezani et al. 2016) and alluviation (Kehl 2009). Nevertheless, due to the lack of integrated multidisciplinary investigations focused on the Bronze Age in this area, it is difficult to link the archaeological and environmental records with an acceptable level of spatio-temporal precision (but see Schmidt et al. 2011 for the Central Plateau).

We confront similar problems in reconstructing the Bronze Age Gorgan Plain’s social landscape. Indeed, such work requires attention to not just the location and size of sites and monuments of varying kinds, but also to the experiential, perceptual, and imaginative dimensions of space, place, and landscape (Smith, A. 2003: 73-75). While it would be ideal to incorporate such a range of features and variables in this investigation, due to the nature of the record, our ability to detect and analyze temporal changes in the cultural landscape in this time and place is limited. Despite the extensive and detailed surveys of tell-settlement in the region, there is precious little other evidence – i.e., a record of landesque capital such as roads, canals, fields, walls, and dams, or symbolic features, monuments, and gathering places – that can be used to reconstruct the Bronze Age cultural landscape of this place (Håkansson and Widgren 2016).

Given these conditions and considering the data available with respect to the Bronze Age Gorgan Plain, the questions, concepts, and methods of regional geography and locational analysis are more suited to the present investigation than those related to the investigation of landscape. I want to stress that landscape is not unimportant; given the present state of evidence and access to the field, however, ecological and symbolic analyses of this landscape of tells will have to wait until geopolitical conditions of access have substantially changed. This entails a narrowing of analytical scope to space-time systematics, the basic parameters of the human settlement geography and certain simple point-process analyses. This restriction of focus
does limit the kinds of inferences that can ultimately be made about the social organization of the Bronze Age Gorgan Plain, but it does not prevent us from modeling basic patterns of territoriality and inter-site spatial organization. More importantly, such simple analyses are best suited to the level of abstraction inherent in the middle-range models under evaluation, e.g. Tosi’s hierarchical proto-state model and Kohl’s heterarchical secondary state model.
CHAPTER 3. THE RELATIONSHIP BETWEEN TRADE, EXCHANGE AND INTERACTION AND POLITICAL GEOGRAPHY IN BRONZE AGE GREATER KHORASAN

The two theories of polity formation in the lands east of Sumer under examination here – proto-state structures and secondary states – both draw on regional settlement patterns as an important part of their evidential reasoning. I have proposed to re-evaluate both the evidence and reasoning underpinning these theories through a social and political geographic analysis focused on clustering, boundaries, and rank-size indices. Before these models can be evaluated in this fashion, however, we must account for one of the central causal factors purported to play a role in driving polity formation within these two theories: interaction, exchange, and trade. Indeed, the relationship between interregional trade and exchange and political complexity is a long-standing question in the field.

To take one famous example, the lapis lazuli source at Sar-i Sang in Badakhshan clearly supplied Mesopotamian markets with the entirety of its demand for this material (Casanova 2013; Law 2014). Less clear is what effect the extraction and circulation of this material had on the political organization of the societies in the source region and in all of the intermediary zones through which lapis must have traveled on its journey from Afghanistan to Mesopotamia (Tosi 1974a). Is it in fact the case that incorporation into networks of long-distance exchange created the conditions in these regions within which nascent elites could emerge, consolidate their privileged status, and begin to build early complex polities? The only way we can progress in answering this question is to first clarify the history of distinct patterns of interaction and the sequence of political-organizational developments in a given region. With respect to discerning the interrelations between these two domains, this chapter takes the first step by examining in greater detail the history of interaction between the Gorgan Plain and the larger world of which it was a part.
There are good reasons for why our understanding of the political geography of Bronze Age Iran has been linked so closely to interaction, exchange, and trade. In addition to the theoretical underpinnings of this link introduced in Chapter 1, when many of the most well-known Bronze Age sites of Iran were first excavated, the dominant culture-historical reasoning was based in a diffusionist model of comparative stratigraphy. Indeed, the earliest and most foundational excavations of Bronze Age sites in Iran took place during a period when considerable advances had been made in this domain (e.g., Childe 1925, 1926, 1929, 1930), most clearly illustrated by V. Gordon Childe, who himself took a keen interest in the results of work at sites such as Susa, Tepe Sialk, and Tepe Hissar (e.g., Childe 1946, 1952, 1954, 1957). This paradigm used “parallels” or “type-fossils,” i.e., material types shared between sites, as both evidence of interaction between regions and as keys to identify contemporaneous strata at different sites. Parallels were thus the link that could be used to establish synchronicity between layers of a newly excavated site and sites with contexts whose calendrical dates were known through a variety of means, particularly as reconstructed from ancient texts. When done with care, such work could afford surprisingly accurate estimations of absolute chronology (e.g., Arne 1945: 306-322).

The evidence for interregional connections during the Bronze Age in the Ancient Near East has not only been used for chronology-building, however. Scholars have long recognized that these material parallels index a range of social processes, providing evidence of contact and interconnection deep into prehistory. In the seventy years since Childe’s classic “The Urban Revolution” (1950) – which proposed a connection between regional trade, the development of craft specialization, the production of surpluses, and the emergence of elites and durable social inequality as part of the emergence of the state – it has become disciplinary common-sense that
long-distance trade is closely linked to the emergence of early complex polities both in the heartland and in the peripheral regions of the Ancient Near East (e.g., Kohl 2007: 221; Meyer et al. 2019). Thus, accounting for the relative importance of different regions and their relationships to their neighbors over time has been a persistent focus in Near Eastern Archaeology, whether the objective is to correlate known archaeological cultures to textually attested geographical-political entities or to understand the flow of commodities and raw materials across long distances (e.g. Barjamovic 2011; Laursen and Steinkeller 2017; Wilkinson 2014).


Regardless of disciplinary or methodological orientation, many scholars see shifting patterns of trade as casually or effectually linked to the emergence and decline of political complexity in the regions outside of Mesopotamia (e.g., Dales 1977; Kohl 2007; Possehl 2002; Tosi 1986; Wilkinson, T.C. 2014). One major problem with this literature, however, is a lack of careful attention to the conceptual and practical distinctions between trade, exchange, and interaction. Not only do the terms imply different modes of activity, they typically involve distinct categories of objects – goods, kin, commodities, gifts, etc. – changing hands and entail different kinds of social relations (Appadurai 1986; Keane 1997; Knappett 2011; Levi-Strauss 1948; Mauss 1954; Parkinson and Galaty 2010; Polanyi et al. 1957; Schortman and Urban 1987, 1992; Thomas 1991; Urban 2010).

While terms are often treated as synonymous, they can and should be explicitly differentiated (Adams 1974; Bauer and Agbe-Davies 2010; Kohl 1975; Renfrew 1975; Sabloff and Lamberg-Karlovsky 1975). Trade refers to formalized, market-based exchange, completed in a transactional moment of commodity $x$ for commodity $y$, which need not, but often does take place across otherwise powerful social and geographic boundaries (Bauer and Agbe-Davies 2010: 15; Meillassoux 1971; Oka and Kusimba 2008: 340-41). Exchange refers to the circulation of non-commoditized goods, information, and individuals outside of market contexts in which neither profit nor satisfaction-of-needs was a predominant motive (Earle and Ericson 1977; Ericson and Earle 1982; Firth 1939: 44; Godelier 1977; Gregory 1982; Kohl 1975; Rowlands 1987: 6; see also Graeber 2001). Interaction refers to the ceaseless and myriad encounters people
have between each other and with things and objects (Schiffer and Miller 1999: 4-5). Interaction
is the set of relational processes that encompass communicative encounters and mediate
between discrete events at differing spatial and temporal scales (Knappett 2011: 11-12). Thus,
trade is a specific range of behaviors constituting a subset of exchange, which is itself in turn
also a specific range of behaviors constituting a subset of interaction (sensu Tache 2011: 2).

It remains to be established, however, that the evident patterns of interregional
connections indexed by the presence of parallels in a variety of contexts across the Ancient Near
East in general, and in Greater Khorasan in particular (see below), can be plausibly interpreted
as evidence of “trade” in the sense of commodity transactions. To advance our understanding of
the relationship between trade, exchange, and interaction on the one hand and political
organization on the other, this chapter examines the physical-, cultural-, and political-
geographic context of the Gorgan Plain from the late-fourth to mid-second millennium BCE
(3.1), the models that have been developed to explain this relationship with reference to
Greater Khorasan (3.2), and how developments in the Gorgan Plain have been understood to
relate to larger-scale processes (3.3). In the final analysis, I argue that for much of the Gorgan
Plain’s Bronze Age history, the patterns of interaction in which it was involved were primarily
local and regional, and that only during the final stages of this sequence that it became involved
in the kind of long-distance exchange that might be understood as commodity trade.

3.1 Physical and Cultural Geography of Greater Khorasan

The lands east of Sumer (sensu Potts, T. 1994) – i.e., Fars, Kerman, the Helmand, the
Central Iranian Plateau, the Kopet Dagh Piedmont, the Tejen oasis, the Murghab delta, Bactria,
and the Gorgan Plain – have been understood to cohere as a cultural-geographic zone rooted in
a broadly shared historical trajectory of social, political, and economic transformations (Kohl
Part of this coherence stems from the clear evidence for material-cultural ties between these regions from the fifth millennium to the mid-second millennium (Lamberg-Karlovsky and Tosi 1973; Lamberg-Karlovsky 1985; Tosi 1977, 1979, 1986). Despite these connections and broad historical similarities across this vast zone, however, there are important regional differences within it.

Attempts to describe these differences has led to a profusion of toponyms used to aggregate smaller regions into groups of greater or lesser similarity, including Eastern Iran, Outer Elam, Turan, and the Indo-Iranian Borderlands, to name but a few (Tosi 1977: 46-47, 1979: 153-154; see also Hiebert and Lamberg-Karlovsky 1992; Lamberg-Karlovsky and Tosi 1973; Wright 1984). Of particular importance to this study is “Turan,” which Tosi defines as an aggregate of three sub-regions, one of which includes the Gorgan Plain: Southern Turkmenistan, the Eastern Alborz, and the Helmand. The first point to note here is that, connections to Southern Turkmenistan notwithstanding, the sites of the Helmand Basin are clearly part of the Indo-Iranian Borderlands and thus should not be considered as belonging to the same geographic subgroup as the first two sub-regions (Stein 1934). The second is that “Turan” is not a suitable toponym to describe either southern Central Asia or northeastern Iran, and for a variety of reasons should be struck from our archaeological vocabulary.  

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3 “Turan” is not primarily geographic designator; rather, it derives from an ethnonym first used in the Avesta to refer to a specific group of enemies of Zoroaster and his followers, who had no particular territorial anchor other than being neighbors of the Airyas (Boyce 1991). During the Sasanian period “Turan” retained its ethnic association, referring to the nomadic tribes and their lands north of the Oxus, beyond the dominion of “Iran” (Yarshater 1983). Subsequently in the Middle Ages, “Turan” became conflated with Turkic groups inhabiting this same territory, helped in no small part by Ferdowsi’s designation of “Turan” in the Shahnameh as the lands allotted to Fereydun’s son Tur to the northeast of Khorasan (Bosworth 1992; Payne 2016). “Turan” is therefore not exclusively a toponym, but when it does denote a geographic entity, it only partially overlaps with Tosi’s use of the term (see Bosworth 2011). Second, “Turan” has a sordid history of having been briefly fashionable in Victorian-era philology and physical anthropology. For example, the orientalist Max Müller proposed “Turanian” as a potential ursprache ancestral to the Altaic, Uralic, Dravidian and Caucasian language families, a dubious hypothesis
to use the historical Persian name for the region, i.e., “Greater Khorasan,” which encompasses Eastern Iran, Southern Central Asia, as well as northwestern and northern Afghanistan as (Rante 2015; see also Vahdati et al. 2019). Where it is necessary to retain Tosi’s usage of “Turan” for clarity, I have chosen to refer to the term in scare-quotes.

3.1.1 Physical Geography of The Gorgan Plain in the context of the Iranian Plateau

The Iranian Plateau is a physical-geographic and cultural region located in Western Asia. In terms of its landmass, the plateau averages approximately 900 meters above sea level in elevation and is bounded on all sides by mountains: by the Zagros Mountains to the west and south, the Alborz mountains to the north, and the Hindu Kush to the east. Beyond these ranges sit the Caspian Sea to the north, the Persian Gulf to the south and the Indus Valley to the southeast (Figure 3.1).

that has been debunked through rigorous applications of the comparative method (Driem 2001). “Turan” also appeared in Victorian racial pseudo-science in the work of J.W. Jackson, who proposed the existence of a “degenerate” Turanid race as a subtype of the Caucasian race, resulting from “Mongoloid admixture,” and characterized by militarism, anti-intellectualism, and tendency toward leader-worship (Jackson 1868; see also Koneczny 1962). For these reasons, this term can no longer be used uncritically.
The Iranian Plateau is far from flat or homogeneous; indeed, it is crossed by a number of smaller mountain ranges and depressions, including two great salt deserts in its eastern portion, the Dasht-e Kavir in the north and the Dasht-e Lut in the south. Overall, the plateau is extraordinarily arid, with long hot summers and little precipitation, but there are numerous micro-climatic zones within the plateau that are suitable for human habitation. Within this wide domain the primary areas of human settlement, whether ancient or modern, are primarily located in fertile strips of land located between the mountains and desert. These include areas that can be classified as piedmonts, intermontane valleys, and endorheic deltas. In each of these
classes of landforms, an agricultural way of life is possible, due to the varying configurations of arable soils and available moisture.

**Figure 3.2 Satellite image of a typical endorheic alluvial fan**

In fact, all three of these landform classes are the result of similar geological processes, and consequently offer similar affordances to an agricultural way of life. Whether the zone is classified as a piedmont, intermontane valley or endorheic delta, human settlement in these areas tends to concentrate in the distal zones of the alluvial fans of mountain streams (Figure 3.2). These alluvial fans are the result of the accumulation of waterborne sediment eroded out of the surrounding mountains, and due to their natural elevation gradients, make for an easily irrigable environment.

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4 https://en.wikipedia.org/wiki/Alluvial_fan#/media/File:Alluvial_fan_in_Iran.jpg
The principle difference between piedmonts, intermontane valleys, and endorheic deltas has to do with their elevation and position relative to the cline or anticline from which they emerge. Piedmont zones and intermontane valleys share the most in common, insofar as the primary difference between the two is elevation (the latter are at higher elevations) and their relative boundedness (in fact, the intermontane valleys are just two piedmont zones arrayed in parallel to each other, on either side of a river between two mountain ranges). Endorheic deltas are formed by similar processes but tend to occur at lower elevations than either piedmonts or intermontane valleys, and generally form at the terminus of rivers with a much larger channel and greater volume of discharge. Such environments tend to form where a large river debauches into a dry basin, whether a salt flat or a sandy shelf, rather than into a lake or ocean, as in the case of the Murghab Delta in southeastern Turkmenistan (Figure 3.3).

Generally speaking, the landmass of the Iranian Plateau receives very little rainfall due to being bounded on all sides by these high mountain ranges. The agricultural regime necessary
to sustain human communities, therefore, has typically been heavily dependent upon streams and rivers that descend from the mountains and hills that ring the outer edges of the plateau. Where surface waters are unreliable or unavailable, human settlement has historically been sustained by the *qanat* system, a technology which tunnels into aquifers at higher elevations and uses gravity to create a gradually sloping artificial underground channel that encourages water to flow the surface at lower elevations, where it can be used to irrigate croplands. This technology was not developed until well after the time period under discussion in this dissertation, however, meaning that Bronze Age settlement on the Iranian Plateau is largely restricted to areas where surface waters are naturally available.

The other major area of human settlement within the cultural zone of the Iranian Plateau is located in the adjacent lowlands, i.e., the Gilan-Mazandaran-Gorgan Plains to the north of the Alborz and Khuzestan to the south of the Zagros. These two areas consist geologically of alluvial plains situated on relict marine terraces (Tosi 1977: 46-49, Table 1). Both of these lowland areas are much more humid than the uplands of the Plateau, but for different reasons. In the case of the former, the concentration of wet air masses over the Caspian collide with the Alborz peaks and dump the greatest volumes of rain known anywhere in the entire Middle East on the region. In the case of the latter, several large rivers, i.e. the Karkheh, the Karun, and the Dez, among others, and numerous seasonal streams flow downward out of the Zagros in a steady annual discharge pattern that affords intensive irrigated agriculture.

In any event, one important difference between each of the sub-regions of the plateau to consider is the differential distribution of natural resources aside from those used for agriculture. Some regions have abundant metallic ores (e.g., the southern Central Plateau [see Rehren et al. 2012]), or are rich in particular categories of desirable and workable stones (e.g.,
southern Kerman [see Pittman 2018b]), whereas others appear to have little mineral wealth, aside from what can be gained via exchange with neighboring areas (e.g., the Gorgan Plain).

3.1.1.1 Physical Geography of The Gorgan Plain

The Gorgan Plain (دشت گرگان [Dasht-e Gorgan Plain]) is a unique environment within Iran and the Middle East more broadly in that it is a humid alluvial plain, well-suited for both rain-fed and irrigated agriculture. Located in the southern and western portions of the province of Golestan, the Gorgan Plain is bounded to the west by the Caspian Sea, to the south by the high ranges of the Alborz Mountains, to the east by the uplands of Iranian Khorasan, and to the north by a steppe-desert known as the Turkmen Sahra.

The Gorgan Plain extends approximately 200 km east-west and 50 km north-south, encompassing a physical-geographical region that comprises a transitional gradient zone that ranges from a humid and forested piedmont (with elevations between 100-500 masl) in the south, to a central alluvial-loess plain located between this piedmont and the Gorgan Plain River, to a sandy steppe-desert that extends far to the north. This overall transitional character is manifest in the region’s topography and geomorphology, as well as in its hydrology, climate, and vegetation regime (Zanjani 2002). The “core zone” of both archaeological and modern settlement in the region is primarily located in the central area, i.e., the alluvial-loess belt located between the piedmont to the south and the steppe-desert to the north (see Forest-Steppe Boundary in Figure 3.4).
Figure 3.4. Topography and Significant Locations of the Region

Figure 3.5 Watershed of the Atrek River and Gorgan Plain River Network

Map produced by UNEP/GRID-Arendal, August 2008
The Gorgan Plain is well-watered in comparison to all but its western neighbors in Mazandaran and Gilan. The reason for this is two-fold: (1) two large rivers, the Atrek River to the north and the Gorgan Plain River to the south, both of which rise in the highlands of the Kopet Dagh mountains to the east and debauch into the Caspian Sea to the west (Figure 3.5), and (2) the region receives comparably abundant rainfall due to being located on the windward side of the Alborz Mountains (Figure 3.6).

In terms of the river system, the Atrek and Gorgan Plain rivers both have many tributaries, but the area of densest archaeological settlement is characterized by a network of streams and rivers that flow south to north from the gorges and foothills of the Alborz Mountains into the Gorgan Plain River, including the Qara Su, Hajilar, Chehel-Chai, and Narmab.
Because the central piedmont-alluvial plain slopes extremely gently from east to west (averaging a slope of 0.06%), from an elevation of approximately 100 masl near the foothills of the Alborz to an elevation averaging ca. 30 meters below sea level along the coast of the Caspian, these rivers meander widely and do not cut deeply into the alluvial and loess deposits that constitute the primary soil types of the region (Ehlers 2002). Nevertheless, these rivers feature well-developed levee systems and terraces, with the consequence that a network of oxbow lakes and swamps surround the main channels (Figure 3.7).

Figure 3.7 Main Gorgan Plain River Channel intersecting with one of its tributaries

Precipitation statistics show that the region experiences two atmospheric moisture gradients (Figure 3.8). Precipitation decreases in amount from south to north and also west to east; this is largely due to wind-patterns over the Caspian Sea that carry moist air masses into the region. These masses collide with the Alborz mountains and deposit rain and snow in the mountains and rain along the foothill belt (Figure 3.6). Consequently, in the southernmost
settlement areas of the Gorgan Plain, rainfall of 600-800 mm per annum is not unusual, whereas in the northernmost settled areas of the region, rainfall can be as little as 100 mm annually (Ehlers 2002). In general, the core of the settled agricultural zone of the Gorgan Plain has a moderate and humid Mediterranean-like climate according to the Köppen climate classification system (Figure 3.9). The other zones of the region are the semi-arid plains and hills to the north and northeast in the province and the mountainous alpine zone to the south of the central piedmont-alluvial plain (Figures 3.10-3.11)

Figure 3.8 Iran Precipitation Statistics

Figure 3.9 Iran 40-year Climate Classification Map (Beck et al. 2018)
Köppen-Geiger climate classification map for Iran (1980-2016)

Figure 3.10 Land Use Zones in the Gorgan Plain (Shapefiles by Kristen Hopper, 2018)
The natural vegetation cover of the region reflects these climatic variations (Figure 9). Historically, both the foothills of the Alborz and parts of the plain proper were covered with dense forests. Now, smaller tree-stands, primarily located in and around the sizeable alluvial fans that spread out at the foot of the Alborz skirt remain as refugia. The gradient of aridity extends to the north, and corresponds to a typical steppe-vegetation regime dominated by grassland vegetation. North of the Gorgan Plain River, the vegetation transitions to a xylophitic regime, typical of a region with such salty and alkaline soils (Ehlers 2002).

Figure 3.11 Terrestrial Eco-Zones of the Gorgan Plain

According to the MODIS land-cover classification system, the aforementioned ecological zones can be characterized as follows: the piedmont-forest zone consists of “Mixed Forests,” the

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Data Source: https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world
core area of archaeological settlement consists of “Croplands,” the marginal area of archaeological settlement, i.e., the steppe-transition zone is considered “Open Shrublands,” and finally, the Turkmen Sahra proper, to the north is considered “Barren.” As a consequence of all these factors, the core settlement region of the Gorgan Plain is more well-suited for rainfed agriculture than many of the surrounding regions. Indeed, it features one of the largest contiguous zones of croplands in Iran today (Figure 3.13), with a comparably long growing season of five-to-seven months (Figure 3.14). This growing season is shorter than that of Mazandaran and Gilan to the west, but longer than those of Semnan to the south or the provinces of Iranian Khorasan to the east.

Figure 3.12 MODIS Landcover classification of Golestan Province

Historically, the primary crops of the Gorgan Plain have been wheat, barley, rice, and cotton (Zanjani 2002). Unfortunately, not a single archaeobotanical study has been conducted
on sites excavated in the region, though charred seeds of quince (*cydonia oblonga*) are reported from Shah Tepe (Arne 1945: 325). Those subdivisions of the region which are unsuitable for rainfed agriculture (due to severe slopes in the south and aridity in the north) are primarily used as pasture for cattle, sheep, goats, donkeys, as well as camels (especially in the north).

**Figure 3.13 Iran Croplands Distribution**

*Map of Iran’s Croplands (data from GlobCover)*

1. Aborçz
2. Ardabil
3. Bushehr
4. Chaharmahal Bakhtyari
5. East Azerbaijan
6. Estehan
7. Fars
8. Gilan
9. Golestan
10. Hamadan
11. Hormozgan
12. Ilam
13. Kerman
14. Kermanshah
15. Khuzestan
16. Kohgiluyeh Boyer Ahmad
17. Kurdistan
18. Lorostan
19. Markaz
20. Mazandaran
21. North Khorasan
22. Qazvin
23. Qom
24. Razavi Khorasan
25. Semnan
26. Sistan Baluchestan
27. South Khorasan
28. Tehran
29. West Azerbaijan
30. Yazd
31. Zanjan
An important aspect of the Gorgan Plain’s physical geography from an archaeological point of view that has remained thus far unmentioned is its general similarity to Mesopotamia insofar as the core settlement zone of the region lacks natural resources aside from abundant water and quality farmland. The highlands of the Alborz to the south and the uplands of Iranian Khorasan to the east are known to be rich in cupriferous deposits and other mineral and ore deposits. Perhaps most important among these are enormous belts of calcite-gypsum formations which are used in an industrial capacity today. These deposits likely bear a variety of semi-precious stones such as agates and chalcedonies as well as softstones such as alabaster and soapstone (Ghorbani 2013). Ancient mines have yet to be identified, however, and likely never will be located due to ongoing modern exploitation of these deposits, which has in all probability already erased any trace of prehistoric activity in these areas.
The final aspect of the region’s physical geography concerns the routes that pass through the region (Figures 3.15-3.16). Historically and archaeologically, the principle corridors of transportation and movement connect the Gorgan Plain to its neighbors along two primary axes. The first is travel east-west, from Mazandaran to the uplands of Iranian Khorasan. The primary option for crossing into the eastern Alborz-Kopet Dagh highlands is to travel up the Gorgan Plain to Gonbad-e Kavus, and cross passes through the mountains to the Upper Atrek valley, which extends several hundred kilometers to the east. The headwaters of the Atrek region feature two key passes for transportation, one to the north via the Darreh Gaz, which makes accessible the Kopet Dagh piedmont, and the other to the southeast, which leads to the Kashaf Rud basin, i.e., Nishapur and Mashhad, and all points east and north (i.e., Transoxiana), as well as south (i.e., Sistan, Baluchistan, the Indus, and the Persian Gulf).

Figure 3.15 Simulated Corridors of Movement in northeastern Iran
The second axis of transit from the Gorgan Plain runs north-south, connecting the region to the central Iranian Plateau immediately to the south across the Alborz. There are three primary passes across the Alborz in the vicinity of the Gorgan Plain, the Sari-Semnan pass furthest to the west (located in Mazandaran province), the Shah-Kuh pass from Gorgan Plain to Damghan in the center, and the Khosh-Yaylaq pass from Gonbad-e Kavus to Shahrud in the east via Bastam (Figure 3.15). No archaeological study of these passes has been conducted, but based on historical accounts, the easiest of these passes to traverse is the easternmost. In any case, once a traveler had passed through the Alborz to present-day Semnan province (whether at Semnan, Damghan, or Shahrud), they would be well-situated to travel speedily along the famous east-west route, later known as the Great Khorasan Road, which historically in its eastern segment connected Rayy (i.e., Tehran) to Qumis (i.e., Damghan) to Neyshabur (i.e., Nishapur) via a series of well-traveled routes hugging piedmont flanks of the southern ranges of the Alborz mountains (Figure 3.16). The further reaches of this famous historically attested route extend at least as far as Merv (i.e., Margiana) in Turkmenistan in the east and Baghdad in the west.
Thus, the Gorgan Plain was never far from a major historically-known arterial transit corridor. Nevertheless, aside from Tepe Hissar, located at the terminus of the Shah-Kuh pass, the Gorgan Plain was consistently much more closely related culturally to its neighbors to the immediate west (i.e., in Mazandaran – see Mahfroozi and Piller 2011), to the north (i.e., in the Sumbar – see Khlopin 1986, 2002), and to the east (i.e., in the Kopet Dagh foothills – see Hiebert et al. 2003; Harris 2010; Masson 1988). Unfortunately, there are no archaeological reports from surveyed or excavated sites along or in any of these passes, with the exception of Omran Garazhian’s work in the valleys of the Middle Atrek (i.e. Garazhian 2007; Garazhian and Askarpour 2011). Nevertheless, it is abundantly clear from Google Earth imagery that prehistoric mounded settlements with similar surface morphology to those found in the central settlement zone of the Gorgan Plain are easily located in the middle Atrek valley, as well as in the Chandyr...
and Sumbar valleys just to the north, suggesting that this was perhaps the preferred route to
the east during the periods in which the Gorgan Plain was most closely connected culturally to
the Kopet Dagh piedmont. Only later, with the advent of the BMAC does it appear that the
Plateau route became more important for the Gorgan Plain, as evidenced by finds of BMAC-
related material culture at sites along this route on the Plateau such as Tappeh Chalow (Biscione
and Vahdati 2011; Vahdati et al. 2019) and in the Gorgan Plain itself, such as at Bazgir, located at
the terminus of the easiest pass across the Alborz from the Plateau route to the plain (Abbasi
2016; Nokandeh et al. 2006).

3.1.2 Cultural and Political Geography of Greater Khorasan

With respect to the cultural geography of the Iranian Plateau, it can be divided into two
broad zones (Tables 3.1-3.2). Previous delineations of these zones into “Outer Elam” and
“Turan” based on a northwest-to-southeast axis running along the eastern edge of the Zagros
mountains no longer obtain, or at the very least are much more blurred than had previously
been assumed (cf. Tosi 1979: 150-151). The main reason for this reconfiguration is that due to
the discovery of the Jiroft civilization (Majidzadeh 2003), much greater connection along a
north-south axis has been demonstrated (Majidzadeh and Pittman 2008; Pittman 2018a,
2018b). In particular, the clear links between Kerman and Transoxiana, especially during the
later centuries of the 3rd millennium, have called into question previous ways of aggregating
cultural-geographic zones across this wide area. Figure 3.17 therefore follows Philip Kohl’s
geographic framework for identifying contiguous cultural zones within the broad category of the
“secondary states east of Sumer” (2007: 214ff.).
Each of these regions has its own unique trajectory of settlement, distribution of mineral and metallic resources, hydrography, climate, and topography. There are some convergences across the broad zone, as can be observed from Tables 3.1-3.2, but even these similarities flatter to deceive. All of the regions can be situated historically within a way of life established at least as early as the Neolithic, but each came into increasing contact with neighbors near and far over the course of the millennia, peaking during a period during the latter half of the third millennium, in a historical conjuncture variably known as the “Bronze Age World System” (Kohl 1978, 1987) the “Middle Asian Interaction Sphere” (Possehl 2002) or “L’âge des échanges inter-iraniens” (Amiet 1986). The key features and developments that tie all of these regions together during this period are interregional trade contacts, the increasing specialization of craft production, the increase in size and complexity of central sites and some form of social stratification. In certain cases, monumental architecture and elite burials are also
found, all of which share in a differential and partially overlapping set of status symbols, elements, and motifs (Tosi 1977, 1986; Figure 3.18).8

Table 3.1 Ecosystem Types and Sites of the North Zone

<table>
<thead>
<tr>
<th>Type of Ecosystem</th>
<th>Southern Turkmenistan</th>
<th>Eastern Alborz</th>
<th>Central Plateau</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kopet Dagh</td>
<td>Tejen/Murghab</td>
<td>Damghan</td>
</tr>
<tr>
<td>Piedmont pre-desert plain</td>
<td>Altyn Depe Namazga Depe Ulug Depe</td>
<td></td>
<td>Tepe Hissar</td>
</tr>
<tr>
<td>500-1000 m.a.s.l.</td>
<td></td>
<td></td>
<td>Chalow</td>
</tr>
<tr>
<td>Intermontane valleys</td>
<td></td>
<td></td>
<td>Ozbaki Sofalin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salk Qoli Davish Arisman</td>
</tr>
<tr>
<td>Alluvial Plains on marine terraces</td>
<td>Shah Tepe Tureng Tepe Bazgir Narges Tepe</td>
<td></td>
<td>Yarim Tepe (DG) Parkhui Shahrak-e Firuzeh Qal'eh Khan</td>
</tr>
<tr>
<td>0-500 m.a.s.l.</td>
<td></td>
<td></td>
<td>Khorvin</td>
</tr>
<tr>
<td>Endorheic delta basins</td>
<td>Khapuz Depe Gonur Depe Togolok</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2 Ecosystem Types and Sites of the South Zone

<table>
<thead>
<tr>
<th>Type of Ecosystem</th>
<th>Helmand</th>
<th>Kerman</th>
<th>SW Iran</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qandahar</td>
<td>Sistan</td>
<td>Dasht-e Lut</td>
</tr>
<tr>
<td>Piedmont pre-desert plain</td>
<td></td>
<td></td>
<td>Shahdad</td>
</tr>
<tr>
<td>500-1000 m.a.s.l.</td>
<td>Mundigak</td>
<td></td>
<td>Konar Sandal Tepe Yahya</td>
</tr>
<tr>
<td>Intermontane valleys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alluvial Plains on marine terraces</td>
<td></td>
<td></td>
<td>Susa</td>
</tr>
<tr>
<td>0-500 m.a.s.l.</td>
<td></td>
<td></td>
<td>Shahr-i Sokhta</td>
</tr>
</tbody>
</table>

In what follows, I introduce the cultural geography of the Gorgan Plain’s near neighbors within Greater Khorasan, with a focus on Southern Turkmenistan and the highlands of

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8 Whether all of this evidence together is an indication of the emergence of true urbanism on the plateau during the third millennium is contested (e.g., Thornton 2012).
northeastern Iran. Other regions will discussed in some detail as well; more attention is paid in particular to the Iranian Central Plateau, as this zone is much more culturally related to the Gorgan Plain than the southern zone – i.e., the Helmand, Fars, Khuzestan, and Kerman – which will be introduced, but not discussed to the same degree of detail.

Table 3.3. Alignment of Regional Sequences

<table>
<thead>
<tr>
<th>Dates</th>
<th>Central Plateau</th>
<th>Damghan</th>
<th>Gorgan Plain</th>
<th>Kopet Dagh</th>
<th>Margiana</th>
<th>Helmand</th>
<th>Kerman</th>
<th>Fars</th>
<th>Khuzestan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700-1600</td>
<td>Sagzabad I</td>
<td>Qeytariyeh Qoli Darvish</td>
<td>Tureng IIIc</td>
<td>NMZ VI</td>
<td>Takhirbai</td>
<td></td>
<td></td>
<td></td>
<td>Susa VI</td>
</tr>
<tr>
<td>1800-1700</td>
<td>Qoli Darvish</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur South</td>
<td>Sokhta IV2</td>
<td></td>
<td></td>
<td>Kaftari</td>
</tr>
<tr>
<td>1900-1800</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-1900</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2100-2000</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2200-2100</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2300-2200</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2400-2300</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2500-2400</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2600-2500</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2700-2600</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2800-2700</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2900-2800</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3000-2900</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3100-3000</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3200-3100</td>
<td>Tureng IIIc</td>
<td>Hissar A</td>
<td>Tureng IIIc</td>
<td>NMZ V</td>
<td>Gonur North</td>
<td>Sokhta IV1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9 Sources: Fazeli et al. 2009: Table 7; Gürsan-Salzmann 2016; Olson and Thornton 2019; Chapter 3, this volume; Salvatori and Tosi 2005: 290, Fig. 13; Majidzadeh and Pittman 2008; Thornton 2009; Pollard et al. 2013, Table 9; Pittman 2013.
3.1.2.1 Greater Khorasan (the Northern Zone)

Southern Turkmenistan can be divided into two zones of archaeological settlement, the Kopet Dagh Piedmont on the one hand and the Tejen and Murghab Deltas on the other. The first is located along the northern slopes of the Kopet Dagh mountains, where a number of tell-settlements are located, including sites that reached proto-urban or urban proportions during the mid-to-late third millennium, such as those larger than 30 ha, i.e., Altyn Depe, Namazga Depe, and those between 10-15 ha, i.e., Ulug Depe (Tosi 1979). The agricultural regime supporting these settlements is partly based on rainfall, partly based on mountain runoff that
collects in rivers in the wettest areas and seasonal streams in the drier zones (Berking et al. 2017; Harris 2010).

**Figure 3.19 Prehistoric Sites in Southern Turkmenistan (Bonora and Vidale 2013: 141)**

Regional perspectives on settlement trajectories are extraordinarily difficult to parse for this region due to the form of investigation pursued by the Southern Turkmenistan Interdisciplinary Archaeological Expedition (YuTAKE), which was focused on excavating the largest sites and which did not conduct anything remotely resembling systematic survey (Kohl 1981). Consequently, any claims about the organization of archaeological settlement systems cannot be regarded as representative or reliable. No archaeological study of the mineral resources of the Kopet Dagh has been conducted, nor has any sourcing study of materials excavated from these sites been performed. The second zone is located to the east-southeast of the first, and consists of two endorheic delta fans, the first of the Hari-Rud, which terminates in...
the Tejen delta and the second, the Murghab river, which fans out far to the north in the sands of the Karakum desert. These areas comprise marshy wetlands surrounding and created by numerous branching river channels and are still today intensively farmed.

The culture history of this region is complex but suffice it to say that many of the excavated settlements, whether large or small, have proven to have been occupied for great durations (Masson and Sarianidi 1972). In any case, the type-site for the pre-Iron Age cultures of southern Turkmenistan is Namazga Depe. The principle cultural eras that intersect with the chronological interval of this dissertation include the Namazga III-VI periods. During the Namazga III (late 4th to early 3rd millennium) period the principle pottery type was a black or brown painted on buff ware with a restricted inventory of forms, though a variety of small jars seem to have predominated (Bonora and Vidale 2013). During this period, the sites of Southern Turkmenistan had wide-ranging exchange contacts, principally with neighbors to the south, as far as Shahr-i Sokhta (Lamberg-Karlovsky and Tosi 1973). The Namazga IV period (early-to-mid 3rd millennium) witnessed a transition in pottery types and a growth of the large central sites, as well as a reduction in contacts with the world to the south and the beginning of the connection to the west with the Gorgan Plain – for the first time, northeastern Iranian style grey wares appear in the assemblages of these sites in small quantities, though the sites furthest west have up to 30% grey ware in their assemblages (e.g., Ak Depe [Kohl 1984: 100-107]). The Namazga V period (mid to late 3rd millennium) is recognized as the peak of the “urban phase” in the Kopet Dagh piedmont, with the greatest internal differentiation and complexity of organization in the large central sites (Masson 1988). A new pottery tradition of wheel-thrown plain wares with complex forms emerged, as well as evidently a new form of kiln technology (Kircho 2009: 21-25). During this period, the intensity of trade contacts between these sites and their near and
far neighbors increased (e.g., Hiebert 1994; Wilkinson 2014). The Namazga V period is also the
one in which the Bactria Margiana Archaeological Complex (BMAC) truly emerges as a cultural
and political force in the lowland deltas of southeastern Turkmenistan, southern Uzbekistan and
Tajikistan, and in northern Afghanistan (i.e., a belt of river valleys that either empty into the
Amu Darya or form endorheic deltas emptying into the Kara Kum).

**Figure 3.20 Map of Bronze Age Margiana (Hiebert 1994b)**

*Figure 1. Bronze Age sites of Margiana. Shaded areas on insert show approximate distribution.*
It is important to note that the BMAC was very poorly understood at the time of most of Tosi’s writing on the subject of proto-state structures in eastern Iran (Lamberg-Karlovsky 2013a, 2013c). In any case, the BMAC is represents a continuation of cultural traditions from the Kopet Dagh Piedmont, but with some new additions in terms of iconographic, architectural, and craft-production repertoires (Hiebert 1994a; Sarianidi 1981). Particularly notable is the emergence of fortifications and the resumption of intensive connections with regions to the south, this time with Kerman and particularly Jiroft, rather than the Helmand as had been the case nearly a millennium prior during Namazga III (e.g., Pittman 2014, 2019; Salvatori 2008a; Vidale 2017).

The final period, Namazga VI (early 2nd millennium) has been understood as one of collapse in the Kopet Dagh Piedmont, where all the major sites are abandoned, and where the central polity of the BMAC focused at Gonur North fragments into smaller sub-regional competing chiefdoms or khanates (Hiebert 1994a; Hiebert and Lamberg-Karlovsky 1992; Lamberg-Karlovsky 2012, 2013b; Salvatori 2008a).

The Eastern Alborz is a complex zone, comprising, in addition to the lowlands of the Gorgan Plain and Mazandaran, two different types of highland environment – first, pre-desert alluvial fans such as the one in which Tepe Hissar is situated, and second, intermontane valleys, such as the middle and upper Atrek, the Kal-e Shur in the western half of the highlands, and the Kashaf Rud in the eastern half (Figure 3.21). The Atrek river flows west into the Gorgan Plain, and consequently, sites in this region are closely connected culturally to those of the Gorgan Plain. The Kal-e Shur’s headwaters are located in the vicinity of the modern city of Esfarayen and it flows westward from there, turning south below Jajarm, where it empties into the marshlands at the edge of the Dasht-e Kavir, the massive inland salt desert. The Kashaf Rud headwaters are located in the vicinity of Quchan, from which it flows to the southeast, passing Mashhad before
continuing to descend to join with the Hari-Rud flowing out of the Hindu Kush before turning north; consequently, many of the archaeological sites in this valley bear strong similarities to those of southeastern Turkmenistan.

Figure 3.21 Map of Prehistoric Northeastern Iran (adapted from Dyson and Thornton 2009: 2)

Major sites dating to this period located in the western zone of the Eastern Alborz (in addition to Tepe Hissar) include Qal’eh Khan and Tappeh Chalow (Garazhian and Askarpour
key excavations in the eastern half of this region include those at the site of Nishapur-P (Hiebert and Dyson 2002), Tappeh Borj (Dana 2006), and Shahrak-e Firuzeh (Basafa and Rahmati 2012). Mineral resources in these both of these zones are abundant due to proximity to mountain ranges which are known to be rich in calcite deposits, polymetallic ores, and in the case of the areas nearest to Nishapur, turquoise (Ghorbani 2013). Few regional surveys have been conducted in this region, thus making commentary on settlement patterns difficult. Many sites dating to the Bronze Age are known in this region (Kohl et al. 1982), particularly in the Upper Atrek (Ricciardi 1980) and in the Darreh Gaz (Kohl and Heskel 1980) but these have been only published as preliminary reports, and in the case of the Italian survey of the Atrek, all of the written material that was intended to be published in the late 1970s and much of the data has been reported as lost (Biscione personal communication 2016). The Iranian Revolution put an end to archaeological survey in this region for nearly three decades. Nevertheless, a recent survey of Esfarayen county in North Khorasan province reported six sites dating to the Chalcolithic and four sites dating to the Bronze Age, all small settlements less than 2 ha in size located in the piedmont zone between the massif of the Shah-e Jahan range to the north and the Kal-e Shur to the south. Sites of both the Chalcolithic and Bronze Age reportedly feature ceramic inventories characteristic of both the Gorgan Plain style and Namazga style craft traditions (Vahdati 2015a).

At all stages of the ca. 3200-1600 BCE interval, the sites of these areas are more or less closely connected culturally to each other, partially sharing inventories of most major categories of material culture, in particular ceramics, metals, beads, and figurine types. One important point to note is that there does appear to be a cultural frontier within this zone, especially in terms of ceramic traditions, dividing it into an eastern and western portion. The western portion
has much more in common culturally with Tepe Hissar and the Gorgan Plain, whereas the eastern zone has much more in common with the Kopet Dagh piedmont and Margiana-Bactria. Indeed, these areas have been thought of as a dual-frontier; the former, the easternmost frontier of northern Iran, and the latter, the northernmost frontier of eastern Iran. The boundary, marked by the red vertical line in Figure 5 above, appears to run northeast-to-southwest from the Darreh Gaz in the north to Sabzevar in the south (Thornton 2013). Indeed, it may be the case that Esfarayen county, surveyed by Vahdati, is the true frontier, the zone of encounter where these two cultural-geographic domains meet and comingle most directly.

Figure 3.22 Locations of Central Plateau Sub-Regions
The Central Plateau constitutes an arc of agricultural lands at the intersection of the Alborz and Zagros mountains and is home to two well-documented zones of archaeological settlement, one along the southern edge of the Alborz mountains and another along the northeastern edge of the Zagros mountains. The first zone consists of a number of large and wide plains, rimming the foothills of the Alborz, starting from east to west with the Tehran Plain, the Karaj Plain, and the Qazvin Plain (Figure 3.22).

Figure 3.23 Archaeological Map of the Tehran Plain (Fazeli et al. 2007: 274)

![Archaeological Map of the Tehran Plain](image)

*Fig. 6. Map of the Tehran Plain showing the location of Tepe Pardis and the 2006 survey zone.*

The second zone of archaeological settlement, i.e., the southern portion of the Central Plateau, consists of a thinner strip of piedmont stretching between Qom and Kashan. Each of these sub-regions shares a common geomorphological setting, insofar as they are comprised of

111
three successive environmental zones: piedmont foothills, flat central plains, and pre-desert margins. Archaeological and historic settlement tends to be concentrated in the flat central plain (Fazeli et al. 2007: 274).

Figure 3.24 Map of the Savajbulaq Plain (after Mousavi 2005a: Figure 1)

tokens, and characteristic ceramic types (Hessari and Saeedi 2017; Saeedi 2015: 250-254). These sites are cross-dated via their ceramic traditions to Sialk IV, Arisman C, and late Hissar II, i.e., Schmidt’s IIB Graves and Gürsan-Salzmann’s D-C Transitional period (Fazeli et al. 2009; Gürsan-Salzmann 2016).

**Figure 3.25 Archaeological Map of the Qazvin Plain (Fazeli et al. 2009: Figure 1)**
The Karaj area has been surveyed twice recently by Ali Mousavi (2005a, 2005b), focusing on an area more properly known as the Savajbulaq Plain, which lies between Karaj (just to the west of Tehran) and Qazvin, below the village of Hashtgerd (Figure 8). This work resulted in the identification of 21 sites related to the Late Bronze and Early Iron Ages (Mousavi 2005a: 89). During the 20th century, important sites such as Ganj Tepe Khorvin and Mushalan were excavated in this area (Hakemi 1950; Mousavi 2005b; Vanden Berghe 1964). More recently, the site of Ozbaki was discovered, which has generated interest due to its long archaeological sequence and the suggestive presence of a Proto-Elamite tablet among its published finds (Hessari and Saeedi 2017; Majidzadeh 2001).

In general, settlement in this plain appears to be temporally concentrated in the fifth-fourth millennia and in the second millennium, with the third millennium representing a severe contraction in settlement, or indeed a possible hiatus for most of the millennium (Mousavi 2005a: 90). The two sites that were re-occupied during the very late third or early second millennium include Igherbulaq B, which features grey ware ceramics in the Hissar-Gorgan Plain style, and Tepe Mohammadabad, a high mound with a sequence dating from the fifth millennium to the Safavid era (Mousavi 2005a: 90). The second millennium contexts from Tepe Mohammadabad feature ceramics with strong connections to those of Hissar IIIC (Mousavi 2005a: 90; see Schmidt 1933: Plates XCVIII-C).

Indeed, Mousavi sees these two sites as the cultural and stratigraphic link between the final phases of the Bronze Age traditions of northeastern Iran – e.g. Tureng IIIC2, the sites of the Sumbar valley, and a site discovered in the vicinity of Shahroud in 1990, which has yet to be fully published – and the Early Iron Age ceramic assemblages of Khorvin, Qeytariyeh, and Hasanlu (Mousavi 2005a: 92-95). The Qazvin Plain has been the subject of considerable archaeological
exploration, particularly in the southernmost portions of the area, where four key prehistoric sites have been excavated (Figure 9): Chehar Boneh, Qabrestan, Sagzabad, and Zagheh (Fazeli et al. 2005, 2009; Negahban 1976, 1977, 1979). As is true of the Tehran Plain and the Karaj Plain, evidence for third millennium occupation is scant, though Tepe Sagzabad is reoccupied during the Late Bronze Age, ca. 1800 BCE (Pollard et al. 2012: Table 16). Two other small sites in the vicinity of Qazvin have materials dating to the third millennium, Tappeh Esmailabad (Figure 3.25, top) and Tappeh Shizar, located ca. 125 km northwest of Qazvin in the mountains behind the modern city of Zanjan.

The southern Central Plateau is best known archaeologically from excavations at the sites of Qoli Darvish, Tepe Sialk and Arisman (Azarnoush and Helwing 2005; Chegini et al. 2004; Ghirshman 1938; Helwing 2006; Sarlak and Aqhili 2005; Shahmirzadi 2006). This latter zone is known to have major copper deposits, and evidence for prehistoric mining and pyrotechnological development is substantial, especially from Arisman (Chegini et al. 2004; Helwing 2006; Rehren et al. 2012).

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10 Chehar Boneh dates to the sixth millennium BCE, i.e., the Late Neolithic; Zagheh dates to the fifth and fourth millennia BCE, i.e., the Transitional Chalcolithic; Qabrestan dates to the late fifth to late fourth millennia BCE, i.e., the Early-Late Chalcolithic; and Sagzabad dates to early-middle second millennium BCE, i.e., the Late Bronze Age (Fazeli 2009: 10, Table 7).

11 While Tappeh Esmailabad is one of the type sites for the Transitional and Early Chalcolithic phases of the fifth and fourth millennium with a less substantial third millennium occupation, Tappeh Shizar’s cultural sequence covers the Middle and Late Chalcolithic, and the Early Bronze Age. The Early Bronze age ceramics have been connected to the Kura-Araxes horizon, as well as Douranabad in the Qazvin plain, the sites of Yaniq and Haftavan in the Urmia Basin, and Godin IV in Hamadan province. The Late Bronze Age ceramics of Shizar are most similar to the polychrome wares of Haftavan Tepe and Tepe Sagzabad of the Qazvin Plain (Mostafapour, 2011: 121-4; Pollard et al 2012: 115).
Tappeh Sialk looms large in the archaeology of the Iranian Plateau, as it was one of the first two major prehistoric sites to be excavated in the region and its early publication by Roman Ghirshman made Tappeh Sialk into an indispensable type-site (Ghirshman 1938). Tepe Sialk comprises two mounds, a Neolithic settlement occupied primarily during the 6th millennium BCE (i.e., the North mound) and a Chalcolithic, Bronze, and Iron Age mound that was inhabited continuously from the 5th millennium to the early 3rd millennium BCE, before an episode of abandonment and resettlement in the Late Bronze and Early Iron Age (SoltySiak and Fazeli 2009). Tepe Sialk was an important metal production center during the Sialk III (Chalcolithic) and Sialk IV (Early Bronze Age) periods, as attested by the significant amount of metallurgical
remains recovered from the site in recent excavations, including slag, crucibles, molds, and other production debris (Nezafati et al. 2008). Sialk IV has two subphases, the first dating to the second half of the fourth millennium, and the second dating to the early third millennium. The earlier of these two phases is linked with the Uruk/Jemdet Nasr horizons, and the latter phase is linked with Susa III (i.e., Proto-Elamite).

The recently discovered site of Arisman, located 60 km southeast of Sialk, is notable for several reasons, perhaps most important among them that the excavations begun there in 2000 represented the first joint-international archaeological expedition between foreign and Iranian researchers since the Islamic Revolution (Azarnoush and Helwing 2005). With respect to its culture-history, Arisman dates to the late Sialk III and Sialk IV phases, spanning the latter half of the fourth millennium and the early third millennium. The site extends over an area of ca. one square kilometer and was formed by a constantly shifting horizontal stratigraphy rather than the build-up of a settlement mound. The site is significant for the considerable evidence it has shown for being the location of a major copper-processing center. These material remains include kilns, stone tools, crucible fragments, molds, furnaces, and massive quantities of copper slag, all of which indicate that the settlement’s occupants were engaged in the smelting of copper ores and the mold-casting of tools. The site shows unequivocal evidence for large-scale specialization in the processing of copper, contemporary with Sialk III<sub>6-7</sub>, Sialk IV<sub>1</sub> and Ghabristan IV (Azarnoush and Helwing 2005: 209; Chegini et al. 2000: 297; Matthews and Fazeli 2004: 66).

Qoli Darvish was once a substantial settlement, extending over an area of ca. 50 ha with a height of up to 30 meters, but much of the site was destroyed by a highway construction project before archaeologists could conduct salvage excavations. Despite the damage to the site, recent excavations at the site of Qoli Darvish near Qom have revealed a complete sequence
of consisting of 27 architectural phases comprising cultural layers spanning the interval from the Early Bronze Age I (i.e., Sialk IV) to the Early Iron Age (Fahimi 2019; Pollard et al. 2013; Sarlak 2010, 2011). The Sialk IV (i.e., Early Bronze) layers are characterized by both Uruk-related ceramic assemblages (buff wares, with beveled rim bowls, four-lugged jars, and trays) as well as pottery traditions connected to the north central plateau, such as Hissar II style burnished grey wares and “plum wares” associated with Esmailabad, Godin V, and Giyan IV. The Early Bronze Age I phase at Qoli Darvish also features a large number of seals and sealings associated with the Proto-Elamite phenomenon as well as small metallurgical workshops. The second phase of occupation at Qoli Darvish, i.e., the Middle and Late Bronze Ages, is characterized by four ceramic traditions, engraved burnished grey wares that continue from the previous phase, burnished brown wares that are restricted to the Middle Bronze Age layers, and Late Bronze Age assemblages of slipped red wares and polychrome wares associated with Tappeh Sagzabad, Tappeh Shizar, and Haftavan VIb. In this regard, Tappeh Qoli Darvish is notable for being the only site located in the Central Plateau that features a certain Middle Bronze Age occupation (Pollard et al 2012: 41-42). The phases of Qoli Darvish have been modeled in OxCal using phase-constrained calibrated dates as follows. The Early Bronze Age I dates to ca. 3100-2900 calBCE, the Middle Bronze Age begins between ca. 2850-2300 calBCE and ends between ca. 1950-1775 calBCE, and the Late Bronze Age begins between ca. 1750-1550 calBCE and ends between ca. 1650-1450 calBCE.

In summary, the Central Plateau is an important region of the Iranian Plateau, and one that has been subject to considerable intensive research in the past two decades, particularly by joint Iranian-foreign research teams. The region features evidence of long permanent traditions of settlement, beginning in the Neolithic that continue until the early third millennium. After the
first few centuries of the third millennium, apparently coincident with the retraction of the Proto-Elamite phenomenon, the region appears to be largely desettled, with few sites dating to the middle of the third millennium. This has been interpreted as a hiatus or gap extending until the early second millennium, for which there is still no convincing explanation. In the earlier part of this sequence, the focus of cultural relations between the various settlement areas of the Central Plateau appear principally to be intra-regional, with extensions including sites like Tepe Hissar.

Subsequently, the Central Plateau is drawn into interregional interaction networks related to the Proto-Elamites, and in the final phase of occupation within this dissertation’s chronological purview, the sites of the Central Plateau are drawn into the Gorgan Plain-Urmia axis, at least on the basis of ceramic traditions. Regional settlement patterns are difficult to discern in all periods, as question-driven survey research has not typically been a focus in this area (but see Coningham et al. 2004, 2006; Fazeli et al. 2004, 2007) but most sites in the northern half of the Central Plateau appear to be quite small, under ca. 10 ha and there is little indication of settlement size-differentiation or hierarchy of any kind. It is also important to note the small number of known sites dating to ca. 3200-1600 in each of these areas. In the southern half of the Central Plateau, the sites appear to be larger, but are located further apart from each other; nevertheless, in each area, there is only one known site (i.e., Qoli Darvish near Qom, Sialk within the boundaries of Kashan, and Arisman near Veshnuviyeh) marking a crucial difference from both the northern half of the Central Plateau, and the other major centers of settlement discussed both above and below.

3.1.2.2 The Western Indo-Iranian Borderlands, Kerman, Fars, and Khuzestan (the Southern Zone)
With respect to the Southern Zone (Table 3.2 and Figure 3.27), the first region to consider is the Helmand Basin (Figure 3.28), formed by the 1400 km-long Helmand River that flows southwestward out of the Hindu Kush mountains and debauches into a desert basin along the border between Iran and Afghanistan, creating a large marshy delta (Figure 3.28), which was home to a dense concentration of urban settlement during the Early Bronze Age, including one of the most important sites of eastern Iran, Shahr-i Sokhta (Pittman 2013: 314).

**Figure 3.27 Southeastern Iran**

Shahr-i Sokhta appears to have first been settled around 3000 BCE and was occupied continuously through eleven architectural phases (10-0), grouped into four major culture-historical periods (I-IV) on the basis of ceramic and architectural features (Tosi and Salvatori
Period I dates to ca. 3000-2750 BCE, Period II to ca. 2750-2500 BCE, Period III to ca. 2500-2200 BCE, and Period IV is split into two components, an earlier phase IV-1 from ca. 2200-2000 BCE and IV-2 from ca. 1850-1700 BCE (Salvatori and Tosi 2005: Fig. 12).

Figure 3.28 Map of Helmand River Watershed, Southwestern Afghanistan

Shahr-i Sokhta grew from ca. 15-17 ha in period I (3200-2800 B.C.) to 150 ha in Period III (ca. 2600-2400 B.C.E), which has, along with monumental architecture and specialized craft quarters been used to argue for the settlement’s urban or proto-urban status. At the end of the third millennium, the settlement area of Shahr-i Sokhta begins to contract, signaling the

beginning of the end of urbanism\textsuperscript{13} in the region, with concomitant the social and political consequences (Biscione 1977; Biscione and Tosi 1979: 47-63). Throughout the Shahr-i Sokhta sequence, the next largest settlement in the Hamun Basin was ca. 4 ha, while the other forty located range between 0.5 and 2 ha (Tosi 1986: 163; Figure 3.29).

\textbf{Figure 3.29 Map of the Hamun Basin (After Lamberg-Karlovsky and Tosi 1973: Map 5)}

\textsuperscript{13} Though it should again be noted that the use of “urbanism” to describe settlements of any kind in Bronze Age Iran must be carefully qualified (Thornton 2012; see also Meyer et al. 2019).
The other major site in the region, Mundigak, is poorly understood due to the fact that little work has been conducted on them since its initial exploration in the late 1950s early 1960s. Mundigak is located in the hills above the Helmand river valley in the vicinity of the modern city of Qandahar. The site is particularly notable for its monumental architecture in the form of a multi-tiered platform structure with pilastered facades (Casal 1961; Tosi 1977, 1979, 1986). The settlement trajectory of Mundigak in particular is similar to that of Shahr-i Sokhta; Mundigak grew from ca. 6-8 ha in period III to 55-60 ha in period IV (Casal 1961: 46, fig. 3). Thus, both Shahr-i Sokhta and Mundigak, despite their different ecological situations, grew by a factor of seven or eight by the mid-third millennium (Tosi 1986: 163). Little is known about Mundigak’s outlying settlements, but limited excavations at Said Qala and Deh Morasi Ghundai have shown that both feature a cultural sequence stretching from the early fourth to mid-second millennia BCE (Dupree 1963; Tosi et al. 1992).

Mundigak and Shahr-i Sokhta share a similar enough inventory of material culture that they have been referred to as the centers of a “Helmand Civilization” (Tosi 1983, 1986). Nevertheless, there are important differences between the two settlements. Mundigak, despite being large relative to many of the sites in eastern Iran, is less than half the size of Shahr-i Sokhta, and somewhat isolated along the upper reaches of the river. Biscione argues that Mundigak was of secondary importance, cut off from long-distance trade and only open to influence from Shahr-i Sokhta on the one hand and southern Central Asia on the other. By contrast, Shahr-i Sokhta is much larger, and was clearly an active participant in international trade (Biscione 1974: 136; Lamberg-Karlovsky and Tosi 1973).

The other major zone of settlement in Bronze Age southeastern Iran consists of two principle areas, one located in the north, along the edge of the Dasht-e Lut, comprised of the ca.
100 ha cemetery, settlement, and craft-production complex of Shahdad (Hakemi 1997; Eskandari 2019), and one to the south, consisting of the Soghun Valley, the Halil-Rud Valley, and the Bampur Valley, where Tepe Yahya, Konar Sandal, and Tepe Bampur are located respectively (Figure 3.29).

Evidence from both the excavations and surface surveys at Shahdad show large concentrations of craft-production debris, including ceramics, copper slag, and semi-precious stones (Hakemi 1997; Pittman 2013: 311). There appear to be two chronological phases at Shahdad, one dating to the fourth millennium based on diagnostic parallels to the first two phases of Tal-i Iblis, and one dating to the mid-to-late third millennium with parallels to Yahya IVB, the later phases of Konar Sandal South, Hissar IIIC, Shahr-i Sokhta II and III, and the BMAC (Pittman 2013: 311-312).

Tepe Yahya, located among approximately 30 other prehistoric sites in the Soghun valley, was excavated in the 1960s-70s under the direction of C.C. Lamberg-Karlovsky (Lamberg-Karlovsky 1968, 1970, 2001; Lamberg-Karlovsky and Potts 2011). Despite its small size, Tepe Yahya has a long cultural sequence, beginning no later than the mid-fourth millennium (Mutin 2013). The site is particularly notable for its phase IVC₂ (ca. 3200-2800 BCE), where the remains of a well-planned building were discovered that contained evidence of a Proto-Elamite related...
occupation, including clay tablets and jar sealings, as well as presumably imported Jemdet Nasr ceramics alongside local ware types (Mutin 2013; Pittman 2013: 306-307). The following phase, Yahya IVB, appears to cover much of the rest of the third millennium based on parallels to more securely dated contexts at nearby sites, Konar Sandal South in particular.

Tepe Yahya is renowned for being a center of production of carved softstone vessels, which have a wide distribution in space and time, but which are particularly famous for the ca. 100 examples of which have been found in temple and tomb contexts in Mesopotamia. While there is evidence for softstone vessel production in many phases at Yahya, it is in period IVB that evidence is strongest for the production of the highly distinctive and most widely distributed style, known as the série ancienne or Intercultural Style (de Miroschedji 1973; Kohl 1975; Lamberg-Karlovsky 1988; see Pittman 2018b: 112-114 for discussion of terminology).

Excavations in recent years at sites in the Halil River valley, particularly at Konar Sandal, have documented substantial Bronze Age settlements, marked by considerable social complexity in the form of monumental architecture, craft production and administrative practices. Numerous sealing impressions (Majidzadeh and Pittman 2008). These ongoing excavations along the Halil Rud south of Jiroft have shown that many of the soft-stone vessels carved at Yahya were produced at least as much for local consumption of peoples living in the Jaz Murian basin, as they were for consumers nearby at Shahdad, or further afield in the Persian Gulf, in Central Asia and beyond (Kohl 2007: 229-230). These surveys and excavations, particularly at Konar Sandal South and Konar Sandal North have demonstrated that the Halil River Valley was densely settled during the third millennium, with an apparent three-tiered site-hierarchy including large urban centers and small villages (Pittman 2013: 305; Figure 3.30).
Finally, the Bampur Valley is known to feature approximately 90-100 prehistoric sites, though many of these date to the fifth and earlier fourth millennia BCE (Figure 3.31). Landmark studies of the region include Aurel Stein’s 1920s-30s surveys of the areas, which provided the first records of archaeological settlement and the identification of two of the area’s most important third millennium sites, Tepe Bampur and Khurab. Tepe Bampur was excavated by
Beatrice de Cardi in the 1960s, and it has served as the type-site for the region ever since (de Cardi 1970; Mutin et al. 2017: 1).

**Figure 3.31 Bampur Map (Locations of Chalcolithic sites surveyed and a representation of the major shifts in settlement from the fifth to the third millennia BCE, after Mutin et al. 2017)**

The Bampur Valley has been surveyed recently by a joint French-Iranian expedition, led by Benjamin Mutin and Hassan Fazeli Nashli, which led to the identification of nearly eighty new sites in the region. This survey recorded 39 sites with materials dating to the fifth and fourth millennia BCE, located primarily in the western half of the region, along both banks of the Bampur river. The non-Chalcolithic settlements are essentially concentrated within the eastern half of the survey area, close to Tepe Bampur (see Figure 10), whereas most of the Chalcolithic sites were found to the west along both the northern and southern banks (see Figure 1). There appears to be a phase of abandonment toward the end of the fourth millennium, however, and while a few of the fourth millennium BC sites are reoccupied during the third millennium BC, the establishment of new settlements dating to the third millennium BC sites is concentrated in the north-eastern corner of the surveyed area, closer to Tepe Bampur.\(^\text{16}\) Culturally, most is known about the site of Tepe Bampur, whose ceramic traditions appear to present a broad

\(^{16}\) The surveyors suggest that these shifts may be linked to environmental changes, particularly related to changes in the pattern of discharge of the Bampur River, which if it had lessened at any point, would have made agriculture in the channel’s distal western reaches more difficult (Mutin et al. 2017: 18-19).
contemporaneity between the first four phases of the sequence (i.e., Bampur I-IV) and Shahr-i Sokhta II-III, as well as Konar Sandal South. One particularly diagnostic ceramic type is the Emir style black on red and black on grey jars that link the site to Yahya IVB, Konar Sandal South Lower Town Phase 2, Shahr-i Sokhta IV, as well as the late Umm an-Nar of northern Oman and the United Arab Emirates (Pittman 2013: 313; see also Wright 1984).

Figure 3.32 Map of Southwestern Iran (de Miroschedji 2003: 16)

Southwestern Iran consists of the intermontane valleys of the Zagros mountains, the most important of which during the third millennium is located in today’s Fars province, namely the Marvdasht, as well as the lowland plains of Khuzestan, which comprise several smaller zones such as the Deh Luran and Susiana. There are many other smaller valleys in the area that are
also known to be rich in archaeological settlement such as the Izeh, Ilam, Behbehan, Ram Hormoz and so on. The Marvdasht (sometimes also referred to as the Kur River Basin) is home to a site of particular importance, Tal-i Malyan, i.e., ancient Anshan, the center of numerous Elamite polities. A full discussion of each of these valleys and their history of archaeological settlement would take as much space as the entirety of the preceding discussion (e.g., Adams 1962; Alizadeh 2014; Neely and Wright 1994; Potts et al. 2009; Sajjadi 1979; Wright 1979; Wright and Carter 2003; Wright and Neely 2010; consequently, this discussion will focus on the Kur River Basin, i.e., Malyan and its environs, and upper Khuzestan, i.e., Susa and its hinterland.

The primary periods under consideration in the Kur River Basin are the Middle and Late Banesh and the Early and Middle Kaftari. The gross outline of the settlement trend is that the sedentary population of the Kur River Basin peaked in the late Bakun phase and declined through the Banesh period, until by the Late Banesh (ca. 2800-2600) all of the settlements in the valley were abandoned, except for perhaps a small occupation at Malyan (Sumner 1972, 1990). Resettlement of the Kur River Basin during the Kaftari period has proven to be difficult to explain (Sumner 1989: 136), but by whoever’s agency, the Kaftari phase began with a period

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17 As for the record itself, in the Middle Banesh period, approximately 41 sites were occupied, with an aggregate occupation estimate of 62ha and an average site size of 1.5ha (Sumner 1990). In the Late Banesh period, an uncertain number of sites were occupied, but the figure given for the aggregate site size is 57ha (Alden 1979). At this point, in Sumner's view, much of the population converted to a pastoral nomadic lifeway, not to resume settled agriculture until the Kaftari period in the late 3rd millennium (Sumner 1989: 135). Sumner contends that despite this decline in settled population, “a considerable pastoral nomadic population migrated from summer to winter pastures in Fars during the mid-third millennium” which he bases on evidence such as the Jalyan cemetery (Sumner 1989: 136; cf. Potts 2014: 34). Dan Potts vehemently disagrees with Sumner’s speculation about the existence of ‘local pastoral nomads’ during the Banesh-Kaftari gap, as well as Sumner’s assertion that a large contingent of the population of the Kur River Basin, especially the Soon district, was comprised of mobile pastoralists. In Potts’ view, despite the telling fact that Tal-e Malyan itself reached 200ha at this time, and even though Sumner himself recorded the existence of a further two towns (10-16ha), eight large villages (4-8ha), and sixty-three small villages (under 4 ha), Potts takes Sumner to task for arguing that ‘the relatively low settlement density suggests that pastoralism and other extensive land use patterns were also important’ ” (Potts 2014: 34).
of relatively rapid growth in the number of settlements and a major increase in the occupied area at Malyan (ca. 2200-1800 BCE), followed by a leveling off and finally a reduction in the number of settlements by the mid second millennium settlement (Potts 1999[2015]: 151-52). In other words, in the Kaftari period, an exceptionally stark settlement hierarchy emerged, with its primate center at Anshan-Malyan (Sumner 1990).

The settlement record for Susiana during the time period under consideration is continuous, with no appreciable gap or hiatus in settlement on the plain overall, despite fluctuations in certain areas. During the Proto-Elamite phase (Early Susa III), according to John Alden, Susa apparently shrank to 11 ha (Alden 1987: 159). This seeming paucity of Proto-Elamite sherds on the Susiana sites may have to do with the difficulty in recognizing its pottery on the surface of the mounds (Alizadeh 2014). Nevertheless, there is no doubt that there was a sharp drop in the number of settlements and in the size of the settled farming population in Susiana during the early 3rd millennium, especially compared to previous periods. The pre-third-millennium BCE settled population of Susiana did not just disappear, however. Some portion of the population may have taken up a semi-nomadic lifeway, some of the earlier inhabitants may have been immigrant population who returned to their homelands, some may have simply relocated to the almost “empty” Deh Luran plain, but these different solutions to the question are exceedingly difficult to evaluate (Alizadeh 2014; see also Alden 1987: 159–60).

Under the Akkadians, Susa was a provincial center. Schacht records 32 very small sites in Susiana (between 0.2 and 0.7 ha). Susa itself seems to have grown considerably from the first half of the third millennium (10 ha at end of Susa III) to approximately 46h a by the end of the Akkadian period. This settlement record suggests that many more people and services were centered in Susa than might otherwise be expected during this period (Carter 1985: 45). Later,
during the Shimashki phase (Susa V), Susa was the only ‘city’ on the middle plains of central Khuzistan. In addition to Susa there were 12 towns (4-10ha) and 8 small villages (0-4) ha scattered across the natural roads traversing the region (Schacht 1987).

What we observe is that overall, despite a long gap in the record of sedentary occupation during the mid-third millennium, there is an increase in population and settled occupation over time in southwest Iran overall across the millennium as a whole, including the Ram Hormuz, Izeh, Mamasani, and the Kur River Basin, with the major element of continuity being a large proportion of small sites in general and a greater degree of urbanism in the lowlands than the highlands. While there is a conspicuous absence of settlement in for much of the mid-third millennium in the uplands, but there is no break in settlement in the lowlands (Alizadeh 2014).

Thus, despite some general resemblances, the differences in physical, cultural and settlement geography between the various regions of the lands east of Sumer are considerable; indeed, each region has a unique distribution of available natural resources, cultural-historical sequence, and trajectory of settlement. With this now established, we can return to the question of models of the relationship between trade, exchange, and interaction and political geography.

3.2 Longue Durée Patterns of Trade, Exchange, and Interaction in Bronze Age Iran

The political geography Bronze Age Iran has often been understood in relation to Mesopotamian history (Potts, T. 1994), in no small part because Mesopotamian scribes from that era left a textual record that speaks to questions of what might be called “foreign relations,” whether these attestations come from myths such as *Enmerkar and the Lord of Aratta* (Kramer 1968; see also Casanova 2019), or from economic/administrative texts that
detail trade relations with Elam, the Gulf (i.e., Dilmun and Magan), and the Indus (i.e., Meluhha) (Laursen and Steinkeller 2017). The broadest outlines of this trajectory have changed little since the first attempts to synthesize these historical developments. Most sources describe the macro-history of long-distance trade during the 3rd millennium as follows. First, the Uruk polity established trade contacts and entrepots within and beyond Mesopotamia to the north and east of Sumer (ca. late fourth millennium BCE). This was followed by the formation of the Proto-Elamite network stretching from Khuzestan to Sistan, which established overland trade networks across the Iranian plateau (ca. early third millennium BCE). Subsequently, the focus of trade shifted to maritime routes, correlated with the ‘rise’ of the Indus Valley civilization and the ‘fall’ of the Turanian polities during the latter half of the third millennium BCE (Dales 1977). Alternative accounts differ only on the details; e.g., Kohl sees the appearance and floruit of proto-urban sites throughout “Turan” or a very extensively defined eastern Iran as occurring during this maritime period and only declining afterward in the early second millennium BCE, when Gulf trade activity decreases substantially (Kohl 2007: 216).

Each of these broad shifts can be thought of as a Braudelian conjuncture, characterized by recurring transformational cycles of structural similarities, involving processes of contact, “colonization,” acculturation, and reprojection of the contact-colonization-acculturation process outward by agents/institutions incubated in those first-contacted zones (Lamberg-Karlovsky 1985; see also De Miroschedji 2003). These cycles ultimately resulted in ever increasing communication between Mesopotamia and its eastern neighbors until the mid-second millennium, when the focus of Mesopotamian trade and foreign relations purportedly shifts away from Iran, reorienting northward to Anatolia and westward to the Mediterranean (Lamberg-Karlovsky 1985). Seven points are key for understanding the macro-history of the
“foreign relations” between Mesopotamia and its neighbors to the east ca. 3200-1600 BCE: (1) each region involved represents an indigenous instance of the development of cultural complexity; (2) only Mesopotamia and perhaps the Indus were literate; (3) there is little to no evidence of sustained extra-regional projection of hegemony; (4) while there is abundant evidence for contact between regions, there is no credible evidence for “dependence” as understood in World Systems Theory; (5) there is, however, evidence of trade asymmetries between regions; (6) outside of Sumer, for much of this history, production was local – foreign goods are mostly commodities found in elite contexts and burials, suggesting that long-distance trade was primarily high-status commodity exchange driven by the social reproduction of elite status; (7) production for export is evident, but typically just single commodities of elite nature – export of finished commodities is rare, e.g. textiles from Mesopotamia or chlorite bowls from Marhashi are exceptional – the typical pattern is instead natural resources prepared for export in semi-finished form, e.g. ingots and bead blanks (Lamberg-Karlovsky 2014: 396-397).

Thus, the forces influencing the emergence of hierarchical political formations appear to be increases in managerial control over increasingly technologically-sophisticated and specialized craft production, primarily driven by elite demand and as part of a process of primitive accumulation. In this framework, whether explicitly or implicitly, craft production is seen as an engine of not only social stratification and class-formation, but also as a centrifugal force driving ever expanding networks of communication and interaction. In other words, at the same time as Mesopotamian elites expanded their activities into new ‘markets’ to acquire raw materials to produce the sumptuary goods that marked their high status, they also created an ever expanding social network through a variety of “exchanges” with local elites including gifting, marriages, and the expropriation and circulation of war booty (Lamberg-Karlovsky 1985:}
In each conjuncture, therefore, the formation of this network was initially driven, or minimally set in motion, by Mesopotamian agents and institutions (Potts, T. 1994: 4). According to this Childe-inflected model, in these secondary areas, acculturation to Mesopotamian models of managed and increasingly-specialized craft production drove class-formation and the emergence of elites. As part of the maintenance of their status, these elites increasingly engaged in a variety of forms of long-distance commodity exchange with elites from other parts of the interaction network. Various areas played differentially important roles as mediators in this exchange over time, but by the end of this longue durée cycle, much of the Persian Gulf, eastern Arabia, the Iranian Plateau, southern Central Asia, Afghanistan and the Indus Valley had participated in this phenomenon (see also Kohl 2007: 217).

Both Mesopotamian texts and the material evidence itself makes it clear that the broad outlines of the sequence related above grossly account for the change over time in the relative balance of overland versus seaborne trade, i.e., between the Iranian Plateau and the Persian Gulf respectively (Potts, T. 1994: 4-6). But who were these participants and what specifically did they exchange? By what means and via which channels were materials and goods conveyed; and how did these materials and means change over time?

3.2.1 Who participated in third-millennium networks of exchange and interaction?

Regarding the question of who was involved in these exchanges, Mesopotamian texts mention a number of geographical-cultural-political entities, including the principle players of the Gulf network: Meluhha, i.e., the Indus Valley civilization, Magan, i.e., Oman, and Dilmun, i.e. the southern coast and islands of Persian Gulf, especially Bahrain and Qatar (Laursen and Steinkeller 2017). Mesopotamian scribes were also aware of a number of geographical-cultural-
political entities presumably located on or connected to the Iranian Plateau, most importantly: Elam,\(^{18}\) Shimashki, and Marhashi (Potts 1994: 9). The appearance of named places appears to have largely been a function of Akkadian and Sumerian military, political, diplomatic and or economic interests – it would appear that the more a place is mentioned, the more important it was for Mesopotamian scribes. By this measure, Elam was by far the most important; though its exact extent appears to fluctuate over time, it often includes parts of the Central and Southern Zagros, especially Fars. Elam is associated with a range of presumably distinct geographic entities, including most importantly Anshan (Tal-i Malyan [Carter and Deaver 1996; Vallat 1985]), Marhashi\(^{19}\) and Shimashki,\(^{20}\) as well as a number of others including Pashime (Abu Sheeja [Hussein et al. 2010]), Awan, Zahara (or Zabshali/Arawa), presumably nomadic groups such as the Lulubi, Guti, and Amorites, as well as apparently mythical places such as Aratta.

Beginning as early as the Early Dynastic III period, many of these places are considered by Mesopotamian scribes to be broadly part of ‘Elam,’ though whether as subdivisions of territories, city-states of some kind, tribal confederacies, or ethnic groups is unresolved (Alizadeh 2014: 230-232; Potts, D. 1999: 88; Potts, T. 1994: 12).

Regardless of where we locate these entities, what we do know is that beginning in the mid-third millennium Mesopotamian sources document a continuous sequence of interaction with lands to the east, principally but not exclusively in the form of intermittent conflict over

\(^{18}\) The term Elam itself is, however, a coinage of Mesopotamian scribes, who imposed this moniker on the various areas of highland Iran and its peoples as early as ca. 3000 BC.\(^{18}\) According to Dan Potts, this name was written with the Sumerogram \textit{NIIM}, meaning “high”, with the determinative \textit{KI}, denoting land or country, or in Akkadian as \textit{KUR-elmanmatum} (Potts, D. 1999: 1). An important attestation of this toponym comes in the mid-third millennium, appearing in the Sumerian King List, where Elam is listed as an enemy of Kish (Potts, D. 1999: 85). Elam continues to be a subject of interest throughout the Akkadian and Ur III periods, where the term appears in royal inscriptions and literary works.

\(^{19}\) While not completely resolved, after a long controversy, it appears that Marhashi should be identified with the BMAC rather than with Kerman (Francfort 2019; Potts 2004; cf. Steinkeller 2012).

\(^{20}\) Apparently located somewhere in the Central Zagros (Carter and Stolper 1984; Potts 2008; Steinkeller 2007; Stolper 1982).
Susa (Amiet 1976; Carter and Stolper 1984: 11-14; de Miroschedji 2003; Potts 1999: 105-108). De Miroschedji assumes that because the nascent Elamite principalities controlled the trans-Iranian trade routes that the first Sumerian kings had an active ‘Elamite policy’, alternatively hostile and diplomatic (see also Moorey 1993; Carter and Stolper 1984). By Potts’s account, military action in the highlands seems to have consisted of raiding in Anshan, Zahara, Sherihum and Marhashi as well as Magan (Potts, T. 1994: 142). Potts is quite skeptical of how far eastward Mesopotamian armies could have reached and how seriously accounts of “conquest” should be taken (Potts, T. 1994: 141-142).

In any case, there are two important inflection points in the Mesopotamian-Iranian relationship over this interval: namely, the role of the “Elamites” in the destruction first of the Old Akkadian dynasty and second of the Ur III Dynasty. When the Old Akkadian state began to lose power, it was the Elamite dynasty of Awan that stepped into the power vacuum, in particular in the form of Puzur-Inshushinak, the twelfth and last king of Awan.21 Puzur-Inshushinak’s exploits are detailed in Akkadian-language texts from Susa, which include numerous conquests and receiving obeisance from a ‘king’ of Shimashki (Andre and Salvini 1989; Pittman 2002; Potts 1999). After the Shimashkian interlude, during the subsequent Ur III period, the competing polities of southern Mesopotamia were reunited by Ur-Nammu and his successor Shulgi. The latter extended his control both north and east, as recorded in the year-names of his reign and in inscriptions, and diplomatic contacts attesting to active relations with Susa, Marhashi, Shimashki, Anshan, and others. Texts regarding diplomatic marriages give the impression that eastern states were treated as subjects or clients, but the fact that the alliances

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21 It may be that Puzur-Inshushinak was not an Awanite king, however; see Steinkeller 2013a.
themselves were needed and the warfare that went along with their formation and dissolution suggests that the people of the Zagros did in fact have considerable autonomy (Stolper 1984).

The ‘geopolitical’ balance deteriorated rapidly during the reign of Ibbi-Sin (ca. 2027–2004 BCE of the Middle Chronology), who waged a number of campaigns against Zabshali, Huhnuri, Susa, Adamdun and Awan. In the penultimate year of Ibbi-Sin’s rule, a force of Elamites and Su-people rampaged across his territory and captured Ur itself, as recounted most famously in the “Lament for the City of Ur” among other sources (Jacobsen 1987; Kramer 1940).

Subsequently, various Elamite dynasts worked together to forge an confederacy including Shimashki, Susa, and Anshan, which together were strong enough of a force to help usher in the disintegration of the Ur III state (Stolper 1982: 54-56; de Miroschedji 2003: 25; Lamberg-Karlovsky 2012: 67; see also Potts 2008). As far as we can tell, the overall cycle’s denouement is correlated with the slow disintegration of the Sukkalmah state beginning in the 18th century BCE, hastened along by their defeat by Hammurabi at Kuduzulush in 1756 BCE, after which the Elamites withdrew from Mesopotamian politics.

De Miroschedji concludes that the fate of Elam was always closely linked to the ups and downs of Mesopotamian historical developments, especially with regard to exchange networks that were either stimulated or amplified by Mesopotamian demand (2003: 36). In keeping with this axiomatic prime-mover, his view of the longue durée of Elamite history is a series of cycles of integration, expansion, and collapse. In each of these cycles, the origins of the process can be found in the eastern margins of the Mesopotamian lowlands, where a polity forms and establishes trade routes, driving the development of episodes of ‘international’ exchange. Subsequently these developments usher in the emergence of secondary states in the highland
regions, who benefit from the ‘international’ trade and who attempt to control the import of essential commodities.

De Mroschedji correlates the final, post-Sukkalmah disengagement of Elam from Mesopotamia (ca. 1500 BCE) with the collapse of both Gulf-focused seafaring trade and the trans-Iranian exchange network, after which few exotic goods appear to have circulated on the plateau. According to de Mroschedji, many of the oasis cities of the Iranian plateau were more of less deserted and much of the area reverted back to nomadic pastoralism (2003: 30; see also Alizadeh 2003; cf. Potts 2014). Most importantly, with the decline of the Ur III state, Magan, Meluhha, and Marhashi disappear from the historical record (cf. Francfort 2019: note 81). The latter of which may have been absorbed by Shimashki, who had gained control over the overland trade routes of the Iranian Plateau (Laursen and Steinkeller 2017: 91).

3.2.2 What materials and goods were exchanged, via what channels, and how did this change over time?

The bulk of the third millennium was a period of intense interaction on the Iranian Plateau. During the first half of the millennium, interaction spheres based on exchanges within communities of practice involved in the production of ceramics, textiles, and beads emerged (e.g., Wilkinson 2014), connecting for example the various sub-regions of the Indo-Iranian Borderlands together (Wright 1984) and northeastern Iran to southern Turkmenistan (Cleuziou 1986; Khlopin 2002; Thornton 2013). During the second half of the millennium, long-distance networks constituted by the exchange of a distinctive suite of products and related iconographic elements (i.e., colonettes, decorated stone vessels, hammers, “axes,” metal vessels, cylinder seals and compartmented copper stamp seals) have been referred to as L’âge des échanges inter-iraniens (Amiet 1986; Pittman 1984, 2014; Potts, T. 1994: 280).
Gulf trade during this period apparently involved regular circulation of goods rather than sporadic or circumstantial exchange (Kohl and Lyonnet 2008: 37). Copper, diorite and other hard stones appear to have come from Magan via Dilmun; lapis, carnelian, gold, silver, tin, and other materials arrived via the same channel from the Indus, though the actual sources of many of these materials somewhat unclear, except in the case of lapis and carnelian, whose zones of origin are both well-known and spatially restricted enough to confidently identify (Casanova 1992, 2013; Law 2008, 2014).

Interestingly, it appears that the Gulf network and the Plateau networks did not overlap in Mesopotamia except at Susa. Potts illustrates this with reference to turquoise and tin in particular. The former is sparsely but widely distributed throughout Iran during the third millennium, but extremely rare in the Indus and hardly found at all in Mesopotamia, despite its presence there in the preceding fourth millennium. Tin presents a mirror image, commonly found within areas connected to the Gulf network, but hardly at all in highland Iran (except in Lorestan) and Central Asia until the Zerafshan sources began to be exploited by Andronovo populations in the mid-second millennium (Potts, T. 1994: 281; see also Helwing 2009; Kaniuth 2007).

There is some disagreement over the relative prominence of overland versus maritime routes in the late third millennium. For example, textual evidence from Mesopotamia has been understood to show that “foreign exchange” increasingly emphasized trade with partners based around and active in Persian Gulf networks at the expense of overland Plateau networks, which had previously been predominant during the Proto-Elamite period (Potts, T. 1994: 280). Some scholars argue that from the Early Dynastic III period onward, Mesopotamian texts and archaeological evidence show that most of Sumer’s raw material “imports” arrived via sea thru
the Gulf, especially during the Akkadian and Ur III periods. Meluhha was more engaged in direct ties with Sumer in the Akkadian period, whereas during the Ur III period, Magan and Dilmun assumed a much more important role in mediating exchange (Potts, T. 1994: 277-278; see also Cleuziou & Vogt 1985; Cleuziou and Tosi 1989; Kohl and Lyonnet 2008: 37).

Other scholars have argued that that while the trade in the Gulf network was still important to the Ur III empire, there was already during this time a noticeable increase in volume of traffic via overland routes connecting the Mesopotamian lowlands with Iran and Central Asia (e.g., Steinkeller 2013b). Steinkeller links this to the emergence of the Great Khorasan Road, along which tin, copper, gold, and lapis traveled to Mesopotamia from their sources in Afghanistan and eastern Iran (see also Herrmann 1968). He argues that the Ur III state’s paramount objective in its various campaigns of territorial expansion was to connect more directly with this transit corridor and thereby and to exercise greater control over movement of people and goods along it (Steinkeller 2013a: 294-295). He sees a contrast between this and Ur III policy toward the polities in the Gulf region, which was marked by so-called “international trade agreements” rather than by attempts at subjugation.

Crucially, there is no mention at all during this period of caravan trade, whether direct or indirect, with the eastern highlands, despite evidence for a political alliance between the Ur III state and Marhashi (Steinkeller 2013b: 415-416; see also Potts, D. 2002). That is, metals and stonework manufactured in the highlands are conspicuously absent in Mesopotamia, with the exception of carved soft stone vessels. And even these objects do not seem to have arrived in Mesopotamia via direct trade or exchange involving actual Mesopotamian on the plateau, but rather took place in the Gulf, as part of the already ongoing seaborne trade in copper and other raw materials (Potts, T. 1994: 278-279). We now know this to not be entirely true, based on
glyptic evidence from Konar Sandal South, which strongly suggests the presence of actual individuals from Susa and Sumer and their administrative activity in situ in southern Kerman at various points during the Early Dynastic period, ca. 2900-2300 BCE (Pittman 2018a: 34-35). Nevertheless, this evidence does not necessarily contradict the supposition that these merchants arrived in Kerman via the Gulf.

In Steinkeller’s account, after the Ur III polity declined ca. 2000 BCE, the political geography of the Iranian Plateau shifted quite dramatically; the two most notable events were the consolidation power in the highlands by the Shimashki confederacy and their Sukkalmah successors and the decline of Marhashi. Steinkeller explains this twin development as the result of Marhashi losing its principal trade partner in Mesopotamia (i.e., the Ur III dynasty) and thereby its status as the “main middleman in trade with Afghanistan.” At the same time, the northern overland routes increased in importance, which he correlates with Shimashkian control over the highland territories (Steinkeller 2013b: 423). Steinkeller connects these developments to the supposition that the Gulf network became a less important source of copper for Mesopotamian polities, insofar as by ca. 1700 BCE, the island of Cyprus had become a major copper exporter, purportedly leading to a collapse of the industry in Magan, and with it, Gulf-focused trade as a whole (Steinkeller 2013b: 425).

Thus in addition to verifying whether these historical interpretations are valid on the basis of the available evidence, the question must be posed: if overland exchange networks were active on the Iranian Plateau during the mid-through-late third millennium, why were they disarticulated from direct interaction with Mesopotamia? Potts speculates that this lack of direct trade in highland materials overland could have resulted from hostilities and conflict between Mesopotamian and Elamite polities (Potts, T. 1994: 283). Potts’s reading of the
historical evidence suggests that, especially in the second half of the third millennium, the priority of Mesopotamian polities with regard to their eastern highland neighbors was the protection of their own borders (i.e., mostly a defensive strategy) which failed catastrophically at the end of both the Old Akkadian and Ur III dynasties (Potts, T. 1994: 284). Potts therefore argues that what movement there was of highland Iranian materials and finished products into Mesopotamia resulted primarily from booty-taking. While he doesn’t rule out other mechanisms such as gift-exchange, tribute, and ad hoc commerce, regular trade – such as what Mesopotamians maintained with partners in the Gulf, the Levant and Syro-Anatolia – is deemed highly unlikely (Potts, T. 1994: 286).

Thus, though Sumerian cultural influence seems to have flowed outward – evidenced in domains such as in cylinder seals, iconographically in the form of the clasped hands motif, kaukanes dress on Bactrian art, Sumerian motifs on metalwork (e.g., the Astarabad Treasure and Fullol hoard), as well as architecturally in the stepped platforms known from Tureng Tepe, Altynd Depe and Mundigak (Casal 1961; Deshayes 1977; Masson 1988) – from the mid-third millennium onward, there does not seem to be “wholesale imposition of Sumerian culture as in Late Uruk Syria or Khuzestan” (Potts, T. 1994: 288). Indeed, there is neither the direct copying of “selected motifs” as occurred in Egypt. Even in late-third millennium Syria, such as at Ebla, Sumerian forms were “creatively modified and adapted according to local tastes” (ibid).

Potts takes this as unsurprising given that any influence Sumer would have been able to assert on distant eastern regions would have had to have been through a chain of intermediaries. Following Kohl, he asserts that the Bronze Age World System of the late third and early second millennia was not comprised of a single core with less developed dependent peripheral zones but rather a mesh of overlapping geographically dispersed core regions, each
primarily exploiting its own immediate hinterland, but remaining in regular, if not so intensive, contact with near and distant neighbors (Potts, T. 1994: 289; see also Kohl 1987: 16). Potts concludes that the pattern of foreign relations he observes show that Sumer’s cultural horizon was not a coherent radius focused on southern Mesopotamia but rather, a highly irregular perimeter consisting of two major corridors that at times extended far into foreign and often hostile territory, i.e. the Tigris-Euphrates to the north, and the Gulf to the south.

§

While many of the issues raised in this section will be explored in further detail below, it is useful to recap some of the main themes here. First, the broad scholarly consensus on the importance of interaction and trade as a structuring force in political-geographic dynamics. Second, researchers generally agree on the timing and trajectory of major trade flows from the Uruk period until the Akkadian dynasty, whereas there is more disagreement on the state of affairs from the Ur III period onward. Third, major shifts in trade patterns between land-based routes across the Iranian Plateau on the one hand and sea-based routes through the Persian Gulf on the other have been causally linked to the “rise and fall” of named politico-geographic entities located to the south and east of Mesopotamia.

To summarize, the sequence of shifts in macro-patterns of trade and exchange has three phases. The first, during the early third millennium is conventionally understood as a period in which land-based routes predominated, as evidenced by the widespread distribution of Proto-Elamite material culture across the Iranian Plateau, however tenuously, connecting sites as far as Hissar and Shahr-i Sokhta to Susa and thus to Mesopotamia. The second phase occurs during the mid-to-late third millennium, in which the Gulf-based network increased in importance, as the Indus valley and the eastern Arabian Peninsula became a focus of trade for Mesopotamian
polities, and one in which the Iranian plateau was oriented toward the Gulf network rather than to Mesopotamia directly. This period is correlated with the rise and importance of Marhashi, Dilmun, and Magan, each of whom was gathering and distributing goods to and from distant lands according to their own agency (Kohl and Lyonnet 2008: 37). This period corresponds to what has been called the Middle Asian Interaction Sphere (e.g., Possehl 2002), the Bronze Age World System (e.g., Kohl 1978, 1987, 2007), and L’age des échanges inter-iraniens (e.g., Amiet 1986). Subsequently, in the third phase, i.e., the early second millennium during the Isin-Larsa and Old Babylonian periods, new overland trade routes gained pre-eminence, connected to the rise of the Shimashkian confederacy, the spread of BMAC assemblages across the northern and eastern Iranian Plateau, the Old Assyrian Trade Colonies, and the opening of the Great Khorasan Road stretching from Central Asia, along the Alborz, to Assyria, Anatolia, and beyond.

3.2.3 The Sequence of Social and Political Transformations in Bronze Age Eastern Iran, Southern Central Asia, and the Indo-Iranian Borderlands

As introduced previously, two primary models have been proposed to characterize political developments in the lands east of Sumer during the third millennium BCE, i.e., the emergence of “proto-state structures” (Tosi 1974b, 1977, 1979, 1984, 1986) and “secondary states” (Kohl 2007). Both of these models presuppose a fundamental theoretical link between interregional interaction and the emergence of new institutions, whether socio-cultural/religious (e.g., “Interaction Spheres” [Caldwell 1964]) and/or political (e.g., “peer-polities” [Renfrew and Cherry 1986]). This theoretical connection is key, as it has been argued that the most intense period of interaction between the Gorgan Plain and the outside world corresponds to the phase of peak urbanization and political complexity in the region, i.e., during the last third of third millennium BCE, encompassing Tureng IIIB-IIIc1 and equivalent to Akkad-Ur
III in Mesopotamia (Cleuziou 1986; Tosi 1974a: 20). This argument has not been convincingly substantiated, however, and it is to this problem that the remainder of this chapter is addressed.

For example, that there was a proto-state structure or secondary state in the Gorgan Plain during this period has yet to be conclusively demonstrated. Indeed, little explicit primary research has been conducted on the nature of such an entity, but several pieces of evidence have been long considered suggestive of the degree of complexity in social and political organization in the region. These include the *Haute Terrasse* at Tureng Tepe (i.e., a monumental stepped platform, see Deshayes 1977; Leone 2014), the extensive record of settlement in the region (‘Abbasi 2011; Arne 1945; Mortezaei and Farhani 2008; Shiomi 1976, 1978), the high-quality craft products (Deshayes 1968, 1969), and wide-ranging trade/exchange contacts (Rostovtzeff 1920; Wilkinson, T.C. 2014). As indicative as archaeologists have considered this evidence, they are united in the recognition that our knowledge of the organization of prehistoric communities and polities in the Gorgan Plain has remained underdeveloped, especially relative to more well-studied neighboring regions. This has not, however, stopped scholars from using the Gorgan Plain as a comparative example in studies of the social and political transformations that occurred during the Bronze Age in neighboring areas. The Gorgan Plain is principally discussed in relation to Southern Turkmenistan, but also to regions further afield such as the Helmand and Soghun-Jiroft-Bampur basins (Kohl 2007: 214-233). Given the fact that political developments in Bronze Age Gorgan Plain are most often invoked in a comparative context, it is necessary to outline the scope of this framework in order to discern how scholars have understood social and political organization in this region.
3.2.3.1 Proto-State Structures

Tosi’s model of the emergence of proto-state structures characterizes the Bronze Age societies of Greater Khorasan as a “mosaic of regional sub-systems”, each of which underwent similar processes of growth, consolidation, and decline beginning in the 4th millennium and ending in the first half of the 2nd millennium BCE (Tosi 1979, 1986; Table 3.4). While Tosi reworked key parts of this sequence over the course of his publishing on the subject, his narrative is always grounded in a series of empirical arguments concerning the evidence for changes in four key domains: 1) the organization of craft production and consumption; 2) administrative technologies; 3) monumental architecture and collective works; and 4) settlement and territorial organization. As this dissertation is primarily focused with the last domain in this list, territorial and settlement dynamics will be emphasized in following discussions.

Table 3.4: Tosi’s First Periodization of the 4th-2nd millennia BCE in Turkmenistan (1979: 169)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Period</th>
<th>Relative Chronology</th>
<th>Absolute Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Urban</td>
<td>Mid-Late Chalcolithic</td>
<td>Namazga I-II</td>
<td>4000-3200 BCE</td>
</tr>
<tr>
<td>Proto-Urban I</td>
<td>Early Bronze I</td>
<td>Namazga III</td>
<td>3200-2800 BCE</td>
</tr>
<tr>
<td>Proto-Urban II</td>
<td>Early Bronze II</td>
<td>Namazga IV</td>
<td>2800-2500 BCE</td>
</tr>
<tr>
<td>Urban</td>
<td>Middle Bronze I</td>
<td>Namazga V</td>
<td>2500-2000 BCE</td>
</tr>
<tr>
<td>Post-Urban</td>
<td>Middle Bronze II</td>
<td>Namazga VI</td>
<td>2000-1600 BCE</td>
</tr>
</tbody>
</table>

Tosi argued for the following sequence in the region.22 Continuing trends established in the fourth millennium (Namazga II), during the late fourth to early third millennium (Namazga III) some of the villages in this region grew into towns and became centers of more advanced craft production as well as the central nodes in emergent networks of cultural integration (Tosi 1977). During the early-to-mid-3rd millennium (Namazga IV), some of these towns grew into...

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22 See Lamberg-Karlovsky and Tosi 1973: Maps 1-4
proto-urban centers, which were larger and more complex settlements within which markers of social differentiation were increasingly observed, which continued to extend their cultural influence over ever larger territories (Tosi 1986: 158). By the mid-to-late-3rd millennium (Namazga V), this process culminated with the formerly proto-urban centers developing into fully urban cities, attaining their maximal territorial hegemony, and exhibiting increasingly hierarchical social complexity (Tosi 1974b, 1977). The political organization of these social groups was characterized as having developed “proto-state structures” (Tosi 1986: 155; see also Masson 1988; Masson and Sarianidi 1972; Tosi 1977). These “proto-state structures” were concentrated in the Gorgan Plain (e.g., at Tureng Tepe), the eastern Kopet Dagh Piedmont (e.g., at Namazga Depe and Alty Depe), and in the Helmand basin (e.g., at Mundigak and Shahr-i Sokhta) (Hiebert 1994a; Biscione and Tosi 1979; Tosi 1977, 1986). By the turn of the second millennium (Namazga VI), the system of proto-state structures began to transform, marked by the rapid decline in size and complexity of the central sites and a breakdown in regional-scale cultural integration (Biscione 1977; Tosi 1986: 158; cf. Biscione 1981; Hiebert 1994a; Kohl 1984, 2007).

While many aspects of this sequence require some degree of revision, its outlines are not terribly controversial in a purely descriptive sense. The primary area to be redeveloped relates to the last phase; in light of ongoing research into the Bactria-Margiana Archaeological Complex, or BMAC, it is difficult to argue that the early second millennium represents a breakdown in either complexity or regional-scale cultural integration, major discrepancies

In any case, Tosi’s definition of “proto-state structures” relies heavily on Johnson’s three recurring elements of state societies (Tosi 1977: 49; see Johnson 1973: 1-4). The first is hierarchicalization of decision-making, the second is specialized and administered craft production, and the third is a “rationalized demographic distribution” reflective of the degree of socio-economic integration both required for and resulting from resource centralization. Tosi viewed the state (and by extension “proto-state structures”) as having two planes of articulation: 1) spatial, related to the distribution of the means of production and 2) hierarchical, related to property and the relations of production. Thus, state formation can be studied by looking at territorial organization of a given polity and the organization of production as reconstructed from commodities themselves and from analysis of the loci of craft manufacture.

In practice, for Tosi this means that the study of the emergence of “proto-state structures” will be tied very closely to developments in the “urban” central sites, where there is abundant evidence for transformations in the productive forces through architectural and artifactual analyses. Indeed, Tosi viewed urbanization as a critical component of state formation. Reducing Childe’s scheme of the famous ten elements of urbanization, Tosi argued that because of the preliminary state of research at the time in Central Asia just three variables could work as indices of urbanization – monumental architecture, demographic agglomeration, and the organization of craft quarters (Tosi 1986: 165). Crucially, he views all three of these factors as being in place at the central sites throughout Greater Khorasan by no later than 2400 BCE (Tosi 1977: 51). In Tosi’s view, state formation in pre- and proto-historic Greater Khorasan had a

²³ Alternatively referred to as the “Oxus Civilization” or the “Greater Khorasan Culture” (Lamberg-Karlovsky 2013c; Vahdati and Biscione 2016; cf. Salvatori 2016).
rather different character than as in Mesopotamia. In the latter case, he understood state-
formation to be focused on the centralization of population and the expropriation of labor for
farming/animal husbandry, whereas in Greater Khorasan, he inferred that the strategy was
based more on territorial specialization and demographic segmentation to take advantage of
the more varied resources available (Tosi 1977: 56).

Importantly for the arguments to be developed in later chapters, Tosi viewed most of
these regions as exhibiting a settlement “hierarchy,” which to his thinking, indicated
economic/political centralization, whether this took the form as in Sistan of a lack of
intermediate sized sites altogether, or in the case of the Kopet Dagh, where there are
intermediate sized sites, but that these simply represent smaller but independent political units.
There is no necessary link, however, between “tiers” in a settlement size distribution and
hierarchical levels of organization within a rationally organized political system. Indeed, there
are many examples to show that size alone is not a good indicator of complexity or organization
(Drennan et al. 2015). Moreover, a settlement hierarchy tells us little to nothing about the
organizational structure of a polity other than a rough index of how its population was (most
often in prehistory, organically) arranged in space (see Lamberg-Karlovsky 2013b: 42). Despite
these criticisms, Tosi’s model has proven to be the baseline framework for subsequent social
and political model-building in Greater Khorasan.

3.2.3.2 Reframing Tosi’s Model: The Central Asian Pattern, Secondary States, and the Khanate

The first general reframing of Tosi’s model to consider is Hiebert’s argument that the
pivotal transition points in the sequence occur in the middle of the periods traditionally defined
by the ceramic styles of the Namazga sequence (Hiebert 1994a: Ch. 10). As he argues, the first
widespread shifts in symbolic culture, agricultural traditions, settlement organization, and
exchange relations that characterize what he calls the “Central Asian Pattern” first emerge during the Namazga III period, rather than signal its beginning (Hiebert 1994a: 166-168).

Likewise, the development of craft specialization, nascent social hierarchy, increased regional integration, and the first monumental architecture and collective works only appear during the later stage of the Namazga IV period. Subsequently, the development of “urbanism” in the Kopet Dagh Piedmont and the “colonization” of the Murghab are hallmarks of the Late Namazga V, rather than the period as a whole. Finally, the transition to what Tosi would have called the “Post-Urban” phase occurs during the middle of Namazga VI, with the end of Margiana 2, what Hiebert considered to be the end of the BMAC (Hiebert 1994a: 165; see also Vidale 2017: 8-10, Table 1). Altogether, Hiebert’s model does not diverge sharply from the overall outline of Tosi’s framework in terms of the trajectory of increasing complexity leading to a peak followed by a collapse. But Hiebert does posit a different chronology of the timing of key developments, which has important implications for understanding how and when these phenomena relate to developments occurring in other regions.

Another broad reframing of Tosi’s model calls into question the evolutionary telos that underlies its historical trajectory; indeed, Kohl draws on a different set of Soviet sources to highlight the “unevenness” (неравномерность) and “lawlessness” (незакономерность) of the Central Asian sequence. In Kohl’s view, these historical, cultural, and political developments in separate but contiguous regions of Central Asia do not follow a regular or inevitable trajectory toward increasing social complexity (1984: 241). Despite his rejection of progressive stadial models, Kohl does argue for the emergence of diverse “states” or “archaic complex societies” in distinct ecological settings across this region during a restricted window between the late third and early second millennia BCE (Kohl 2007: 218).
Kohl terms these states “secondary” in the sense that they emerge in the context of already existing states, and because they are less nucleated, less densely populated, and less socially differentiated than the contemporaneous polities in Mesopotamia. Each of these secondary states had its origins in local Neolithic/Chalcolithic sequences, relied on intensive but technologically simple irrigation in interior drainage basins (Francfort and Lecomte 2002), had related traditions of monumental/religious architecture, and a repertoire of shared meaningful iconography (Amiet 1986; Pittman 1984; Tosi 1986). Each had some indication of varying degrees of social stratification, manifested in domestic architecture, burial practices, and access to exotic materials and goods. Indeed, these states were all tied together through some degree of circulation of finished and unfinished metal weapons, tools, and jewelry, as well as stone vessels and precious raw materials (Wilkinson, T.C. 2014). While each of these secondary states had its own specific features and developments, all either collapsed or “devolved” primarily in the first half of the second millennium BCE (Kohl 2007: 214ff.). This model only diverges from Tosi’s on theoretical grounds, principally over the nature of the types of societies that emerged during the late third millennium (i.e., “proto-state structures” versus “secondary states”).

In terms of more issue-specific critiques of the model, Tosi’s “Post-Urban” phase has undergone a significant reanalysis, even by Tosi himself (1986). His later writings on the subject conclude that the previously proposed “crisis of urbanism” is just that – the decline of the urban centers does not herald the collapse of complex society, states, or “supertribal organization”, but rather simply signals the emergence of a new system in which social and political structures did not necessarily depend on the concentration of people and services allocated in “regional centers” (Tosi 1986: 158; see also Biscione and Tosi 1979: 47-63). Aspects of this account accord with the more recent study done by Salvatori, who argues that the “collapse” of the Namazga V
urban system in the Kopet Dagh precipitated the settlement of Margiana and Bactria and the emergence of a system of “subregional chiefdoms.” These units were based in small fortified centers and exercised control over a limited territory, in accordance with their position relative to the regional irrigation system (Salvatori 2008b). Based on the results of the AMMD project and on new excavations at sites such as Ulug Depe, Sapalli Depe, and Djarkutan, the Namazga VI period sees neither a widespread “breakdown in regional integration”, nor a reduction in the size and complexity of most central sites, though both assertions may turn out to be true in the case of the Kopet Dagh Piedmont on the one hand, and of the post-BMAC period, i.e. Margiana 3, on the other (see Luneau 2014; Rouse and Cerasetti 2017; Salvatori 2008b: 63).

In other words, what Tosi had originally considered to be a phase of collapse has been demonstrated to be anything but (Hiebert 1994a; Sarianidi 2002, 2006, 2009; see also Salvatori 2008b). Rather, Hiebert and Lamberg-Karlovsky argue that the Namazga VI period witnessed the emergence of a new type of socio-political organization – the *khanate* – a quasi-feudal system organized around control over qalas and irrigation canals by segmentary tribal lineage groups, which continued to exist in one form or another until the ethnographic present (Hiebert 1992; Lamberg-Karlovsky 1994, 2012: 70, 2013: 28; see also Szabo and Barfield 1991). Lamberg-Karlovsky based this idea on several pieces of evidence. First, the extensive excavations at Gonur, its monumental fortification system, the large central qala, its “royal” cemeteries, and ritual precinct are taken to suggest that the site was a major political and/or religious center presided over by some kind of paramount authority. Along with this, other sites of comparable size which have been much less extensively excavated (i.e., Togolok, Djarkutan, Adji Kui 9), are understood to attest to a diverse mosaic of authoritative centers, which Lamberg-Karlovsky proposes would likely have presided over distinct segmentary social units. In his view, the BMAC
thus resembles Barfield’s concept of a “Turko-Persian” tribal society (e.g., Barfield 1993). Such an organizational form is characterized by a social hierarchy “organized through ranked set of lineages, clans, and tribes in which leadership was hereditary and limited to specific descent groups” (Lamberg-Karlovsky 2012: 70).

Thus, this argument models the BMAC on an oasis-adapted settlement system centered around large and small “fortified” architectural complexes associated with a distinctive pattern of land use (Hiebert 1994a; Moore et al. 1994; Salvatori 2008b; see also Markofsky 2014, 2015). Clearly, a cultural-political system with an extraordinary organizational capacity for the mobilization of primary productive forces and craft specialization emerged in this time and place, and was actively involved in an extensive network of interregional flows of luxury goods, as attested by the wide range of exotic materials found in context in Margiana and Bactria, as well as the vast range of BMAC-related finds that have been recovered across Greater Khorasan and beyond (Salvatori 2008a: 93; see also ‘Abbasi 2016; Pittman 2014; Potts, D. 2008; Biscione and Vahdati 2011).

Whether or not the khanate model is appropriate for understanding the socio-political organization inferred from this evidence remains an open question. Extensive surveys conducted since the early 1990s have produced a rich record that can serve as the basis for reanalysis of this and other hypotheses (Gubaev et al. 1998; Markofsky 2014, 2015; Markofsky and Bevan 2012; Markofsky et al. 2017; Rouse and Cerasetti 2017; Salvatori et al. 2008). In any case, this excursus on the khanate has taken us some distance from our concern with the Gorgan Plain, as no one, to my knowledge, has attempted to apply this theory to the “Post-Urban” Gorgan Plain. Given that scholarly consensus to the present has held that settlement
collapsed and the Gorgan Plain was abandoned at the end of the Bronze Age, this is an important issue that should receive greater attention in future research.

Thus, scholars agree that societies of Greater Khorasan experienced significant socio-political and economic transformations over the course of the Bronze Age, a long interval spanning at least the entire third millennium BCE, and perhaps several centuries of the preceding and succeeding millennia. It remains to be determined, however, whether the terms “proto-urbanism”, “urbanism”, “proto-state structure”, “secondary state”, and the “khanate” are appropriate concepts for describing the developments that occurred in Greater Khorasan during this period. Sustained inquiry into this topic is required because the premises underlying these concepts have rarely been questioned in the regional literature (but see Kohl 1984; Lamberg-Karlovsky 2012, 2013). Rather, these concepts are often either accepted *prima facie* or have been considered merely incidental to the research design of subsequent expeditions. For good reason, the need to conduct primary field research and to generate materially grounded space-time systematics has taken precedence over abstract theorization (e.g., Bendezu-Sarmiento 2013; Gubaev et al. 1998; Hiebert 1994a; Kohl 1984; Salvatori and Tosi 2008; cf. Lamberg-Karlovsky 2012, 2013).

Of these regions, the Gorgan Plain has remained particularly understudied and undertheorized, despite having one of the richest archaeological records in the area. As there has been no serious study of political organization for the Bronze Age Gorgan Plain, it has been necessary to examine those neighboring regions which have been the subject of more explicit theorization. Fortunately, the Gorgan Plain is never far away from the minds of these authors, even if they had little primary evidence to go on beyond the paltry published record. Thus, Tosi’s
model and its reformulations represent the anchor for constructing a descriptive model for the Gorgan Plain.

One important point is that Tosi’s model and its reformulations do not necessarily disagree on the basic empirical framework under discussion for much of the sequence. The broad trajectory of observed transformations is not presently disputed, but what these transformations correlate to in terms of social processes is. Thus, major areas for future studies will be in close examination of this evidential record to determine whether the consensus is justified, and in critical scrutiny of the reasoning used to connect the evidence to models and theories. Because of the nature of the published record, it is very easy for assertion and allegation to assume the status of received wisdom. Given the extent of the discrepancies in understandings of space-time systematics in this region, it can quickly become difficult to link evidence-to-evidence, much less evidence-to-theory and back again.

To take one notable example, it is often stated that during the Namazga V period, three social classes took shape at Altyn Depe (Masson 1988: 32-55; Bonora 2016: 24-26). The evidence given for this is the emergence of distinct districts on the mound, which were differentiated from each other by the quality and size of the architectural complexes, as well as by the richness of their furnishing and material culture assemblages (Kohl 1984: 128). We must first ask ourselves whether this is in fact the case. Has the presence of districts differentiated by wealth been theoretically overdetermined, or can such a distinction be maintained based on the present state of the evidence? In other words, do the wealth distinctions observed in domestic architecture truly correlate to the existence of three distinct social classes? How would we know for certain? What other evidence might corroborate or detract from this interpretation? Can we extrapolate from the small number of detailed case studies that we currently have to a more
generalized level? That is, can we propose that these changes would have occurred anywhere other than where they have already been observed and documented? While this is just one specific case, similar lines of questioning can and should be applied to each evidentiary plank in the theoretical scaffolding of Tosi’s *longue durée* framework, especially regarding comparisons between the “Turanian” model and developments in the Gorgan Plain.

This is precisely what this dissertation will do in subsequent chapters with respect to the question of regional-scale patterns of settlement. Before this can be undertaken, however, there are a number of problems that must be addressed. Primary among these is to understand how the regional chronology of the Gorgan Plain fits into the broader framework of Greater Khorasan, such that the timing of the proposed transformations – both in regional settlement and in patterns of regional and interregional interaction – can actually be evaluated.

3.3 Situating the Gorgan Plain Within Regional and Interregional Flows

In the previous two sections, I discussed: (1) the broadest outlines of the patterns of political geography in Bronze Age Iran, (2) how scholars have related these patterns to shifts in trade, exchange, and interaction, and (3) the models that have been used to understand the emergence of political complexity in the latter half of the third millennium in Greater Khorasan. In this section, I work toward understanding how the Gorgan Plain fits into the domain outlined above. This will necessarily require – as in the previous section – discussion of surrounding areas as much as if not more than the Gorgan Plain itself due to the patchwork nature of the history of archaeological research. Indeed, the Gorgan Plain is almost always discussed in a comparative context because so little was known about it at the time that many of the syntheses of the region were written, especially relative to immediately neighboring (and better-known) regions, principally Southern Turkmenistan and the Central Iranian Plateau. To be able to integrate the
broad patterns identified by Wilkinson and Tosi with the more specific claims that have been made about the Gorgan Plain’s regional and interregional connections at various points in time, some chronological issues must first be addressed.

### 3.3.1 Chronology

As introduced above, Tosi proposed a five-phase sequence spanning the interval from 4000-1600 BCE (Tosi 1977, 1979). He later revised this sequence, condensing it to four phases by collapsing the Proto-Urban I and II phases (ca. 3200-2600 BCE) and slightly revising the absolute chronology of the transitions between periods (1986: 158). Tosi argued that the changes which previously distinguished these phases (i.e., Namazga III-IV) from each other, rather than representing disjuncture, instead reflected a process of gradual growth and consolidation of the forces that defined the Chalcolithic social order (see also Hiebert 1994a: 170-174). In the new framework, the Urban Phase begins from 2600 BCE onward, with all the signature hallmarks of “urbanization” – monumental architecture, demographic agglomeration, and the re-organization of craft quarters – in place by no later than 2400 BCE (Tosi 1986: 165). In Tosi’s updated framework, by 2200 BCE, the Urban Phase has run its course and transitions into the Post-Urban Phase.

**Table 3.5: Tosi’s Periodization of the 4th-2nd millennia BCE in South Turkmenistan (1986)**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Period</th>
<th>Relative Chronology</th>
<th>Absolute Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Urban</td>
<td>Chalcolithic</td>
<td>Namazga II-III</td>
<td>4000-3200 BCE</td>
</tr>
<tr>
<td>Proto-Urban</td>
<td>Chalcolithic-Early Bronze</td>
<td>Namazga III-IV</td>
<td>3200-2600 BCE</td>
</tr>
<tr>
<td>Urban</td>
<td>Middle Bronze I</td>
<td>Namazga V</td>
<td>2600-2200 BCE</td>
</tr>
<tr>
<td>Post-Urban</td>
<td>Middle Bronze II</td>
<td>Namazga VI</td>
<td>2200-1600 BCE</td>
</tr>
</tbody>
</table>

It is important to remember that the relative sequence of interregional parallels has been slightly revised since the time of Tosi’s formulation of the model, as new sites have been
discovered and old excavations restudied (e.g., Hiebert 1994a; Gürsan-Salzmann 2016; Luneau 2014; Pittman 2014; Salvatori and Tosi 2005; Thornton 2009). The most crucial points to bear in mind are: 1) the elaboration of the Margiana sequence as independent from the Namazga sequence, and 2) the results of the Hissar Restudy Project and Ayşe Gürsan-Salzmann’s correlation of these results to Schmidt’s original sequence. While the more technical issues related to the correlation between relative and absolute chronologies of the Gorgan Plain specifically will be picked up again in more detail in Chapter 5, for now I want to clarify the interregional framework both in terms of equivalencies between phases as they have been conventionally understood in the literature and in terms of a Bayesian simulation of radiocarbon dates (Tables 3.6-3.9).

**Table 3.6: Relative Chronological Chart for Greater Khorasan**

<table>
<thead>
<tr>
<th>Kopet Dagh</th>
<th>Margiana</th>
<th>Gorgan Plain</th>
<th>Damghan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Namazga VI</td>
<td>Margiana 3 (Takhirbai)</td>
<td>Turaiq IIIIC</td>
<td>Hissar IIIIC? (A?)</td>
</tr>
<tr>
<td>Early Namazga VI</td>
<td>Margiana 2 (Gonur S)</td>
<td>Turaiq IIIIC-3</td>
<td>Hissar IIIIC (A)</td>
</tr>
<tr>
<td>Late Namazga V</td>
<td>Margiana 1 (Gonur N)</td>
<td>Turaiq IIIIB-IIIIC</td>
<td>Hissar IIIIB-C (B-A)</td>
</tr>
<tr>
<td>Early Namazga V</td>
<td></td>
<td>Turaiq IIIB</td>
<td>Hissar IIIB (B)</td>
</tr>
<tr>
<td>Namazga IV</td>
<td></td>
<td>Turaiq IIIA</td>
<td>Hissar IIIA (C-B)</td>
</tr>
<tr>
<td>Namazga III</td>
<td></td>
<td>Turaiq IIIB</td>
<td>Hissar IIIA (D-C)</td>
</tr>
</tbody>
</table>

**Table 3.7: Summary of the Different Absolute Chronologies for the Kopet Dagh Piedmont**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Late NMG VI</td>
<td>...-1600</td>
<td>...-1600</td>
<td>1800-1500</td>
<td>1700-1500</td>
<td>1500-1300</td>
<td>1560-830</td>
<td>1405-1035</td>
</tr>
<tr>
<td>Early NMG VI</td>
<td>2000-...</td>
<td>2200-...</td>
<td>2100-1800</td>
<td>1900-1700</td>
<td>1900-1500</td>
<td>1875-1365</td>
<td>1785-1535</td>
</tr>
<tr>
<td>Late NMG V</td>
<td>...-2000</td>
<td>...-2200</td>
<td>2200-2100</td>
<td>2200-1900</td>
<td>...-1900</td>
<td>2025-1740</td>
<td>1910-1830</td>
</tr>
<tr>
<td>Early NMG V</td>
<td>2500-...</td>
<td>2600-...</td>
<td>2500-2200</td>
<td>2500-2200</td>
<td>2400-...</td>
<td>2575-1970</td>
<td>2405-2145</td>
</tr>
</tbody>
</table>

24 Moreover, we now know a great deal more about the Central Asian Bronze Age Civilization (e.g., Salvatori et al. 2008; Sarianidi 2009) and discoveries in Jiroft have added a new major center to account for in the broader system of exchanges (e.g., Majidzadeh and Pittman 2008).

25 Adapted from Biscione and Tosi 1979: Chronogram Insert; Cattani et al. 2008: Figure 3.3; Hiebert 1994: Figure 10.6; Luneau 2014: Ch. 2, Table 1; Thornton 2013: Table 10.1.

26 Dates rounded to the nearest 5-year according to standard convention of reporting constrained calibrated 14C determinations (Hamilton and Krus 2018; Lulewicz 2018; Millard 2014).
Table 3.8: Summary of the Published Absolute Chronologies for the BMAC

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Margiana 3</td>
<td>1860-1520</td>
<td>1500-1300</td>
<td>1800/1750-1500/1450</td>
<td>1700-1500</td>
<td>1740-1405</td>
<td>1640-1580</td>
</tr>
<tr>
<td>Margiana 2</td>
<td>2040-1680</td>
<td>1900-1500</td>
<td>2300/2100-1800/1750</td>
<td>1900-1700</td>
<td>1945-1555</td>
<td>1865-1685</td>
</tr>
<tr>
<td>Margiana 1</td>
<td>2285-1785</td>
<td>2400-1900</td>
<td>...-2300/2100</td>
<td>2300-1900</td>
<td>2130-1840</td>
<td>2000-1910</td>
</tr>
</tbody>
</table>

Table 3.9: Gorgan Plain Absolute Chronology

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tureng IIIC2</td>
<td>Ca. 1900-17/1600</td>
<td>2000-1600</td>
<td>1800-17/1600</td>
<td>2005-1530</td>
<td>1780 (one date)</td>
</tr>
<tr>
<td>Tureng IIIC1</td>
<td>Ca. 1900</td>
<td>2100-1800</td>
<td>2526-2100</td>
<td>2526-1715</td>
<td>2225-1910</td>
</tr>
<tr>
<td>Tureng IIIB</td>
<td>Late 3rd mill</td>
<td>2500-2000</td>
<td>2700-2100</td>
<td>3120-2010</td>
<td>2730-2245</td>
</tr>
<tr>
<td>Tureng IIIA</td>
<td>Mid 3rd mill</td>
<td>2900-2700</td>
<td>3725-2780</td>
<td>3725-2780</td>
<td>3300-3045</td>
</tr>
<tr>
<td>Tureng IIB</td>
<td>Early 3rd mill</td>
<td>3000-2500</td>
<td>3300-2900</td>
<td>3725-2780</td>
<td>3300-3045</td>
</tr>
</tbody>
</table>

Table 3.10 synthesizes the published chronograms that have been used to compare the regional sequences of Greater Khorasan. Certain phases require additional clarification, especially the later part of the sequence, e.g. Namazga VI relative Margiana 2-3 and Tureng IIIC1-IIIC2. Some progress can be made on these two questions with reference to: (1) published accounts of absolute dates (Table 3.4) and (2) reanalysis of radiocarbon determinations via a phase-constrained OxCal model (see Tables 3.5-3.6).

27 Hiebert 1994: Tables 5.1-5.3.

It should be noted that there are a large quantity of recently available radiocarbon determinations for Gonur Depe in particular, but due to the fact that the authors do not connect the different excavations from which these samples were obtained to Hiebert’s sequence, it is difficult to determine which phase the contexts belong to; in any case, the model presented suggests that between Gonur North, Gonur South, and the Necropolis, the site was in use from 2500-1500 calBCE, and that preponderance of dates from all contexts at the site cluster between 2000-1500 calBCE (Zaitseva et al. 2008).


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Table 3.10: Matching Tosi 1986 to Adjacent Regions by Absolute Dates

<table>
<thead>
<tr>
<th>Abs. Dates</th>
<th>Tosi Phase</th>
<th>Tosi KDP</th>
<th>14C Kopet Dagh</th>
<th>14C Margiana</th>
<th>14C Gorgan</th>
<th>Mesopotamia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600-1500</td>
<td>Post-Urban</td>
<td>Nmz VI</td>
<td>Nmz VI</td>
<td>Margiana 3</td>
<td></td>
<td>Kassites</td>
</tr>
<tr>
<td>1700-1600</td>
<td>Post-Urban</td>
<td>Nmz VI</td>
<td>Margiana 2-3</td>
<td>Turin IIIIC 2</td>
<td>Old Babylonian</td>
<td></td>
</tr>
<tr>
<td>1800-1700</td>
<td>Post-Urban</td>
<td>Nmz VI</td>
<td>Margiana 2</td>
<td>Turin IIIIC 2</td>
<td>Old Babylonian</td>
<td></td>
</tr>
<tr>
<td>1900-1800</td>
<td>Post-Urban</td>
<td>Nmz VI</td>
<td>Late V - NMZ VI</td>
<td>Turin IIIIC 2</td>
<td>Isin-Larsa/Ob</td>
<td></td>
</tr>
<tr>
<td>2000-1900</td>
<td>Post-Urban</td>
<td>Nmz VI</td>
<td>Margiana 1-2</td>
<td>Turin IIIIC 2</td>
<td>Isin-Larsa</td>
<td></td>
</tr>
<tr>
<td>2100-2000</td>
<td>Post-Urban</td>
<td>Nmz VI</td>
<td>Early-Late Nmz V</td>
<td>Margiana 1</td>
<td></td>
<td>Ur III</td>
</tr>
<tr>
<td>2200-2100</td>
<td>Post-Urban</td>
<td>Nmz VI</td>
<td>Early Nmz V</td>
<td>Turin IIIIB</td>
<td></td>
<td>Akkadian/Ur III</td>
</tr>
<tr>
<td>2300-2200</td>
<td>Urban</td>
<td>Nmz V</td>
<td>Early Nmz V</td>
<td>Turin IIIIB</td>
<td></td>
<td>Akkadian</td>
</tr>
<tr>
<td>2400-2300</td>
<td>Urban</td>
<td>Nmz V</td>
<td>Early Nmz V</td>
<td>Turin IIIIB</td>
<td></td>
<td>ED/Akkadian</td>
</tr>
<tr>
<td>2500-2400</td>
<td>Urban</td>
<td>Nmz V</td>
<td>Early Nmz V</td>
<td>Turin IIIIB</td>
<td></td>
<td>Early Dynastic</td>
</tr>
<tr>
<td>2600-2500</td>
<td>Urban</td>
<td>Nmz V</td>
<td>Nmz IV</td>
<td>Turin IIIIB</td>
<td></td>
<td>Early Dynastic</td>
</tr>
<tr>
<td>2700-2600</td>
<td>Proto-Urban</td>
<td>Nmz III-IV</td>
<td>Nmz IV</td>
<td>Turin IIIIB</td>
<td></td>
<td>Early Dynastic</td>
</tr>
<tr>
<td>2800-2700</td>
<td>Proto-Urban</td>
<td>Nmz III-IV</td>
<td>Nmz III-IV</td>
<td>Turin IIIIA?</td>
<td></td>
<td>Early Dynastic</td>
</tr>
<tr>
<td>2900-2800</td>
<td>Proto-Urban</td>
<td>Nmz III-IV</td>
<td>Nmz III-IV</td>
<td>Turin IIIIA?</td>
<td></td>
<td>Early Dynastic</td>
</tr>
<tr>
<td>3000-2900</td>
<td>Proto-Urban</td>
<td>Nmz III-IV</td>
<td>Nmz III</td>
<td>Turin IIIB</td>
<td></td>
<td>Jemdet Nasr</td>
</tr>
<tr>
<td>3100-3000</td>
<td>Proto-Urban</td>
<td>Nmz III-IV</td>
<td>Nmz III</td>
<td>Turin IIIB</td>
<td></td>
<td>Jemdet Nasr</td>
</tr>
<tr>
<td>3200-3100</td>
<td>Proto-Urban</td>
<td>Nmz III-IV</td>
<td>Nmz III</td>
<td>Turin IIIB</td>
<td></td>
<td>Uruk</td>
</tr>
</tbody>
</table>

Particular care is required with the analysis of radiocarbon dates from this region. In addition to concerns about the Leningrad radiocarbon laboratory and the reliability of its results in the 1980s (K. Pustovoytov personal communication 2018), there are also substantive questions to be posed about the relationship between the dated events (i.e., the samples analyzed) and the target events (i.e., what archaeological contexts and therefore social processes the samples purport to represent). Indeed, experts often highly skeptical of the radiocarbon chronology of Bronze Age Central Asia (Thornton personal communication 2017; cf. Hiebert 1994a; Zaitseva et al. 2008). While concerns about sampling strategies in particular are

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valid, the method of modeling that I deploy here is capable of mitigating these problems to an extent.\textsuperscript{32} With respect to the relationship between Namazga VI and Margiana 1-2 on the basis of absolute dates, there are several issues to address. First, with respect to Namazga VI, this period is now divided into an Early and Late Phase, with the maximal outer boundaries for both phases taken together being ca. 22/2100-15/1300 BCE, with older sources suggesting an earlier date on average for the onset of this period (e.g. Tosi 1979/1986 at either 2000 or 2200 BCE and Kohl 1984 putting it at 2100 BCE) and the more recent sources suggesting an early second millennium beginning for Early Namazga VI (Hiebert 1994a and Cattani et al. 2008 both place it at 1900 BCE). Either way, all but one source put the end of Namazga VI in the mid-second millennium at ca. 16/1500 BCE (cf. Cattani et al. 2008). The Bayesian model suggests a similar range of dates, with the Early Namazga VI period comprising broadly the early second millennium, and the Late Namazga VI period encompassing the early-middle the second millennium. There is reason to doubt the reliability of this latter date-range, but for now it is what we have to go on, and it should be noted that the unconstrained calibrated dates for this period also suggest a later second millennium date for the period. Thus, we can hypothesize on the basis of these dates that at minimum, the Namazga VI period, whether Early or Late, appears to overlap best with Margiana 2-3, which matches the sequence of relative chronological alignments in Table 3.3.

\textsuperscript{32} By incorporating groups of dates into a stratigraphically informed probability simulation, the range of error and uncertainty inherent in single samples can be considerably decreased, and thereby gives us greater confidence in the accuracy of date-ranges, if not in their precision as well. Such models provide a probability range for phases in addition to those for individual dates. Despite the fact that an individual sample may be contaminated or have come from an uncertain context, the combination of multiple dates in Monte-Carlo Markov-Chain probability simulation increases the reliability of the results (Bronk Ramsey 2017). On the one hand, it affords easier identification of outliers, and on the other, it allows us to evaluate the variance within groups of dates, delineated according to stratigraphy. Simply, groups of dates allow us to reason about the distribution of radiocarbon determinations within a given phase, which at the very least gives us an idea of the range of possibility (Lulewicz 2018).
Naturally, this remains to be fully substantiated on the basis of the materials themselves, and the nature of the Namazga VI occupation of the Kopet Dagh piedmont ought to be more fully explored. There are solid indications that the notion of “collapse” at the end of the Namazga V period may be overstated, however, especially at Namazga Depe and Ulug Depe, but also at Altyn Depe as well (Hiebert 1994a: 81).

Concerning the relationship between Tureng IIIC and the Margiana sequence, the first phase of Tureng IIIC (i.e., IIIC₁) has been proposed to date to either the first century of the second millennium, the first half of the second millennium, or spanning the turn of the third-second millennium. The Bayesian model suggests this latter dating is more likely to be correct, with a 2-sigma (i.e., 95% probability) range of 2526-1715 calBCE and a mean of 2225-1910 calBCE. This means that IIIC₁ best overlaps with Margiana 1, though it may also overlap with Margiana 2 as well. Tureng IIIC₂ is conventionally dated to the second quarter of the second millennium and the one radiocarbon determination for the period gives a 2-sigma range that covers the entire first half of the second millennium, with a mean date of 1780 calBCE, again suggesting the strongest overlap with Margiana 2. While this result fits expectation, a single date doesn’t inspire the greatest confidence, and there is the no small problem to resolve of certain ceramic parallels between Tureng IIIC₂ ceramics and those of Margiana 3 (compare Deshayes 1969b against Hiebert 1994a and Luneau 2014). At the very least, these parallels and the 2-sigma range suggest that we ought not to be surprised if there is in fact overlap between Tureng IIIC₂ and Margiana 3.

Naturally, radiocarbon dates only tell part of the story; in the following sections, the various material-cultural connections between the different subregions of Greater Khorasan will be considered in greater detail. There are several key chronological anchors to be discussed first,
however. These include notably the “Persepolis vase,” now widely considered to have been manufactured in Margiana (Potts, D. 2008); on the basis of a later Linear Elamite inscription added to the vessel, it has been argued that the manufacture of this item has a *terminus ante quem* dating to the reign of Puzur-Inshushinak ca. 2100 BCE (Potts, D. 2008: 187-191). This suggests that the craft industry that produced this object would have had to have been in place prior to this date and should therefore likely be dated to the Margiana 1 period. Recent analysis of the chronology of the available corpus of Linear Elamite inscriptions from similar silver vessels (i.e., *gunagi*), however, suggests a potentially more recent *terminus ante quem* between 2050-1850 BCE of the Middle Chronology, which could perhaps then just as easily date to Margiana 2 (Desset 2018:139).

There are also BMAC connections to the Indus to be accounted for in the form of stamp seals, ivory, perforated jars, monkey figurines, etc. (Dubova 2019; Frenez 2018), not to mention the wide range of BMAC-related necropolises and cenotaphs that have been found across the Indo-Iranian borderlands as well as in eastern Afghanistan at Shortugai (Frenez 2018; see also Possehl 2002; Salvatori 2008a; Sarianidi 1990). While many of the finds that have been used to connect the Indus to the BMAC are stray-finds, contextless, or came from the art market, there are several fixed points to anchor this relation. For example, a fired steatite excavated from the “water temple” at Gonur North with the image of an elephant and Indus characters has been dated to the last phase of the Indus Civilization ca. 2200-1900 BCE (Kenoyer and Meadow 2010; Sarianidi 2005: 258, fig. 114; as in Frenez 2018), again suggesting Margiana 1 or perhaps early Margiana 2.

Connections with Jiroft and Mesopotamia suggest a slightly earlier date for the BMAC. Take for example the hybrid combat scene cylinder seal found on the surface near Togolok 1.

163
Through iconographic parallels to Konar Sandal, especially KSS Trench V, the imagery of this seal can be dated to the late Early Dynastic III period, particularly the Royal Cemetery, which using the lower chronology suggests a date of 2400-2350 BC (Pittman 2014: 633). It should be noted that this link provides a terminus post quem for the object’s arrival in Margiana, suggesting that the relationship between Jiroft and the BMAC could have started no earlier than this stage.

Another terminus post quem for the establishment of BMAC-Mesopotamia connection is provided by an Akkadian cylinder datable in manufacture to the reign of Naram Sin, ca. 2250-2225, excavated from a grave at Gonur (ibid). If this seal arrived at Gonur and was placed into this grave shortly thereafter this would suggest a Margiana 1 date, though it could have occurred at any time after this as well (Pittman 2019). This evidence tracks with the parallels between the composite softstone seated statuettes, commonly found in BMAC contexts; it has recently been argued that these objects have prototypes in Late Early Dynastic and Akkadian phases at Ebla and Mari, suggesting a date range for these objects beginning around ca. 2300 BCE (Francfort 2019: notes 58-62).

Altogether these examples suggest that Margiana 1 may begin somewhat earlier than the radiocarbon model would indicate. Nevertheless, we have two termini post quem from secure contexts dating to ca. 2350-1900 BCE and a terminus ante quem dating to 2050-1850 BCE, meaning that the Margiana 1-2 phases must fall at least partly within this range. If Francfort’s identification of the BMAC as Marhashi is correct, then based on the attestation of Marhashi in Mesopotamian texts indicates that this entity must have continued until the reign of Zimri-Lim of Mari at the very least, ca. 1775-1760 BCE (Francfort 2019: note 61; see also Casanova 2019). There are a large number of additional examples to consider for cross-dating the BMAC, but the point of this exercise is to help clarify some of the issues that will be raised in
the next section. While there are outstanding issues to redress with respect to the earlier phases of the sequence as well, I chose to focus in the foregoing on the later part of the overall sequence because these phases represent the starkest discrepancy between Tosi’s chronology (introduced above) and Wilkinson’s chronology (to be introduced below).

3.3.2 Material flows and the Gorgan Plain’s shifting role in regional and interregional interaction

As established above, numerous land routes connected the various parts of the Iranian Plateau to the world beyond at different times between ca. 3200-1600 BCE. These routes coexisted with, complemented, and at times competed with maritime routes in relation to shifting political, economic, technological, and ecological conditions. Land routes connecting the study area of this dissertation – i.e., northeastern Iran – to its neighbors have a deep history, beginning, for example, with exchange of obsidian between eastern Anatolia and the northern Iranian plateau as early as the late 8th millennium BCE (Roustaei and Gratuze 2020). The intensity of material flows along these routes fluctuated over time, at different intervals linking the Gorgan Plain more or less closely with its neighbors both near and far. These overland routes were quite active already by the late 4th and early 3rd millennia, especially during the time of the Proto-Elamite phenomenon which connected Susa to Fars, the Central Plateau, Kerman, and Sistan (Kohl and Lyonnet 2008: 38; see also Amiet 1986; Pittman 2003; Weiss and Young 1975).

While contemporaneous texts are often too fragmentary and unreliable to clarify the scope and character of the relations that constituted these routes, it is clear that the exchange of raw, semi-processed, and processed materials was an important factor in the development of durable patterns of interregional contact. While the extent to which the circulation of these
items can be considered as an indication of “trade” of commodities in a market is doubtful, especially at early stages in this process, at various junctures, production of goods and materials was evidently managed or administrated in some capacity, as demonstrated by the widespread use of stamp-seals in workshop and other contexts at sites such as Hissar, Sarazm, Mundigak, Shahr-i Sokhta, Konar Sandal and Tepe Yahya at this time (Pittman 2016; Tosi 1984; see also Gürsan-Salzmann 2016). Nevertheless, that there was sustained interaction is not in question.

Another major period of material flows corresponds to the Middle Asian Interaction Sphere (Possehl 2002) or L’âge des échanges inter-iraniens (Amiet 1986). This network took shape during the middle of the third millennium BCE and continued into the early second millennium. This phase is recognized as one which knitted together various parts of the Iranian Plateau, southern Central Asia, Afghanistan, Baluchistan, and parts of the Indus into a network of exchange, involving the transfer of items such as the carved softstone vessels (Kohl 1978; Pittman 2018b), a number of specific types of adornment, such as etched and/or biconical tubular carnelian beads and items made of ivory from the Indus (Wright 2010: 228-229; see also Frenez 2018), seals and sealing practices (Pittman 2018a), particularly compartmentalized bronze stamp-seals, and a highly distinctive repertoire of iconographic themes, motifs, and figures (Amiet 1986: 267-332; Pittman 2012, 2013, 2014).

Importantly, this phase coincides with the emergence of the Bactria-Margiana Archaeological Complex Kohl and Lyonnet 2008: 38), encompassing the Akkadian and Ur III periods as well as the formation of the Old Assyrian trade network in Anatolia. Given that this is a long and complex historical conjuncture, the coherence of this period as an “episode” of flows may break down upon further inspection. In the earlier part of this interval (Akkadian-Ur III), there is mounting evidence for contact between Margiana, Jiroft, and Mesopotamia in particular
This connection is pivotal for understanding how the Gorgan Plain fits into the broader picture, because the result of these connections clearly impacted northeastern Iran, as amply attested by the Astarabad Treasure and the Bazgir hoard. With respect to the latter phase (Old Babylonian-Old Assyrian) it has been argued that this floruit of exchange was driven by, among other things, the trade of tin and silver (Barjamovic 2011; Wilkinson, T.C. 2014). While there is good reason to be skeptical of this particular casual argument (see 3.3.2.5), it is incontrovertible that numerous categories of exotic materials and products are found within eastern Iran and southern Central Asia during this time. Moreover, Iranian/Central Asian materials and parallels have been found in Anatolia, Mesopotamia, the Gulf, and the Indus, clearly demonstrating a robust pattern of exchange and material flows (e.g., Dubova 2019; Frenez 2018; Hiebert 1994a; Pittman 1984; Possehl 2002). One important objective for future research is to further discern the differences in patterns of interconnectedness during the Akkadian/Ur III periods from those of the Old Babylonian/Old Assyrian periods.

In each of the following sub-sections, I will summarize the evidence for interaction at both regional (concerning the Gorgan Plain and its immediate neighbors) and interregional (concerning the broader world of the Ancient Near East) scales, to discern and evaluate the shifting density of travel in people and goods along these routes over time using loose 300-year intervals to organize the evidence (following Wilkinson, T.C. 2014: 289-306). Three notes of caution must be registered before proceeding, however: (1) there has been no systematic or

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33 To briefly summarize a long and complicated debate, many scholars have believed that the primary source of tin during this time period was located in chain of deposits distributed in an arc between the Kyzyl Kum and the Pamir ranges to the south of the Zerafshan (Kohl and Lyonnet 2008: 39; see also Muhly 1973; Pigott 1999; Weeks 2003). This has been contested recently, with an argument in favor of the source region being located in southern Afghanistan instead, in the Helmand basin between Qandahar and Kabul (Kaniuth 2007: 36). This debate has major implications for discerning which routes conveyed this tin to Mesopotamia and beyond (i.e., via the northern plateau versus via the Gulf).
comprehensive study of the Gorgan Plain’s interregional relationships based on excavated material aside from those used to establish the area’s relative chronology, thus much of the evidence used to describe the intensity and kind its relations at any given point in time is impressionistic and unsubstantiated in a quantitative sense; (2) in prior scholarship, especially with respect to the Gorgan Plain and Central Asia, the regional and interregional scales of material connections/parallels are often discussed in the same breath and can therefore at times be difficult to disentangle; and (3) much of the effort expended in this analysis is to resolve inconsistencies between sources that have proliferated due to the uncritical repetition of arguments put forth in authoritative accounts.

3.3.2.1 3200-2900 BCE (Tureng IIB)

Regarding broader regional patterns, at the end of the fourth millennium, an interaction sphere formed, connecting Southern Turkmenistan to communities across the Indo-Iranian borderlands (Lamberg-Karlovsky and Tosi 1973; Masson and Sarianidi 1972; Tosi 1974b). One of the most visible indicators of these connections is a shared repertoire of ceramic decorative motifs – i.e., the Namazga III “tapestry style” – with parallels distributed from the Kopet Dagh Piedmont to Sistan, Helmand, the Zarafshan, and the intermontane valleys Iranian Khorasan, especially the Kashaf Rud, Upper Atrek, and Darreh Gaz (see also Kohl et al. 1982). Wilkinson explains this pattern as the emergence of a zone of “common social, economic, or craft-based values,” provisionally connecting it to an interregional trade network centered on textiles and or baskets (Wilkinson, T.C. 2014: 291-292).34

34 It should be noted that while where 40% of the painted pottery of Period I is identifiably related to Namazga III Shahr-i Sokhta in Sistan, and that while similar ceramics are found at Damb Sadaat II-III in Quetta and at Mundigak near Kandahar, according to Wright, their resemblance is only superficial and general (Wright 1984: 349).
Contemporary and parallel to this was a similar but distinct craft and interaction zone in northeastern Iran most well-known from Tureng Tepe, Shah Tepe, and Tepe Hissar; beginning in the late 4th millennium, i.e., the Tureng IIB period, a distinctive tradition of Grey Ware pottery production began (Tosi 1974b; Kohl 1984: 93-103; Cleuziou 1986: 232). Wilkinson identifies a different focus of exchange in this zone, connected to metals and the skeumorphism of metallic aesthetics as manifest in the grey ware pottery types, as opposed to the weaving/basketry skeumorphism of the Namazga III interaction sphere. The production of Grey Wares was not just limited to northeastern Iran but is also found in central and western Turkmenistan (Khlopin 1997; Thornton et al. 2013), as well as throughout the Indo-Iranian Borderlands, and as far as Oman (Jarrige 1984; Wright 2002).

The timing of the spread of this pottery production method across this wide zone is key, but for now it seems that there are several stages in the sharing of production techniques and repertoires across this vast zone, the earliest of which occurs during this period. For example, the Grey Wares outside the Gorgan Plain/Damghan region first appear at Ak Depe and Parkhai Depe during the Early-Mid Chalcolithic (Namazga II) period and find their best parallels to the Tureng/Hissar II sequence. Like at Tureng and Hissar during this time, Grey Wares are far from predominant in the assemblage. Subsequently, during the Namazga III period, the Grey Wares become more widespread in their distribution, being found at Ak Depe, Kara Depe and Parkhai II. During this period, they come to represent about half of the ceramics at Ak Depe, almost all of the ceramics at Parkhai, but only 5-10% of the assemblage at Kara Depe. These wares find their best parallels to Tureng/Hissar IIB and Shah III-IIB.

35 The Grey Wares of the Indo-Iranian Borderlands do not form a horizon style with those of northeastern Iran, but what appears to be shared between them is the production technique, i.e. well-controlled reducing firing atmospheres.
In Wilkinson’s account, both of these craft-based exchange networks or interaction spheres were connected to the outside world in the form of flows of precious stones – particularly at this juncture, lapis lazuli and turquoise, whose principal sources were in Badakhshan in the case of the former, and in the case of the latter, in the Karakum and near Neyshabur (Law 2006). Both stones are found in increasing quantity in Mesopotamian elite burials at this time, though lapis was always more widely distributed and found in greater quantities than turquoise (Wilkinson, T.C. 2014: 292). With respect to northeastern Iran and its role in lapis exchange, it should be noted that lapis is present at both Tureng and Hissar throughout the third millennium, but evidence for lapis-working is much more abundant at Hissar (Thornton 2014).

Deshayes argues that lapis lazuli production peaked at Hissar during the IIB period, i.e., what he understood to date to 3400-3000 BCE, whereas lapis production at Tureng Tepe peaked somewhat later, during the IIIA period, i.e., 3000-2500 BCE (Thornton 2013: 191-192; see also Deshayes 1968: 37, 1969a: 14). It is possible, however, that these “peaks” are actually contemporaneous, given Tosi and Bulgarelli’s study of the so-called “lapis lazuli workshop” at Hissar’s South Hill, which they date to “phase 4, somewhere in the first half of the third millennium” (Tosi and Bulgarelli 1989: 48). Further evidential support for this dating comes from the contemporaneous Parkhai II cemetery of the Sumbar Valley located just north of the Gorgan Plain. This site is full of richly adorned graves, beginning particularly in Period IV (ca. 3000-2500 BC); these graves contained fantastically-decorated rectangular, pedestalled "altars" and ornaments of lapis, silver, and other valuable materials, suggesting a time of great prosperity and interregional connection (Khlopin 2002: 141 as in Thornton 2013: 192). Mention should also be made of double-headed spiral pins made of gold and copper that tie the region into a
broader zone of practices of personal ornamentation (e.g., Miller 2013). Given the level of chronological imprecision inherent in these sources, however, many of the observations here could just as easily apply to the following 300-year window as to 3200-2900 BCE.

Despite this evidence of lapis production and consumption in northeastern Iran during this interval, it does not appear that this region was directly connected to Mesopotamia and beyond via the lapis trade. Indeed, following Herrmann, Tosi argues while it is clear that lapis was circulating between northeastern Iran and southern Turkmenistan, the routes that conveyed lapis to not only Sumer and Akkad, but also the rest of the Iranian Plateau (e.g., at Sialk in III-IV), must have primarily been those that passed through Shahr-i Sokhta. To wit, the main trade corridor in lapis was along Herrmann’s southern route, i.e., across the Hindu Kush, following the Helmand River to Sistan, and on from there to Kerman, whence it either was carried northwest to Sialk or west through Fars to Elam and onto Mesopotamia from there (Tosi 1974a: 14). Thus, at this stage, only a down-the-line mechanism can be inferred for the circulation of these goods and technological styles, with the primary agents of transmission for materials such as lapis being a series of “locally-oriented intermediaries” rather than via some form of organized long-distance trade (Wilkinson, T.C. 2014: 292). Moreover, Wilkinson accords this trade only a minor role in the overall local economy of these regions. In his account, direct long-distance trade and its cultural importance only increased later, connected to the use of pack-animals such as Bactrian camels by the mid-third millennium.

To summarize, from 3200-2900 BCE (i.e., Tureng IIB), the Gorgan Plain was most closely connected to its immediate neighbors in southern and southwestern Turkmenistan on the one hand and to Damghan (i.e., Tepe Hissar) on the other. These connections were primarily manifest in shared ceramic traditions and perhaps also in the production and consumption of
beads made of lapis and turquoise, but in neither case has an intensive comparative study been conducted that could give greater empirical specificity to either of these claims.

3.3.2.2 2900-2600 BCE (Tureng IIIA-early IIIB)

In general, Wilkinson views this interval as one in which the “foundations of deeper integration were laid but still nascent” (2014: 292). Two key pieces of evidence for this are: (1) the spread of inter-calculable systems of weights and measures and (2) cylinder seals after ca. 2800 BCE, which he takes as an index of the level of inter-regionalism in the overall flow of commodities during this period. At the same time, however, he observes no evidence for such systems in Central Asia at this time. While Wilkinson doesn’t discount the possibility of the use of weights in a perishable medium in this place and time, other lines of evidence point to a different form of economic integration. Between 2900-2600 BCE, the trend in northeastern Iran and Central Asia appears to be one toward localism, principally observed in a contraction of the geographic scope of the craft-based interaction spheres from the previous interval. This claim is based on the apparent decrease in the spatial scope of sharing of pottery styles in particular. Following Kircho, Wilkinson suggests this and other indicators of smaller zones of interaction may be linked to a “transportation crisis” during this period in which cattle-driven wagons were less effective due to climate deterioration, a situation only to be mitigated by the harnessing of camels for pulling wagons sometime later. This is a difficult argument to accept prima facie for a number of reasons. On the one hand, there isn’t much evidence for either a transportation crisis, or climate deterioration, aside from the fact that the interval between 3300-2700 BCE was one of a low-stand in the Caspian Sea, with the sea’s altitude approximately 5-8 m lower than its current level (Leroy et al. 2013; Leroy et al. 2019). Minimally this suggests that evidence which
could speak to this issue is possibly underwater at present, but it seems imprudent to stretch this any further.

In any case, Wilkinson views this period as a time in which the study area is involved in much less intensive and extensive flows, both inter-regionally and regionally. The most important piece of evidence would seem to be that the amount of lapis lazuli recovered from Mesopotamian contexts during this interval is quite low (Wilkinson, T.C. 2014: 295). This might be connected to the collapse of the Proto-Elamite phenomenon across the Iranian plateau at the beginning of the third millennium BCE, which has been understood to have “effectively ended complex society in north-central Iran for nearly a millennium,” at Sialk and in the Tehran plain (Thornton 2013: 191-192). Does this correlate to an episode of temporary localism or a “mobility crisis” (Wilkinson, T.C. 2014: 295)?

The evidence is difficult to parse, in no small part because whatever happened on the Central Plateau does not seem to have greatly affected the societies of northeastern Iran, except for Tepe Hissar. Indeed, the lowland sites of the Gorgan Plain flourished in the first half of the third millennium BCE (Thornton 2013: 191-192), perhaps connected to the “rise of important centers of production and trade” during the Namazga IV period in Southern Turkmenistan, especially Altyn Depe and Ak Depe (Thornton 2013: 191-192). In fact, during this period, Gorgan Plain-style grey ware ceramic styles are found widely across Greater Khorasan, as far east as Sarazm in Tajikistan. The proportion of grey wares in a given assemblage appears to be a concentration gradient from west to east, with the greatest percentage present in the Gorgan Plain, but with large amounts still present at Ak Depe and Parkhai II, lesser amounts at sites to the east such as Namazga Depe, and Altyn Depe and finally the smallest amounts at Sarazm.
In other domains of material-cultural connection, Tosi identifies seven elements that are shared in common between Namazga IV sites and Shahr-i Sokhta II, some but not all of which are also shared with Tureng and Hissar, including: 1) contracted graves with random orientations (shared with Tureng and Hissar), 2) funeral architecture types of either tholos, rectangular cist, or circular pit with dividing wall, 3) drilling and processing techniques of semi-precious stones (which both Altyn Depe and Shahr-i Sokhta also share with Hissar at this time), 4) round metal mirrors with no handle, 5) gilded faience and clay necklace beads (the latter both Altyn Depe and Shahr-i Sokhta share with Tureng), 6) types of figurines, and 7) metal wands with cast heads depicting naturalistic motifs (also shared with Hissar IIIB and Sialk). Tosi concurs with Masson and Sarianidi that these shared elements must certainly result from constant process of interaction between autonomous spheres (Tosi 1974b: 53).

It should be noted that many of these parallels are loose, insofar as precise objects and contexts are not necessarily always specified in Tosi’s argumentation. Indeed, late Hissar II and early Hissar III are often referred to in the same grand sweep, and, furthermore assumed to equate directly to the phases bearing the same names in the Gorgan Plain (i.e., Tureng IIB, IIIA, and IIIB), which we now know to be an extraordinarily problematic assumption (Gürsansalzmann 2016; Olson and Thornton 2019). Thus, Tosi is able to make statements to the effect that this period (i.e., the early third millennium) witnessed an increase in the traffic of precious materials and the concomitant accumulation of wealth during the Hissar IIB and IIIA-IIIB interval, during which he argues that Damghan and by extension the Gorgan Plain are “opened up to commercial traffic” and “deal in noteworthy amounts of metals and various stones, naturally including lapis lazuli” (1974: 20). Resolving this issue is important, as Deshayes notes on multiple occasions that the burials dating to Tureng IIIA feature a more varied and valuable set of grave
goods than previously or subsequently, including many objects made of copper, silver, carnelian, lapis, and so forth, correlated to a sudden and marked change in architectural styles (e.g., Deshayes 1968, 1969).

At issue is the timing of relative and absolute chronological shifts concerning the periods known as Tureng IIIA and IIIB, and their equivalents at Hissar. One concern is that developments between the two periods are difficult to ascertain, as samples related to these two periods are difficult to segregate on the basis of stratigraphy, except in the case of Deshayes’s incompletely published excavations. Deshayes’s account suggests that there is a clear-cut distinction to be drawn between the two periods (see especially Martinez 1990), which would appear to be supported by what we know from the Wulsin excavations. At Hissar, however, the equivalent period is murky, and at Shah Tepe the situation is even worse, with one expert of no less standing than V. Gordon Childe himself going so far as to question whether or not this period is archaeologically justifiable as a distinct entity, or whether it is merely a blurred gradient of a long, gradual, and unbroken transition between two more well defined periods (Childe 1946). In any case, there are precious few published sources that can be relied upon to conclusively resolve this problem, as will be discussed in Chapter 5.

Simply stated, on the basis of parallels in ceramics, Tureng IIIA should line up with Namazga IV, and thus date to the second quarter of the third millennium, fuzzily ca. 2750-2500 BCE (Thornton personal communication 2017; see also Tosi 1974a: 20). On the other hand, Deshayes places Tureng IIIA later, in the middle of the third millennium, based on parallels between lapis beads found from burials at the site to the Royal Cemetery at Ur (Deshayes 1969a). It is possible that these are both correct, but the fact this period is often not discussed separately from the one that preceded (i.e., IIIB) or succeeded (i.e., IIIIB) it makes it difficult to pin
down these parallels and to discern their significance. Moreover, recalling the gap between the modeled $^{14}C$ ranges for Tureng IIB and IIIB, both perspectives may be wrong as well, and that Tureng IIIA should be dated to the first quarter of the third millennium.

3.3.2.3 2600-2300 BCE (Tureng IIIB)

Wilkinson characterizes this period as one of expansion and intensification of interaction across the entire Near East (Wilkinson, T.C. 2014: 295). Beginning in the Early Dynastic III period (starting ca. 2600 BCE), demand for a wider variety of metals appears to have increased, especially in Mesopotamia. Gold and silver assumed a position of great importance, particularly for adornments and vessels, though silver importantly appears to have assumed the role of an exchange mediator at the time. Tin-bronze alloys first appeared in Mesopotamia, although arsenic-bronze remained much more prevalent in Iran, Anatolia, the Caucasus, and Central Asia (Kaniuth 2007; Moorey 1993). Importantly, lapis and other precious/semi-precious stones became “essential symbols of elite identity and display” (Wilkinson, T.C. 2014: 295, emphasis added; see also Casanova 2019). The demand for these materials may have graded the road for new material flows, including such famous craft-styles as the “Intercultural style” vessels (Lamberg-Karlovsky 1988). Tosi takes this as evidence that during the late Early Dynastic period, Herrmann’s northern route (the future Great Khorasan Road) opened up for the first time. Herrmann’s southern route continued to operate during this time, and according to Tosi, starting from approximately 2500 BCE, routes to the Indus opened as well. Interestingly, however, it appears that during Shahr-i Sokhta IV (equivalent to late Yahya IVB), neither lapis lazuli nor the tools used to work it are found, suggesting that Sistan was cut off from the “international” lapis trade during this time, which seems to contradict the first conclusion (Tosi 1974a; see also Herrmann 1968).
At any rate, Wilkinson similarly sees much of these interconnections over a vast area as being connected to trends in elite dress, suggested by the wide distribution and increased cross-cultural popularity of particular styles of metal ornaments, beads, and woolen textiles (Wilkinson, T.C. 2014: 297). Wilkinson observes elevated quantities of metals flowing through Central Asia from ca. 2600 BCE onward, reflected again in cross-craft styles particularly evident in strong metallo-skeumorphism in ceramic traditions. Similarities between Namazga IV and especially Namazga V high-quality undecorated wares and those of the contemporaneous northeastern Iranian grey ware tradition, have been taken to suggest that there was even more interaction between these zones during this period than in the preceding two intervals (Cleuziou 1986; Mousavi 2008). Moreover, Wilkinson observes a large number of zoomorphic figurines during this period in Iran and Central Asia, particularly notable among them camels and model carts with camel heads, suggesting that these animals were becoming or had already become an important mode of transportation (Wilkinson, T.C. 2014: 297).

The degree to which lapis and other stones circulated within and between northern Iran and southern Central Asia is unclear at this point. In fact, the densest concentration of evidence for lapidary in the lands east of Sumer at this time is found at Shahr-i Sokhta, suggesting northeastern Iran and southern Central Asia were not as deeply involved in the trade in semi-precious stones at this time (Wilkinson, T.C. 2014: 298). This accords with Deshayes’ point that during the Tureng IIIB period, lapis was scarce relative to the preceding period; in his account this was “coincident with a perceptual impoverishment of the civilization, perhaps associated with rise of Akkad who didn’t value lapis or otherwise couldn’t control/organize its traffic” (Deshayes 1969a: 14; see also Deshayes 1977: 108). Nevertheless, Deshayes does observe the
presence of copper artifacts in greater quantities during this period, including weapons like those from Central Asia (ibid).

Another notable trend indicating the scope and orientation of interaction involving these regions concerns changing figurine repertoires, particularly the shift to approximately hand-sized figurines of an in each case locally-inflected yet recognizably common tradition of anthropomorphic forms found everywhere from Cyprus, western Anatolia, Syria, eastern Iran and the Indus (Olson in press). The mechanism for the sharing of this repertoire remains inscrutable, but Wilkinson suggests that their widespread popularity at this juncture indexes some shared ritual practices or values placed on such images, which he takes as testament of the depth of interregional interaction at this time (Wilkinson, T.C. 2014: 297-298). While I certainly agree that there was a convergence in form and imagery related to figurines across a vast area during the third millennium, my research shows fairly conclusively that the period of greatest interregional parallelism actually occurs during the next 300-year window, principally during the Ur III period and immediately thereafter (Olson in press; cf. Deshayes 1969a, who incorrectly dates these to the end of the IIIB period, but correctly to the final century of the third millennium).

3.3.2.4 2300-2000 BCE (late Tureng IIIB-IIIC1)

This period covers two major episodes of attempts at political unification in Mesopotamia, that of the Akkadians (ca. 2330-2150 BCE) and the Ur III period (ca. 2110-2000 BCE). While both events had inestimable cultural, political, and economic consequences, it can at times be difficult to judge how these affected the flows of metals, stones, and textiles. In particular, there appears to be much less lapis in Mesopotamia during the Akkadian period (Wilkinson, T.C. 2014: 299), but this could be the result of fewer lavish burials during this period
or as a result of uneven excavation (notable in this respect is that Akkad remains as yet unlocated). In any case, the final three centuries of the third millennium are understood to be the time of the “urban phase” and polity formation across the Iranian Plateau and beyond (Kohl 2007: 216-218). This interval also corresponds to the peak of the “Middle Asian interaction Sphere” (hereafter “MAIS” as per Possehl 2002) or L’âge des échanges inter-iraniens (Amiet 1986) and is characterized by intensive exchanges across and between the eastern Iranian plateau, the Indo-Iranian Borderlands, and the Indus. While these two terms refer to distinct patterns, these patterns substantially overlap spatially and temporally. This system of exchanges knitted together the early complex polities of a broadly defined “Eastern Iran” via the circulation of unfinished and semi-processed materials, as well as highly-crafted tools, weapons, containers, and ornaments, including perhaps most famously the so-called “Intercultural style” vessels (Kohl 2007: 221).

This chronological interval also encompasses the emergence of the Bactria-Margiana Archaeological Complex (ca. 2400-1500 BCE), also known as the Oxus Civilization (Francfort 2009), the Greater Khorasan Culture (Vahdati et al. 2019), or the Central Asian Bronze Age Civilization (Lamberg-Karlovsky 2013c). The BMAC is key to understanding patterns of interregional and regional flows during this period and consequently a great deal of attention will be paid to it in this and subsequent sections. There are several major problems with understanding the role of the BMAC in macro-scale patterns of exchange and interaction, however, none of which can be resolved here, but which require clarification. Simply, these result from the discrepancies between the relative and absolute chronologies for the internal phasing of the BMAC, a lack of contextual control over excavations at almost but not all major
sites, and a vast but fragmentary secondary literature that seeks to connect the BMAC via parallels to better-dated contexts across the Ancient Near East (e.g., Pereira 2017).

In any case, the BMAC clearly had wide-ranging contacts, shown by the abundant finds of gold, silver, bronze, lapis, carnelian, alabaster, ivory, and other precious materials in Central Asia, and the ubiquitous BMAC statuary, seals, stone and metal vessels, grooved columns, and iconographic style found widely in late third and early second millennium contexts from Susa to Iranian Khorasan, the Indo-Iranian Borderlands and the Gulf (Lamberg-Karloffsky 2013a: 25, 41, 48; see also Amiet 1986; Pereira 2017; Possehl 2002; Potts, D. 2008; Pittman 2018a, 2019; Ratnagar 2004). The interactions that Possehl’s and Amiet’s models describe provided many of the “stylistic precursors to many of the BMAC motifs, but also established awareness of distant cultures and familiarity with administrative systems over a large geographical area” (Frachetti and Rouse 2012: 701).

During this period, Namazga Depe and Altyn Depe in the Kopet Dagh piedmont reach their largest size and greatest complexity, with evidence of monumental architecture, specialized craft industries, regularized administrative practices, increased social stratification, and resumed evidence of long-distance trade (Tosi 1984, 1986; see also Kohl 2007: 214-220). All of these phenomena are also observed to greater or lesser degrees in the Gorgan Plain as well, especially at Tureng Tepe, with its Terasse Haute, fine ceramics and metalwork, stamp seals, and differentiated (though not so starkly as in the Kopet Dagh) burials. By the end of this period, however, the Kopet Dagh sites contracted severely in size or were completely abandoned. This process has been connected to the expansion of settlement in the Murghab delta around the same time, whether this was the result of migration or not (Wilkinson, T.C. 2014: 299; see also Hiebert 1994a).
Turning our attention to northeastern Iran, there are two important pieces of evidence that have been used to argue for its increased participation in interregional networks during this time: (1) the inventory of high-quality craft products found at Tureng Tepe and Tepe Hissar and (2) the evidence for monumental architecture at Tureng Tepe. By this point, the highland settlements in northeastern Iran such as Tepe Hissar, ca. the mid-to-late third millennium BC, i.e., Hissar IIIB-C or Hissar B-A, returned to prominence (Thornton 2013; see also Gürsan-Salzmann 2016). There does seem to be a difference between the highlands and lowlands with respect to their participation in the lapis trade, insofar as lapis is scarce at Tureng in contexts dating to this period, but abundant at Hissar (Deshayes 1977: 108). It is important to note that while Hissar IIIB appears to have been a period of great wealth on the northern Plateau is attested by the plethora of valuable items in the Hissar settlement, particularly in the Burned Building (Dyson 1972; see also Gursan-Salzmann 2016), the many burials from Hissar IIIC excavated by Schmidt need some qualification (1937: 232-61). This evidence is often taken as the first appearance of truly elite burials, notably at Hissar, i.e., the "Warrior’s," the "Priest’s," and the "Little Girl" (Schmidt 1933: 438-52, as in Thornton 2013: 194), which would suggest continuity in this regard from the preceding IIIB, but it is also abundantly clear that the architectural remains from Hissar IIIC are haphazard and do not suggest any of the finery on evidence from the IIIB Burned Building, for example. It is also true, however, that much of the upper portion of the mound was eroded away by the 20th century, perhaps obscuring what was a more substantial final settlement layer.

In any case, this interval was certainly a time of elevated levels of high quality craft production in the lowlands of northeastern Iran, indicated by the finely made, pattern-burnished gray ware pottery, as well as a diverse suite of decorative beads, pins, pendants, and
vessels in various materials with parallels to those found widely across the region during this time (Olson and Thornton 2019). Deshayes attributes the spread of these materials and influences to increased traffic of goods and people along this lapis lazuli route which united Badakhshan with the piedmonts of the Hindu Kush, the Alborz, and the Zagros. On the evidence of materials, iconography, and craft-styles, this interval has been understood to be the most intense period of interaction between the Gorgan Plain and its neighbors (Cleuziou 1986). For example, Deshayes (1977: 100, 105-106) identifies what he sees as clear Mesopotamian influence on the region at this time, in particular in the iconography of the Astarabad Treasure, whose parallels suggests either a mid-to-late third millennium date – i.e. Tell Asmar level 1 of Abu Temple (ED IIIA) and the Sargon stele at Susa. A late-third-to-early-second millennium date is also possible based on parallels to Treasure Hill at Tepe Hissar (Bayani 2013), the Fullol Hoard (Tosi and Wardak 1972), and a variety of BMAC-related items and motifs (e.g., Sarianidi 1990: 80ff., fig. 17; see also Dubova 2019; Qadim et al. 2017).

In particular, the silver and gold decorated vessels from the Astarabad Treasure present parallels in terms of the human figures, who wear *kaukanes* garments resembling those found on a vase in Kabul, on a Shahdad emblem, on the cylinder seals of Yahya IVB, on a lapis lazuli disk from Kerman, on the Persepolis vase, and the composite softstone seated figurines (Deshayes 1977: 106; Potts, D. 2008; see also Francfort 2019). Another group of finds of particular chronological importance includes stone “colonettes,” i.e., concave grooved cylinders, which also appear at Shah Tepe in Period Ila (Arne 1945: 282), as well as in “elite” burials, cenotaphs, and hoards at Hissar dating to the IIIC period (e.g., Schmidt 1937: pl. 61), and atop the *Haute Terrasse* at Tureng Tepe (Bessenay-Prolonge and Vallet 2019). Such items are also known from Gonur, Altyn Depe, Dashly Tepe, Shahr-i Sokhta, Shahdad, and the art market in
Kabul, where they often co-occur with large stone disks, with or without handles (Deshayes 1977: 100; Thornton 2013: 194-195).

Together, these objects suggest a late third millennium date, though given the parallels to similar finds from Gonur, they could also parallel early second millennium contexts as well (Deshayes 1977: 105-106). Indeed, material culture of the early Bactria-Margiana Archaeological Complex appeared at all of the major sites in northeastern Iran, sometimes intermixed with local gray ware ceramics (Hiebert and Lamberg-Karlovsky 1992). The Astarabad treasure discussed above also contained a number of BMAC-related items, such as miniature "trumpets" (Rostovtzeff 1920: 6-7) which perfectly parallel those found at Hissar (Schmidt 1937: 209) and elsewhere (Lawergren 2003). It is now known that BMAC necropolises are widely distributed across northeastern Iran (Basafa 2016; Vahdati et al. 2019), and even into Southern Khorasan (e.g. Heydari and Babazadeh 2017), including prominently the sites of Tappeh Chalow (Biscione and Vahdati 2011; Vahdati and Biscione 2013, 2016; Vahdati 2015a, 2015b), Tappeh Eshq-e Bojnord (Vahdati 2014), and Shahrak-e Firuzeh (Basafa and Rahmati 2012; Basafa et al. 2017; Rezaei et al. 2019).

During the last quarter of the 3rd millennium BCE, there are also considerable parallels between the figurine corpus known from Tureng Tepe and figurines known from across the Ancient Near East, from the Indus valley to northern Syria. Parallels, both loose and strong, are found in the choroplastic representation of hairstyle and jewelry, but also of gesture, and sexual features (Clark 2017; Dales 1960, 1963; Olson in press; Spycket 1992). Of course, emphases on different features and how they are instantiated vary over space within this distribution; the different categories of figurines at Tureng Tepe show stronger parallels to some locations than others (see Arne 1945: 253; Ögüt and Piller 2014: 585-586; Bessenay-Prolonge 2017: 19).
general, the best dating that can be provided for most of these parallels places them, whether at Ur, Susa, Alalakh, Tell Asmar, Assur, Alishar, Tell Tayinat, Mari, or elsewhere in either the Ur III, Isin-Larsa, or equivalent period, ca. 2100-1700 BCE (Dales 1960). Thus, these patterns should also obtain in the next 300-year interval of the present framework as well.

In addition to the artifactual evidence for interregional contacts, changes in architectural forms are also notable. Shifts are observed not only in domestic architectural traditions at both highland (i.e., Hissar) and lowland (i.e., Tureng) sites, but also in the emergence of monumental architecture at Tureng Tepe. Indeed, this is often taken as one of the most important pieces of evidence discussed in the context of interregional interaction during this period, tying the Gorgan Plain into a “vast cultural complex stretching from Turkmenistan to Bactria, Afghanistan and southeast Iran” (Deshayes 1977: 100-101). In particular, much has been made of the stepped platform structures found at Mundigak, Nad-i Ali Altyne Depe (Namazga V), and Tureng Tepe (IIIC), and Konar Sandal, though these seem to belong to a different architectural tradition (Bessenay-Prolonge and Vallet 2019). Each has multiple construction phases, pilastered facades, and symmetrical staircases or ramps. These features recall the Ur-Nammu Ziggurat in particular, but Deshayes is skeptical of a close connection between these structures.

In any case, the chronology of the Tureng platform (ca. 80x80 m at its base and 14 m tall, thus, far and away larger than those platforms at Altyne Depe, Mundigak, and Nad-i Ali) has proven problematic, since the structure was re-used in several later periods, partially obscuring its Bronze Age morphology. Nevertheless, both Wulsin and Deshayes dug into the mound at

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36 For example, at Tepe Hissar, the well-planned architecture of Period IIIB was abandoned and replaced by the poorly-organized structures of the early Hissar IIIC period (Deshayes’s Period IIIC1) that were laid out without regard to the plan of the earlier settlement (Thornton 2013; see also Gürsan-Salzmann 2016; Schmidt 1937: 155).
various points, affording the identification of secure prehistoric contexts. The direct dating of
the Terrasse Haute is based on five radiocarbon samples (Bessenay-Prolonge and Vallet 2019:
Table 1), which give a maximal 1-sigma range of 2675-1750 BCE. Along with the evidence of
multiple re-plasterings (20 cm thick) of the façade of the lowest of the platform steps, the
structure has been interpreted to have been in use for a long duration.

While the evidence for multiple construction phases and refurbishments of the
structure are undeniable, there are some major problems with this dating, chief among them
that the reported 925-year span at 68% confidence doesn’t inspire much faith in the accuracy or
precision of this chronology. Some of this derives from problems with the samples, as they all
have extraordinarily wide error ranges, and it is possible that some of the samples are
contaminated; for example, one sample (TUNC-42) is reported to have come from the terrace’s
foundation trench, but is the youngest date reported (i.e. 1975-1750 calBCE). Moreover, the
dates are reported in an unconstrained fashion, with individual dates calibrated in isolation from
each other without the incorporation of stratigraphic priors. If we perform the OxCal calibration
correctly, however, and place the dates in sequence (i.e., the foundation trench samples must
be before the samples retrieved from the architectural layers must be before the sample
recovered from the destruction layer) and calibrate them as a sequence, then we derive a much
more robust model (Figure 3.33).
Table 3.11 Results of the Haute Terrasse OxCal Model

<table>
<thead>
<tr>
<th>Phase</th>
<th>68% Prob. (1-sigma) Start-End</th>
<th>95% Prob. (2-sigma) Start-End</th>
<th>Mean Start-End</th>
<th>Simplified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destruction</td>
<td>2100-1945</td>
<td>2200-1865</td>
<td>2195-1625</td>
<td>2030-1945</td>
</tr>
<tr>
<td>Foundation</td>
<td>2205-2000</td>
<td>2355-1915</td>
<td>2260-1910</td>
<td>2130-2075</td>
</tr>
</tbody>
</table>

The results of constraining the calibration routine in this fashion present us with a much shorter chronology (Table 3.11). By incorporating stratigraphic priors into the model and by

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37 For this, I calculate a non-standard summary statistic according to the following formula:

\[
\text{simplified_start} = \frac{((168\%\text{start1} + 68\%\text{start2})/2) + ((95\%\text{start1} + 95\%\text{start2})/2) + \text{start_mean}}{3},
\]

rounded to the nearest quarter century, and so on for simplified_end for all other target events.
formalizing the relationship between the targets event and the dated events, we can ascertain that the construction of the *Haute Terrasse* most likely occurred sometime between 2125-2075 BCE and the destruction most likely took place sometime between 2025-1950 BCE. This is a considerable improvement upon the original date range. Importantly, this result does not invalidate the observation about multiple replasterings of the pilastered façade and also fits much better with the artifactual remains excavated from the surface of the upper platform, i.e. the characteristic BMAC-style grooved stone columns (Bessenay-Prolonge and Vallet 2019: Figures 7 and 8).

By way of summary, this period appears to be one in which northeastern Iran had close contact with its neighbors immediately to the east in Central Asia, but also to the south in Kerman and the Helmand. One issue that is difficult to resolve at present is the precise timing of all of these developments – future research should strive to discern temporal variation in this widely distributed set of cases.

### 3.3.2.5 2000-1700 BCE (late Tureng IIIC1-IIIc2)

A new pattern of broad interregional flows begins during this period. This is observed most prominently in the transport and trade of textiles, tin, copper, and silver, as attested by the textual records of the Old Assyrian Trade Colonies (Wilkinson, T.C. 2014: 301). This new and highly organized commercial system evidently involved an intensive system of circulation between Central Anatolia and northern Mesopotamia in particular. The exchange of Anatolian silver for tin obtained at Assur as attested at Kultepe-Kanesh, is particularly important for my

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38 If we assume that each replastering was 1 cm thick, then there were 20 replasterings. With a maximal date range length of use of 175 years, an average length of use of 100 years, and a minimal length of use of 75 years, that would represent a replasterings every 8.75 years, every 5 years, or every 3.75 years. Even if we change the assumption about the thickness of the replasterings, there is no reason to assume that 20cm worth of it indicates that the building must have been in use for hundreds of years as is implied is possible, based on the lengthy date-ranges presented (cf. Bessenay-Prolonge and Vallet 2019).
account here, insofar as this tin was purportedly derived from an “eastern” source (e.g., Barjamovic 2002, 2018; see also Boroffka et al. 2002; Helwing 2009; Parzinger and Boroffka 2003; Pigott 2012; Stöllner et al. 2011). It has been suggested that the BMAC played an important role in the provision of this tin (Wilkinson, T.C. 2014), but this is a difficult claim to substantiate at present, given unresolved controversies over the timing and intensity of the exploitation of tin deposits in the Pamirs and southern Hindu Kush (Kaniuth 2007; Thomalsky et al. 2013).

Additionally, it appears that eastern sources of metals overall became less important overall in this period, with potential knock-on effects for the fate of the societies and polities in those regions. For example, following Ratnagar (e.g., 2004: 123), Kohl observes a redirection of the tin and tin-bronze trade during this period. Whereas these metals previously flowed “through Elam to central Mesopotamia and the kingdom of Mari,” following Hammurabi’s conquest of Mari, long-distance trade in tin and tin-bronze was diverted toward sources further west, and ultimately coinciding with “the permanent decline of these Bronze Age secondary states east of Sumer” (Kohl 2007: 232). Kohl concurs with Weeks’s observation that “a text from the fifth year of the reign of Hammurabi’s successor, Samsu-Iluna, bearing the first cuneiform reference to copper from Cyprus (i.e., Alashiya), also contains the last reference to Dilmun copper” (Weeks 2003: 17). For Kohl, this is evidence that these interconnected broad patterns of interaction were redirected in tandem, and such a shift fundamentally undermined the viability of these secondary states (Kohl 2007: 232). While this may perhaps be true for the Gulf states, the Indus Valley, and even parts of the southern Iranian Plateau – e.g., correlating chronologically to the “deurbanization and disintegration” phase in the Indus Valley civilization ca. 1900 BCE (Wilkinson, T.C. 2014: 303) – whether it is the case in Central Asia and the northern
Iranian plateau remains to be demonstrated. While it is possible that the end of this period represents one of “collapse,” or at the very least some kind of major sociopolitical-organizational transformation, the earlier part of this phase appears to comprise considerable intensity in interregional flows of material, especially as regards the Gorgan Plain and its immediate neighbors.

What we can say, however, is that the first three centuries of the second millennium witness the further development of trends set in motion during the previous interval in northeastern Iran and southern Central Asia (Wilkinson, T.C. 2014: 301). The BMAC continues to be a major center of settlement and craft production. Again, it can be difficult to precisely trace the timing of developments, but it is clear based on the assemblage of metal vessels, the so-called “Bactrian” axes, and miniature stone vials that connections established in the preceding centuries were maintained into the early second millennium. Using absolute dates, this 300-year interval corresponds to Margiana 2, i.e., the Bactria-Margiana Archaeological Complex proper (Hiebert 1994a; Luneau 2014; Sarianidi 2002, 2006, 2008).

While scholars often have difficulty segregating material assemblages of Margiana 1 from Margiana 2, as discussed above, it is clear that the visual and craft culture of this complex has demonstrable links to various parts of the Iranian Plateau and beyond (Salvatori 2008a), including especially to Susa (Pittman 2002), Iranian Khorasan (Biscione and Vahdati 2011), Fars (Potts, D. 2008), Jiroft (Pittman 2014), Baluchistan (Cortesi et al. 2008) and the Indus (Pittman 2013; see also Frenez 2018). Key categories of materials which exhibit these connections are miniature stone vials, metal vessels decorated with figures, decorative “axes,” stone columns, certain pottery types, and composite stone figurines (Amiet 1986; Muscarella 2003; Pittman 1984; Potts, T. 1994). Most scholars of the subject agree that these items and the iconography
that they bear index the sharing of myths, rituals and clothing fashions, but that the mechanisms and forces driving the circulation of these cultural elements are still uncertain (Wilkinson, T.C. 2014: 301).

As far as northeastern Iran is concerned, this period is understood to be one of great transformation, ultimately resulting, by its conclusion, in the “collapse” of the Bronze Age in this region and a hiatus in settlement until the Iron Age (see discussions in Cleuziou 1986; Mousavi 2008; Thornton 2013). The discussion that follows partially overlaps with that of the preceding section, since Wilkinson’s 300-year intervals cross-cut the relative phases of the Gorgan Plain somewhat awkwardly. Here we are still dealing partly with Tureng IIIC1, but primarily Tureng IIIC2. The early second millennium of the Gorgan Plain is best known from the Deshayes excavations at Tureng Tepe (e.g., Deshayes 1969b, 1973) and from Tepe Bazgir (‘Abbasi 2016; Nokandeh et al. 2006).

In the case of Tureng Tepe, these finds primarily comprise a new assemblage of ceramics, clearly derived from the previous IIIB-IIIC1 tradition, but now apparently wheel-thrown and featuring a new repertoire of vessel forms; vessels are less finely burnished than in previous periods, with the lines more widely spaced, with a more brownish clay than previously used, an increase in mineral temper, as well as a higher prevalence of vertical handles and side-spouts (Deshayes 1968: 38, 1969: 16). Deshayes draws parallels between this assemblage and Sialk V, the Sialk Necropolis A, Marlik, Khorvin, Giyan I-II and Hasanlu V (Deshayes 1969b: 159-160). There also appear to be materials dating to this period known from Tepe Hissar (Thornton 2013: 195), such as jars with vertical handles (Schmidt 1937: pl. 41, H2871) and socketed spearheads (Schmidt 1937: pl. 50, H2779).
In the case of Tepe Bazgir, the bulk of the finds dating to this period comprise a hoard of over seven-hundred metal vessels, tools, weapons, and ornaments (‘Abbasi 2016; Mosalehi et al. 2014; Nokandeh et al. 2006; Qadim et al. 2017). A major problem with Bazgir results from the fact that there are no published radiocarbon dates from the context of the hoard, and that the most complete description of its find-spot comes from a secondary source, whose authors were not involved in the original excavation (e.g., Mosalehi et al. 2014). Nevertheless, the most concrete parallels between Bazgir and other sites are (Qadim et al. 2017: 6-7, 10; Mosalehi et al. 2014: Table 1; ‘Abbasi 2016): (1) to Tepe Hissar IIIC, witnessed especially in the decorative mace heads and in the forms of metal vessels, as well as the bidents and socketed axeheads; (2) to the Astarabad Treasure with the metal vessels, bidents, socketed axe-heads, and spearheads; and (3) to a number of sites from Asia Minor and Syro-Palestine dating to ca. 1900-1600 BCE, including Qatna, Ališar II, and Boğazköy (Gordon 1951: 47-52). Importantly, Gordon’s sketch-map of all of the finds of trunnion axes, adze-axes, hook/button tanged spearheads, and teapot jars shows that these finds are widely distributed from Central Asia, across the northern Iranian Plateau, into the Caucasus, Central Anatolia, and down the Levantine coast, but not in Mesopotamia or in any Persian Gulf-adjacent region (Gordon 1951: 57, fig. 4). More recent research has also shown that the bronze clothing-pins with decorative heads that appear in the burials of late Hissar IIIC and are known widely from BMAC contexts are also found at Kultepe-Kanesh II-Ib in layers dating to ca. 1950-1700 BCE (Highcock 2019: 31). Some questions remain as to whether there are earlier parallels, especially as regards the key finds from Tureng Tepe (dated to IIIB-IIIC1), but given the new dating of the Hissar sequence (i.e., Hissar IIIC = Hissar A,

39 E.g. H 468 and H 471, both of which come from DF08 Burial 1 (i.e., Hissar B-A/A [Late Hissar IIIC], Gürsan-Salzmann 2016: 204, Table 4.1).
ca. 2000-1800 BCE) it would seem that the early second millennium date is likely to be most accurate.

Another important question regarding the Bazgir metals is their chemical composition and the implications that this has for the question of the origin of the tin discussed in connection with the Old Assyrian trade colonies. The two available studies that have been conducted concur that the Bazgir metals are primarily arsenical copper alloys, and insofar as there is tin-content in these objects, it is likely due to naturally occurring composite copper ores bearing trace amounts of tin, rather than a deliberate alloy (Lorenz 2008; Mosalehi et al. 2014). This finding tracks with previous studies of the bronzes from Tureng and Hissar, which also show a low-to-non-existent tin content (Pigott 1989: 32 as in Kaniuth 2007: 35; see also Thornton 2009). These results also concur with recent X-Ray Fluorescence studies of copper “mirrors” from Gonur Depe, only one of which has tin content at all, and even then, likely results from the use of a polymetallic copper ore rather than a deliberate alloy (Tishkin et al. 2019: 84-85).

### 3.3.2.6 1700-1400 BCE (End of Tureng IIIC₂)

This period only just overlaps with that of this dissertation’s chronological window of focus, but given the fuzzy nature of these chronologies, and given the scholarly importance placed on developments in the mid-second millennium BCE, it is necessary to at least introduce the issues with this period. At this juncture, Wilkinson observes an increase in importance of Mediterranean networks relative to earlier centers of exchange, with the growth of first Minoan and then Mycenean centers in the Aegean, Anatolian powers such as the Hittite and Mitanni empires, and an increasingly central role played by the Egyptian polity in the eastern Mediterranean (Wilkinson, T.C. 2014: 304). He contrasts this with the apparent decline of intensity in trade of etched carnelian beads, Intercultural vessels and perhaps also lapis along
Persian Gulf routes. Wilkinson questions the extent to which the evidence indicates an actual stoppage in flows or whether these processes just became less archaeologically visible. It is possible that there was a shift in what materials were desirable for the reproduction of elite status. In any case, it is clear that the networks of metals exchange transformed dramatically, with the breakdown of the formerly integrated Circumpontic Metallurgical Province into three distinct circuits focused on the Eurasian Steppe, Iran-Anatolia, and the Caucasus (ibid; see also Chernykh 1992).

During this period, Wilkinson argues that the BMAC zone oriented itself more to the Eurasian steppe world, as suggested by increasing evidence of contacts between the piedmont/oasis zone and the previously separate Andronovo world. Moreover, the first unequivocal evidence for Andronovo exploitation of tin and other ore deposits in the Zerafshan dates to this period (Wilkinson, T.C. 2014: 306). Wilkinson suggests that there may have been a relationship between this north-south connection the emergence of greater mobility on the steppes in the form horsemanship and even the use of fast, light, spoked-wheel chariots. Interestingly, despite evidence for the use of both horses and fast chariots in Mesopotamia, there is little evidence for their use in southern Central Asia, except from rich burials at Gonur, which it must be said, may date to the previous 300-year window, rendering this a somewhat moot point. In any case, Wilkinson concludes that the southward encroachment of Andronovo material culture may be connected to a demand for tin from the autonomous and metallurgically advanced craft traditions of the Eurasian steppe (e.g., the Eurasian Metallurgical Province and the Steppe East Asian Metallurgical Province, see Chernykh 2008), perhaps attempting to tap into Near East sources of metal in Afghanistan and beyond rather than to trade for the products of the urban centers of Mesopotamia and the Near Eastern world.
In any case, by all accounts, this entire period represents archaeological terra incognita in the Gorgan Plain, as the radiocarbon chronology for Tureng IIIC\textsubscript{2} indicates that this period ends either before or shortly after 1700 BCE. There are several major problems here: 1) scholarly consensus takes for granted a collapse of settlement in the Gorgan Plain at the end of the Late Bronze Age (understood as Tureng IIIC\textsubscript{2}); 2) the relationship between Tureng IIIC\textsubscript{2} and Tureng IV\textsubscript{a} has yet to be fully clarified, with some estimates proposing as much as a millennium long gap between them; 3) it’s not clear to what extent the “Archaic Dehistan” (see Muradova 1991) phenomenon of Southwestern Turkmenistan is a direct continuation of the Late Bronze Age population of the Gorgan Plain, and whether part of this tradition may actually more properly corresponds to something like the “Final Bronze Age,” in addition to the Early Iron Age (see Cleuziou 1986; Mousavi 2008).

Indeed, it is recognized that the Archaic Dehistan culture has several phases, the earliest of which may erase any gap between the Late Bronze and Early Iron Ages of this region altogether (Cordoba 2015; Lecomte 1999). I suggest that the lack of Russophone specialists in Iranian archaeology, both foreign and local, has resulted in a major scholarly lacuna (see a total lack of citation of Muradova’s work in Sauer et al. 2013). The fundamental problem here is that Archaic Dehistan materials are clearly attested in surveys and excavations at what are called “Early Iron Age” sites in the Gorgan Plain, but are either not identified at all as such or are otherwise misidentified, meaning that there may actually be considerable hitherto fore unrecognized continuity of settlement in the region, rather than disruption at the end of the Late Bronze Age (e.g. Sauer et al. 2013: 102-125). If this is in fact the case, the Late Bronze Age to Early Iron Age hiatus is wildly overstated. This seems an increasingly likely possibility, given that Late Bronze Age assemblages appear to transition without break to Early Iron Age
assemblages at Gohar Tappeh in Mazandaran (Mahfroozi and Piller 2009: 183), at sites in the Sumbar valley, (Khlopin 1986), and perhaps in the Central Plateau as well (Fahimi 2019; Mousavi 2008; Piller 2004; Pollard et al. 2013; Sarlak 2010, 2011).

3.3.2.7 Summary of Wilkinson’s account of interregional flows

The trajectory outlined above is shaped by several major historical developments, including: (1) the first definitive steps toward a metal-based monetary economy, (2) innovations in the shaping of precious metal objects and the relative desirability of different metals over time (principally silver, gold, tin, and copper), (3) the intensification/extensification of textile production, and (4) new forms of widely shared bodily adornments connected to these textiles, namely common types of beads and jewelry (Wilkinson, T.C. 2014). The material remains of these four developments are most visibly and densely illustrated at the Royal Cemetery at Ur (ca. 2400-2350 BCE); the rich and eclectic set of objects found there attests to the great demand for exotic valuable materials in mid-third millennium Sumer. Moreover, the Royal Cemetery also demonstrates the role of imbalances in the flow of commodities during this time, as processes of accumulation created what Wilkinson calls eddies or sinkholes in the flows of precious goods.

Wilkinson ascribes a driving role in this entire process to the demand for first silver, and subsequently tin, and suggests that the demand for these two metals in particular gave rise to ever greater amounts and varieties of goods moving over long distances from their source regions. But he is careful to point out that this need not imply an ex Mesopotamia lux paradigm; instead, he emphasizes the multi-directional nature of these flows. Indeed, there is little to no evidence that Mesopotamia was able to exert direct control over distant areas. Instead, groups of actors in the source regions for these and other materials had their own motivations for exchange, to acquire goods originating in Mesopotamia for their own endogenous cultural aims.
and ends (Wilkinson, T.C. 2014: 317). Much of this is connected to the reproduction of elite status, insofar as the spread and use of metallic aesthetics among even “relatively metal-poor” regions reflect not the amount of metal in circulation, but rather the cultural significance of symbolic capital in the performance of rituals and practices that signified high status (see also Kohl and Lyonnet 2008: 40).

3.4 Revisiting the Relationship between the Gorgan Plain and its Neighbors

At every 300-year stage in Wilkinson’s framework, the Gorgan Plain is clearly connected to other regions, though it appears that its closest relations are always with its immediate neighbors, particularly on the northern Iranian Plateau and in southern Central Asia (3.3.2). Recalling the discussion above about the shifting importance of overland versus maritime trade routes over time (3.2), the Gorgan Plain seems to have largely unaffected by the first two of these conjunctures (i.e., the Proto-Elamite plateau network and the Akkadian Gulf network); it is only at the end of the overall sequence that the Gorgan Plain becomes an active participant in long-distance exchanges and perhaps trade, which I have proposed can reasonably be understood as the beginning of the Great Khorasan Road. This development should be understood, at least temporally, in relation to a downswing in Persian-Gulf related trade (presumably connected to the simultaneous “demise” of Meluhha and the “rise” of Shimashki), but the extent to which these two events are causally related to each other is beyond the scope of the present investigation. Part of the reason why such lines of causality are difficult to draw is because of the incorporation of the eastern Mediterranean into the interregional system of interaction known as the Bronze Age “World System” during the first half of the second millennium BC and the apparent disengagement of many of the regions home to “secondary
“states east of Sumer” from this network, especially in the area designated above as the “southern zone” (Kohl 2007: 246).

In any case, we should recognize that the networks of interconnection that the Gorgan Plain participated in did not constitute a “single unit, an inchoate version of the modern ‘world system’,” but rather, a shifting set of interaction spheres that expanded and contracted over time (Kohl 2007). In some cases, particular interaction spheres articulated with each other in reciprocal feedback loops, with contact between them reinforcing and strengthening ties within them. At other times, however, certain spheres supplanted others as a major focus for one or another particular center of commerce. While the narrative of the shifting importance of overland versus maritime trade routes is a necessary oversimplification given the evidential, historiographic, and theoretical complexities of this topic, we still stand to benefit from careful region-by-region examination of connections over time, as has been done here through the case study of the Gorgan Plain (3.3.2).

To summarize the Gorgan Plain’s history of regional and interregional interaction, I have used Wilkinson’s chronological framework of 300-year intervals to organize the evidence. This turned out to be a problematic way of arranging the sequence and will likely not be pursued further due to the complications it produced. At any rate, between 3200-2900 BCE, the foundations of a craft-based interaction sphere are in place in the Gorgan Plain, exhibited by the distribution of Tureng IIB-style grey ware ceramics, which are found at Hissar, and at Parkhai, Ak Depe, and Kara Depe in Turkmenistan. While there are a range of objects fashioned from (presumably) exotic raw materials present in contexts dating to this period within this zone, the degree of interregional interaction seems quite low. In the following 2900-2600 BCE interval, the Gorgan Plain appears to be pulled even more into the orbit of the Kopet Dagh cultural zone.
with increasingly strong parallels between the ceramic assemblages of Tureng IIIA-IIIB and Namazga IV, as well as a shared repertoire of gold and semi-precious stone jewelry indicating closer links during this time. This era has been considered to be one of great material wealth in the Gorgan Plain, but this argument is largely based on unsubstantiated claims made in preliminary reports by Deshayes, rather than careful empirical study. During the subsequent interval, i.e., 2600-2300 BCE, the evidence is the thinnest for interregional connections between the Gorgan Plain and its neighbors. Part of this is due to the fact that the evidence that previous scholars have mobilized to discuss this interval were incorrectly assigned to this time period, and actually occur toward the end of this span or after it (see discussion above and in Chapter 5). One thing that can be ascertained is that there is yet more convergence between metallurgical and ceramic craft traditions between the Gorgan Plain and the Kopet Dagh piedmont during this period. The following 300-year interval (ca. 2300-2000 BCE) is one in which the Gorgan Plain’s interregional connections truly begin to become evident. Key pieces of evidence here all come from Tureng Tepe: the Astarabad Treasure, the famous figurines, and the monumental stepped platform of Mound A. The Astarabad Treasure is tricky to pin down chronologically, and many of its parallels suggest a slightly later date, but it clearly connects the Gorgan Plain to a zone of circulation of metal vessels, weapons, and tools, as well as a very specific iconographic repertoire that demonstrates links to both Central Asia and to Mesopotamia. The figurines link the Gorgan Plain to a widely distributed horizon style found everywhere from the Aegean, Anatolia, Mesopotamia, Susa, Central Asia, and the Indus and the monumental platform at Tureng Tepe finds close parallels to contemporaneous structures at Altyn Depe, Mundigak, and Konar Sandal. Finally, during the 2000-1700 BCE interval, the key piece of evidence for the Gorgan Plain’s participation in interregional flows is the Bazgir hoard, which formally and
iconographically parallels metal assemblages known principally but not exclusively from Central Asia and Anatolia (Abbasi 2016). A word of caution must be registered here, however: given the possibility that Bazgir may date to the previous 300-year interval, and that the evidence dated here to ca. 2300-2000 BCE may also date to parts of the ca. 2000-1700 BCE interval, untangling the precise relative chronological parallels of all of these examples and narrowing the range of absolute dates represent a crucial area for further research.

Thus, it appears that during all parts of the sequence, the Gorgan Plain was most closely connected to its nearest neighbors in Greater Khorasan, via what I termed above interaction and exchange. Sustained interregional contacts, some aspects of which might be hypothesized as trade, only occurred toward the end of the sequence, ca. 2300-1700 BCE, but most likely from ca. 2100 onward. My account here is by necessity incomplete, but three key pieces of evidence link the Gorgan Plain to the broader world within and beyond Greater Khorasan at this time: traditions of monumental architecture, figurines, and high-quality craft goods, especially metal and stone tools, vessels, weapons, and adornments (i.e., Bazgir and the Astarabad Treasure). At each phase in this sequence, however, the nature and extent of interaction between the Gorgan Plain and Central Asia remains to be further clarified, especially during the early-to-middle third millennium BCE. Indeed, as Kohl, Biscione and Ingraham argue: “the relationship and extent of interaction between the Namazga culture area and that of their Gorgan Plain neighbors remains an outstanding problem for future research” (1982: 19). Moreover, “a complete interpretation of developments in Central Asia also has to consider how this area related with other major foci of cultural development,” particularly the Iranian Plateau and the Indus, but also with Anatolia, the Caucasus, and the Gulf (Kohl 1984: 242).
Regarding the question of the relationship between trade and political organization, scholars agree that a number of distinct early complex polities took shape in the mid-to-late third millennium BCE in a range of geographic settings “east of Sumer.” Whatever their form of organization, these polities include most notably the Indus Valley Civilization and the BMAC, but also dense concentrations of Bronze Age settlement featuring large “proto-urban” complexes in the Kopet Dagh Piedmont, the upper and lower Helmand, as well as in Kerman, Fars, and Khuzestan (Kohl 2007: 217). This phase of proto-state or secondary state formation has been understood to be the result of processes established in previous periods, wherein extensive interaction spheres laid the groundwork for the emergence of an elite stratum of society who came to control the long-distance trade of commodities and raw materials (e.g., Lamberg-Karlovsky and Tosi 1973), culminating in the transformation of society into “more compactly integrated territorial units, [the] presumed embryos of state structures” (Tosi 1986: 163) or “secondary states” (Kohl 2007: 223-224).

The system of exchange between the elites of nascent regional polities has been understood to have involved the transfer of raw materials, semi-processed and unfinished goods, as well as highly refined craft products, including tools, weapons, containers, ornaments, and presumably textiles. One of the most remarked upon (and indeed, widely distributed) indicators of this system of exchange are the so-called “Intercultural Style” vessels, whose production appears to have been concentrated in southeastern Iran (Amiet 1986; Aruz 2003; Marchesi 2016; Kohl 1975; Pittman 2013, 2018). These vessels, carved from chlorite and other soft stones, feature a distinctive and particular iconographic repertoire, from which it has been inferred that “ideas and possibly belief systems were also exchanged or diffused over large parts of western Asia during the late third and early second millennia BC” (Kohl 2007: 220). The social
processes that this material evidence represents clearly took a variety of forms, including gift-exchange, commerce, booty-taking, and tribute, as well as perhaps as yet undiscernible others (Amiet 1986; Lamberg-Karlovsky 2009, 2013; Pittman 2018a, 2018b). Regardless, what is clear is that in order for an agent or group of agents to participate in this system, there had to be some form of surplus production. For certain categories of material, e.g., textiles, this remains mostly archaeologically invisible, but contemporaneous texts from Mesopotamia give a glimpse of the astounding volumes of such surplus that were capable of being produced by centralized temple or palace estates of individual Mesopotamian city-states during this period (Kohl 2007: 221; see also Adams 1981, McCorriston 1997; Potts 1997; Wilkinson, T.C. 2014). 40

While the “elites” of the lands “east of Sumer” were hardly the “peers of their urban contemporaries in Mesopotamia,” the large and complex urban settlements of the Indus Valley Civilization and the royal necropolis at Gonur calls this generalization into question (Kohl 2007: 223-224). It is important to recognize, however, that the societies and polities in Greater Khorasan, southern Iran, and the Indo-Iranian Borderlands were qualitatively different in overall scale, degree of urbanization, social differentiation and complexity from those found in Mesopotamia (Meyer et al. 2019: notes 10-14). The extent to which the Gorgan Plain and the Iranian Central Plateau should be considered within this group of early complex polities remains to be conclusively demonstrated, given what appears to be both qualitative and quantitative differences in the scale and organization of these areas in comparison even to the other zones within the lands “east of Sumer” (e.g. Thornton 2012). Nevertheless, the Gorgan Plain in

40 Spectacular finds such as the Uluburun shipwreck, which is admittedly later than the period of focus here, also attest to the magnitude and complexity of Bronze Age interregional exchange, and remind us how incomplete our overall record of this phenomenon is (Kohl 2007: 249).
particular is clearly connected to general developments on the eastern Iranian Plateau, especially toward the end of the third millennium during the Tureng IIIC1-2 period.

A key question, and one for which further examination of the Gorgan Plain’s role in broader networks of interaction ought to be clarifying, is: what exactly happened during this “collapse” phase that followed the peak of interregional interaction and proto-state formation? In this chapter, I have shown that this “collapse” phase is anything but. On the one hand, it is widely agreed upon that this system of “proto-states” or “secondary states” underwent a significant phase shift during the early second millennium. On the other hand, this shift does not appear to correlate to a downturn in the intensity of interregional interaction. Key to understanding this apparent contradiction is the Central Asian Bronze Age Civilization, i.e., the Bactria-Margiana Archaeological Complex. In its earlier phase, the BMAC has been argued to have been a territorially extensive proto-state or secondary state, hierarchically organized around a centralized seat of authority in a proto-urban center, i.e. Gonur North. During the so-called “collapse” phase, there does appear to have been a political-geographic fragmentation, in which sub-regional chiefdoms dominated the scene, each “pivoting on a fortified centre that was able to control a limited portion of the regional territory” (Salvatori 2008a: 94-95). This political geographic transformation, seen most clearly in Margiana, has been generalized to the entire system of early complex polities east of Sumer, i.e., a co-occurring set of political-organizational-institutional transformations linked to territorial re-arrangements and shifting commodity flows, along with the loss of the material symbols and shared practices that had characterized the earlier trading network (ibid). While it may be the case that there were political-geographic and interactional shifts at this time, based on evidence from the Gorgan
Plain, it seems increasingly less likely that these transformations resulted in a drop-off in interregional connection.

Major challenges to further specification of this argument include: (1) inconsistencies in region-internal chronologies, which result in (2) difficulties in lining up inter-regional chronologies, exacerbated by (3) the loose manner in which “parallels” are put to use in the secondary literature, where they are often decontextualized or otherwise chronologically underspecified. These three factors together have hampered our ability to assess the timing, duration, and intensity of contacts between regions.

Two final points should be noted with respect to the role of the Gorgan Plain in the system of interregional exchanges that constituted the “Bronze Age World System.” First, the large number of evidently prosperous settlements in the Gorgan Plain during the third millennium is almost certainly due to the fact that it has one of the most favorable climates for primary agricultural production in the entirety of Western Asia. This has meant that the region was able to independently support extensive regimes of settlement through long historical periods without involvement in long-distance exchanges. Indeed, much of the Bronze Age sequence of the region is a direct outgrowth of the long and natural culmination of the growth of agrarian lifeways and concomitant patterns of local and regional interaction first established during the Neolithic. Thus, it is hard to see how interregional exchange could be a driver of polity-formation in the region.

The second point is that, despite the first point, the Gorgan Plain has long been recognized as a favorable location along the trade routes that run from Central Asia to the Iranian Plateau (Deshayes 1969a). Indeed, in Wilkinson’s archaeotopogram models, Tureng Tepe lies precisely along the least-cost path from the ancient source of lapis lazuli at Sar-i Sang in
Badakhshan and Ur in Sumer (Wilkinson, T.C. 2014: 232, Fig. 4.4). What should now be clear is that, contrary to long-standing received wisdom, the Gorgan Plain only played a key role in long-distance interregional exchanges and trade at the end of the third and beginning of the second millennia. The consequences of this argument will be drawn out more fully in Chapters 7 and 8, but suffice it to say for now, it is significant that the Gorgan Plain’s period of greatest interregional connection appears to follow – rather than precede or coincide with – an episode of polity, proto-state, or secondary state formation.
CHAPTER 4. METHODS FOR STUDYING SETTLEMENT PATTERNS FROM LEGACY SURVEY DATA

“David Clarke famously described archaeological knowledge as ‘a sparse suspension of information particles of varying size, not evenly randomly distributed in archaeological space and time’ (Clarke 1973: 10), thus leading to his definition of archaeology as ‘the discipline with the theory and practice for the recovery of unobservable hominid behaviour patterns from indirect traces in bad samples’ (Clarke 1973: 17). Archaeologists have since developed an extraordinary interdisciplinary toolbox, borrowing and adapting techniques from various disciplines, to name a few, anthropology, ethnography, sociology, biology, geology, chemistry or physics. Four decades onwards, we are much better at capturing as many as possible of these elusive ‘information particles’ and, arguably, a lot of knowledge about the past have been produced in the meantime. And yet, despite these many advances, one issue, central to Clarke’s analytical archaeology, remains contentious: how do we interpret variations in the material record, and especially patterns in the spatial and temporal distribution of certain material traits? This question might not be listed amongst the grand challenges of the discipline (Kintingh et al. 2014), yet it underscores many of the archaeological theoretical debates of both the twentieth and twenty-first centuries (Roberts and Vander Linden 2011).” (Drost & Vander Linden 2018: 1087)

As discussed in the two preceding chapters, a major empirical objective of this dissertation is to re-examine the settlement patterns of the Gorgan Plain from ca. 3200-1600 BCE. This aim supports the further goals of evaluating the models proposed for the political geography of Bronze Age Iran and reasoning about the relationship between political-geographic trends and broader patterns of trade, exchange, and interaction in the Bronze Age World System. In this chapter, I discuss the methodology by which I propose to undertake this endeavor. As in the epigram, the spatial interpretation of the archaeological record requires great care, and my objective here is to explicate precisely how I aim to recover patterns of human activity from “indirect traces in bad samples.”

First and foremost, the practical question of “how do we identify and characterize political geographic patterns through archaeological settlement patterns?” must be addressed. In Section 4.1, I tackle this problem by introducing the three primary methods by which I will perform quantitative, spatial and organizational studies of the Gorgan Plain settlement record, namely exploratory data analysis of regional settlement demography (e.g., Drennan et al. 2015),
site-catchment modeling (Ullah 2011; Wilcox et al. 2007), and rank-size analysis (Palmisano 2017; Falconer and Savage 2009). Each of these methods has its particular drawbacks, but their strengths lie in their ability to produce measures and visualizations that serve as proxies for charting broad historical transformations in territoriality and political organization.

Given that the settlement patterns of the Gorgan Plain have never been subject to any kind of systematic descriptive analysis, I have prioritized computational simplicity over elegant and sophisticated modeling. While a great deal more about these methods can be said, I have chosen a “proof-of-concept” approach for the purposes of this study that hews as closely as possible to the conceptual objective of evaluating Tosi’s model of the formation of proto-state structures in Bronze Age “Turan.” Thus, the first section of this chapter (i.e., 4.1) is dedicated to the descriptive and spatial measures by which I will examine Tosi’s model.

The following two sections (i.e., 4.2 and 4.3) are more directly addressed to the particularities of why the Gorgan Plain settlement data has never been properly analyzed, namely due to the fact that the total record is fragmented and incompletely published in English (e.g., Arne 1945; Sauer et al. 2013), Farsi (e.g., Abbasi 2011; Mortezaei and Farhani 2008), and Japanese (e.g., Shiomi 1974, 1976). Despite this fragmentary record, due to the fact that each of these sources present the results of site-based surveys of the “tell-spotting” type, they share similar data structures. Consequently, these sources did not pose any inordinate challenge to synthesis or require the construction of an object-ontology to use as a key for harmonizing divergent terminologies. Nevertheless, the process of data synthesis and integration is a complex procedure under even the simplest of circumstances. I therefore discuss the theoretical and practical concerns raised by comparative analyses of regional surveys and describe the methods by which I evaluated the reliability of these legacy surveys and extracted the maximum
possible volume of information from their maps and data tables through a process of digitization, database-modeling, formalization, and record-augmentation. Finally, I introduce the protocol by which I re-evaluated these data through a systematic restudy of the Gorgan Plain survey records using QuickBird satellite imagery accessed via Google Earth.

4.1 Analysis of Regional Settlement Distributions

The basic categories of evidence in settlement pattern analysis are cultural instances and environmental features. “Cultural instances” is a deliberately vague umbrella term that encompasses the results of both artifact- and feature-based surveys and site-based surveys. These artifacts, features, and ‘sites’ are the empirical reality in which the abstraction of the ‘settlement’ is grounded (Drennan et al. 2015; Drennan et al. 2017; Peterson and Drennan 2005). In the case of the Gorgan Plain, all the surveys that have been conducted have been site-based surveys, using unproblematized definitions of ‘sites’ (Dunnell 1992; McCoy 2020), which largely correspond to either settlement mounds (tappeh), settlements (mohavvateh), graveyards (qabrestan), or forts (qal’eh). While interrogating these categories would be a worthwhile endeavor, it is beside the point here, other than to note the specificity of the received categories of information and the kinds of analyses this sort of record can and cannot support.

Restricting ourselves, then, to survey records that are primarily if not entirely site-based, the categories and attributes that comprise the data to be analyzed in settlement pattern analysis include: site location, toponymy, size (in the case of tells, rendered as base area and height), morphology, chronological components, surface finds, and ground conditions (Green and Petrie 2018; Kouchoukos 1999; Lawrence 2012; Ristvet 2005; Wilkinson 2003). These data not only provide us the ability to place the sites in space-time but also within a culture historical
matrix. These variables can, entirely on their own, afford a range of analyses by combining and recombining them along different axes. For example, the archaeologist could seek to understand correlations between site size and location, or between categories of surface finds and site morphology. But of course, if these variables are tested only in isolation – i.e., in relation to each other and not to external factors such as climate, landcover, geomorphology and so on – these correlations may prove to be misleading and could result in spurious answers to the questions motivating them (Kouchoukos 1999; Wilkinson et al. 2014).

It is necessary, therefore, to take into consideration environmental factors including but not limited to climate, topography, hydrology, landcover, and changes in all these variables over time. Climate data could for example comprise elements such as atmospheric moisture indices (Lawrence et al. 2016) or reconstructed isohyets and measures of regional mean annual rainfall (Wilkinson, T.J. et al. 2014). For a settlement system presumably with an agricultural subsistence base without substantial irrigation structures, precipitation certainly is an important factor that must be considered. Topographic variables include elevation, slope, aspect, and various indexes that can be derived from them, such as the ‘topographic wetness index’ (Beven and Kirkby 1979; Sørensen et al. 2006). Along with these, data on the location and type of water resources is crucial, as is evidence for past landcover and vegetative regimes (Hill 2000). The most easily accessible sources of this information (e.g. MODIS, SRTM) can be misleading, however, due to the temptations of presentism, great care must be exercised in their use.

Indeed, in the case of a region like the Gorgan Plain, it can be tempting to assume that the past landscape was the same as it is today, given the striking density of tells across the landscape and their frequent locational coincidence with modern settlement. However, specialists in a variety of disciplines have convincingly demonstrated that considerable changes
in the region’s climate have occurred, including but not limited to drastic transgressions and regressions in the level of the Caspian Sea (Kislov et al. 2014; Kislov 2016), periods of intense aeolian loess deposition (Karimi et al. 2009; Vlaminck et al. 2016), and continuous but fluctuating rates of alluviation (compare Lahijani and Tavakoli 2012 with Schmidt et al. 2011). This, of course, is not taking into consideration the impact of anthropogenic environmental change, whether in the past or in the present, including the removal of ground cover, disturbance of topsoil structures, construction of dams, or otherwise (Hill 2000; McLachlan 1988; Lambton 1969; Wilkinson, T.J. 2003). Yet, in northeastern Iran few such studies have been conducted with the level of chronological precision that would afford a fine-grained correlational analysis between the mid-Holocene archaeological record and the corresponding paleoenvironmental record (cf. Leroy et al. 2019 for a notable exception).

Consequently, in the sections that follow, I outline the procedures by which I characterize and examine the third-millennium settlement distributions of the Gorgan Plain through exploratory data analysis, territorial modeling, and rank-size analysis (4.1.1). I wrap up this section with a discussion of a key problem in regional settlement analysis and how I address it in this dissertation, namely that of “map-overfilling,” or the “contemporaneity problem” (4.1.2). Far from constituting what may at first seem an unnecessary abstraction, accounting for simultaneous settlement is in fact essential for exploratory data analysis, territorial and rank-size modeling to avoid conflating synchrony and diachrony (Duffy 2015).

4.1.1 Methods of Regional Settlement Analysis

In this section, I introduce the two broad categories of regional settlement analysis that will be used in Chapters 6 and 7. The first category, exploratory data analysis of “regional demography,” involves tracking changes over time and space in the counts, locations, and sizes
of sites over time. Many different methods can recombine these variables in a number of ways to render different aspects of settlement distributions legible, but most important for my purposes here is to simply quantitatively characterize these distributions for the first time. As will be discussed further below (4.1.1.1), I principally focus on counts of sites, summary statistics of site-size distributions, and a simple measure of “demographic profiling” that stratifies the site distribution into size-classes and measures each class’s proportional contribution to the total in terms of site counts and aggregate size. Subsequently, more complex matters of territorial (4.1.1.2) and rank-size modeling (4.1.1.3) will be taken up, which pertain to the analyses to be conducted in Chapter 7. These analytical techniques are used to evaluate Tosi’s model of proto-state structures through modeling of territorial patterns and examination of rank-size dynamics.

4.1.1.1 Exploratory Data Analysis and Regional Demography

In Exploratory Data Analysis (EDA) of regional settlement patterns there are five primary variables: units, counts, size, location, and time (see Sharma et al. 2018 for more on descriptive statistics). The first step in EDA is to define analytical units, which can be thought of as windows of analysis (i.e., individual or combinations of regional survey boundaries, physiographic or cultural regions, or chronological periods) or otherwise as corresponding to some meaningful prehistoric social group (Lawrence and Wilkinson 2015; Fish and Kowalewski 2009; Palmisano 2017). The selection of these units – whether spatial, temporal, cultural or otherwise – will necessarily depend upon the questions being posed (Drennan et al. 2015). Additionally, new units may be identified recursively through spatial analysis and modeling, which are then fed back into other spatiotemporal and cultural analyses. Once units have been identified, the remaining four variables – counts, size, location, and change – can be plotted and compared within and between groups (e.g. Johnson 2012; Kintigh et al. 2004; Neely and Wright 1994;
Underhill et al. 2008). In this dissertation, much of the EDA will be conducted on a single unit, i.e., the Gorgan Plain as an entire region.

Counts involve the computation of the number of sites of different types and measures of their spatial density within a given unit of analysis (Drennan et al. 2015; Lawrence and Wilkinson 2015; Lawrence et al. 2016). Site sizes are most typically analyzed in terms of maximum site area, average and median site area, and aggregate site area (ha) within a given areal unit (Lawrence et al. 2016). Location can be analyzed in a number of ways, but one simple and effective technique is to produce histograms that depict the east-west/north-south spread of site locations within a given region (e.g. Wright 2008), or by being plotted as dots-on-a-map and subjected to visual inspection for pattern-detection (Cowgill 2015), or through a battery of statistical tests (e.g., Crema et al. 2010; Mehrer and Wescott 2006; Lloyd and Atkinson 2004; Van Leusen 2002). A crucial characteristic of these forms of locational analysis is the degree to which the surveys upon which the analysis is predicated accurately represent the spatial distribution and relative frequency of archaeological sites of different sizes at a given point in time (Kouchoukos 1999: 21). Locational analysis can quickly become complex as geostatistical techniques are introduced; for now, let us recognize that the basic techniques involve mapping or otherwise plotting site locations against some meaningful topographic or other landscape representation and simple measures characterizing the spatial distribution of sites and features relative to this contextual frame. Lastly, change is accounted for by comparing counts, density, size, and location between units, as well as within and between units over time (Bevan and Conolly 2006). Each of these metrics has been exhaustively reviewed to evaluate their utility and limitations (e.g. Kouchoukos 1999; Lawrence and Wilkinson 2015; Lawrence et al. 2016; Ristvet 2005; Wilkinson, T.J. et al. 2016); suffice it to say here that these metrics have been chosen...
because they are well-suited to the resolution of archaeological data and do not introduce any unnecessarily sophisticated mathematical abstractions. This is not to say that more elaborate statistical techniques are unhelpful in all circumstances, but for the kind of exploration undertaken here, basic descriptive statistics will provide the kind of measures that can speak to the questions posed without undue complication.

Nevertheless, the basic EDA categories can be used in more complex ways to generate population estimates and analyze the synchronic and diachronic spatial variation in the population distributions without recourse to more sophisticated statistical techniques (Drennan et al. 2015: 51), desirable as more computationally intensive and statistically rigorous tests might be under suitable empirical circumstances (e.g., Spencer and Bevan 2018). Population estimates can be generated from measures of site size, density of occupation, or both (Drennan et al. 2015: 34). Calculating these measures using data from legacy surveys can be complicated, however, as these sources may exhibit imprecise site-size measurements, contain no information on which to compute artifact density, and/or make little to no discussion of the changing extent of occupation at a site in different time periods. Adding to the frustration of this objective, even when these three measures are available, site size and occupation density are only loosely correlated with population estimates (Drennan et al. 2015: 20-33). This is renders demographic estimations of tell-based populations challenging, due to difficulties in discerning occupational extents of different chronological components and in measuring the variation in the density of occupation across a tell site. These complications are due in part to the range of morphological particularities of tell-settlements during the Bronze Age, such as the high-mound/low-mound problem identified in Northern Mesopotamia (Lawrence and Wilkinson
Despite these challenges, base area, volumetric estimates, and ratios of base area to height have been treated as the most reliable proxies for population of tells (Drennan et al. 2015: 46). In this dissertation, due to the nature of the record, tell base area will be taken as the proxy for “population,” I am choosing to leave this point relatively undertheorized given how many unknowns there are and because any measurement will be at best a rough proxy.

Nevertheless, comparative measures of site-size can provide a rough approximation of the degree of, for example, urbanization or centralization in settlement distributions. Such approaches include but are not limited to comparisons of the maximum site size with the aggregate settled hectarage as an index of whether a settlement system is “top-heavy” (Lawrence and Wilkinson 2015; Yanchar 2013; cf. Cowgill 2015: 9). Regional demographic profiles of populations could also be captured with measures of the percentage of populations living in ‘urban’ settlements, e.g. proportion of aggregate site area coming from sites >10ha versus frequency of rural sites, e.g. proportion of sites with base areas less than 5 hectares out of total site counts (Kouchoukos 1999; Ristvet 2005). In this case, I follow Kouchoukos’s division of site-size classes for prehistoric agrarian societies: small villages (0-3 ha), large villages (3-8 ha), small towns (8-15 ha), and large towns (15-40 ha). The terminology of village/town is a bit anachronistic and arbitrary, but the size-bins are the more useful part of the framework. By charting the changing proportions of site counts and site area relative to aggregate counts and area by period, we can disaggregate some of the summary statistics introduced above and

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41 Lawrence and Wilkinson hypothesize that distinct settlement morphologies (e.g. lower-town/high-citadel, or “fried egg”) correspond to particular settlement histories and potentially to different forms of socio-political organization (Lawrence and Wilkinson 2015). Prima facie this appears to be a reasonable hypothesis, but the challenge at present is that this insight doesn’t readily translate to guidelines for the creation of population estimates.
detect the occurrence of changes in the demographic profile of a settlement distribution resulting from patterns at different levels of settlement-size.

In Chapters 6 and 7, I focus on characterizing the basic parameters of the Gorgan Plain settlement distributions over time according to the schema laid out above. At the first stage of analysis, I present counts of sites per period using bar-charts; characterize the overall size-distribution of sites using box-and-whisker plots along with site-size histograms (see Adams 1981: 71, fig. 15); and calculate summary statistics of site-sizes per period, principally median, mean, and aggregate hectarage over time. I examine demographic processes through a simple measure of settlement differentiation, namely, computing the proportion of total site counts and proportion of aggregate site-area by size-class for each of the time periods under consideration (Kouchoukos 1999: 24-26).

4.1.1.2 Territorial Modeling

As is true of spatial analysis more broadly, territorial modeling in regional settlement archaeology is concerned with the overall distributions of and relationships between sites in a given modeled landscape, in this case focused on patterns of clustering and grouping of settlements (Bevan et al. 2013; Gillings et al. 2020; Gorenflo and Gale 1990; Green 2018; Kintigh and Ammerman 1982; Orton 2004). Geostatistical tests on point- or polygon-data, assuming a background matrix of Euclidean, isotropic, or anisotropic space are commonly used to identify settlement clusters and groups qua territory (Bevan 2020; Howey and Brouwer Burg 2017; Lloyd and Atkinson 2004). The major areas of spatial statistics used in settlement archaeology are neighborhood and cluster analysis, various forms of density-dependent interpolation, and correlational analyses (see chapters in Barcelo and Bogdanovic 2015; Bevan and Lake 2013; Carlson 2017; Clark 1977; Gillings et al. 2020; Lloyd 2007; Tremblay et al. 2017). Such techniques
have been widely used to identify territorial patterning because they produce measures that characterize site distributions in relation to three idealized spatial configurations, i.e., regular, random, or clustered; territorial modeling is particularly concerned with clustering, which has been used to infer the formation of more bounded groups of settlements within a locational distribution. Settlement patterns rarely conform to these measures, however, and typically differ in their configuration depending on the scale of analysis (Bevan and Conolly 2006; Bevan et al. 2013; Harris 2006; Harrower and D’Andrea 2014). Consequently, the result which is of the greatest interest to the analyst is the manner and degree of deviation from these ideal states.

On another level, these techniques can be used to discriminate the boundaries between distinct phenomena, based on numerical and spatial breaks or other kinds of signals in the computed indices returned by these statistical analyses, which may be used as a proxy to infer territorial processes.

Out of all of these techniques, the ones most germane to my purposes here are clustering routines (Carlson 2017: Chapter 15). While cluster analyses can be deployed to either compare the degree of grouping/dispersion of site locations over space and time, my interest here is to identify clusters of sites and/or clusters of clusters of sites, which I will use as proxies for territorial units to be plotted, measured, and subsequently fed into rank-size analysis (Falconer and Savage 2009; see also Bevan and Conolly 2006; Bevan et al. 2013; Crema 2013; Casarotto et al. 2016; cf. Baxter 2003; Cowgill 1989, 2015). As discussed above, territorial and distance modeling of site-location distributions involve the use either of Euclidean space (e.g. Thiessen polygons [Creekmore 2018: 194-198; Hodder 1972; Iannone 2006; Renfrew 1973; Renfrew and Level 1979; Salvatori 2008b]), isotropic space (e.g. Central Place calculations, boundary profiles and catchments [Kimes et al. 1982; Varien et al. 2000]) or anisotropic space
(e.g. hiking functions and least cost analysis [Casarotto et al. 2016; Ullah 2011; Yanchar 2013]) to identify boundaries within settlement distributions, which are understood to demarcate territories associated with settlements (Gorenflo and Gale 1990; Hare 2004; Hernández 2006; Negre et al. 2017; Stoner 2012; Yanchar 2013).42 The statistics calculated in service of territorial and travel modeling also often are fed into social network analysis and interaction models as well (Bevan and Wilson 2013; Brughman and Peeples 2017; Hill et al. 2015; Mills et al. 2013; Paliou and Bevan 2016).

As discussed in Chapter 2, territory and territoriality are integral to the study of the organization of early complex polities. The extent to which a human social group marks and maintains a territory varies widely, but most scholars agree that agrarian communities and polities comprised of agrarian communities exhibit more bounded forms of territoriality as a consequence of their emplacement and investment in fields and agricultural landesque capital (Ullah 2011; Wilcox et al. 2007). This need not imply that a social or political group necessarily maintains a contiguous bounded territory; indeed, it is possible that the subjects of various political authorities lived “interspersed with one another to such a degree that it is impossible to draw discrete territorial boundaries between the polities” (Tomaszewski and Smith 2011: 26). Thus, Agnew’s territorial trap is a danger that archaeologists must also take care to avoid. As previously discussed, we can view territory as a dynamic configuration of space rather than an inherent and essential part of the functioning of early complex polities. This is possible if we remember that the territories of ancient polities can be variably bounded, variably geographically contiguous, variably emplaced in physical landscapes, variably dependent upon

non-territorial forms of authority, and variably impactful for social life in general (Van Valkenburgh and Osborne 2013).

Thus, while Thiessen polygon models (Colburn and Hughes 2010), modified lattice models such as X-Tent (Stoner 2012), site catchment analysis (Ullah 2011), and various forms of cluster analysis (Bevan and Conolly 2006; Palmisano 2017) can give us a basis on which to reason about possible territorial configurations, under ideal circumstances, these would represent only one cable in a bundle of evidential reasoning. Given that this investigation represents the first step in the formal analysis of this data set, I have focused on the most basic outlines of territoriality. While many alternatives exist, and ought to be explored in future analyses, I decided to pursue two cluster modeling strategies, one multi-scalar (k-means) and one hierarchical (catchment-buffer). The former works entirely based on points in mathematical space and can be automated, as we will see in Section 4.1.1.2.1. I chose it specifically because it has recently been used to interesting effect to study configurations of polity-territory in Bronze Age Syria, Palestine, and Anatolia (e.g., Falconer and Savage 2009; Palmisano 2017; Savage and Falconer 2003). The latter involves more direct human intervention, though someone with the skills and wherewithal could script out the entire process if they were so inclined (Section 4.1.1.2.2). I chose this method because it allowed me to include behavioral factors into the model of territoriality, i.e., culturally meaningful spatial thresholds for different types of interaction which would be crucial to maintaining the social cohesion of communities and polities. Using both methods in combination with each other allows us to access some of the variability in territorial dynamics and to help us avoid essentializing territory as a static container for society.
4.1.1.2.1 **K-Means Clustering**

K-means clustering is a multi-scalar clustering method that identifies groupings of point-coordinates in Euclidean space by minimizing in-group distances between points and maximizing out-group distances between points (Carlson 2017: 319-323). This procedure has been used to model the geographic organization of “polities,” though it should be noted that k-means clustering does not produce a straightforward political map (Palmisano 2017). Instead, it has been used to infer clusters of settlements as spatial approximations of polities, or what Palmisano calls the “spatial arrangement of well-integrated settlement systems” (Palmisano 2017: 227 and citations therein). One of the strengths of this technique is that it evaluates cluster solutions at many different levels and returns the solution(s) which best minimize intra-cluster variance and maximize inter-cluster distance (Palmisano 2017: 227; see also Bevan and Conolly 2006; Bevan et al. 2013; Savage and Falconer 2003: 35-36).

For this analysis, I adapted the R script appended to Palmisano’s 2017 article to the Gorgan Plain settlement distributions.43 Palmisano’s script iterates the k-means algorithm through several steps. The first step generates random k-centroids within the spatial extent of the data frame (i.e., the k-centroids cannot exceed either the min-max of the x and y coordinates of the actual data points involved). The second step assigns each actual point in the sample to the nearest randomly generated centroid. The third step recalculates the location of these centroids as the spatial mean of all the points in that group. The fourth to the i step of the algorithm then iterates steps 2 and 3 until the centroids can no longer be recalculated, i.e., until the threshold at which intra-cluster variance has been minimized and inter-cluster distance has been maximized has been reached (Palmisano 2017: 228). At the end of this process, the

43 [http://dx.doi.org/10.14324/000.ds.1557154](http://dx.doi.org/10.14324/000.ds.1557154)
ultimate result is a figure $k$, which is the number of centroids that best minimize variance within and maximize distance between clusters, and a list of all the points which belong to each of the centroid groups.

**Figure 4.1 K-Means SSE Simulation Output example**

Where Palmisano’s script differs from previous approaches is that it allows us to sidestep one of the greatest drawbacks of k-means analysis, which is the problem of knowing the cluster solution level in advance. It does this by iteratively calculating the sum of squared error (SSE) for each possible cluster solution level. SSE is a measure of within-cluster variance, computed as the aggregate squared distance between each cluster member and the cluster’s centroid (top graph of Figure 4.1). SSE’s maximum value would occur when all points belong to a single cluster, and its minimum value when each point is its own cluster. A log-plot with the SSE value depicted on the y axis and k-solution levels arranged on the x axis allows us to see fluctuations in the curve of this degree of variance over increasing cluster solutions (bottom
right graph of Figure 4.1). Peaks in the SSE plot are taken to signal that a particular cluster-solution may be optimal (strong peak), or worth investigating further (weak to medium peaks).

Potential problems with this approach include: 1) there may be no obvious peaks in the SSE distribution, and 2) there may be many peaks in the SSE distribution. Indeed, “in situations where the points distributions are not highly clustered, there is not a clear inflection point in the plot of the SSE against the number of clusters (k)” (Palmisano 2017: 228). In such situations, an additional chart which plots the goodness-of-fit, i.e., “average silhouette width,” between points and the clusters that they are assigned to at different k-solution levels should be consulted. This goodness of fit is termed “average silhouette width.” According to Palmisano’s interpretation of this measure, the optimal number of clusters is the one that maximizes the average silhouette width over a range of possible values for k, and thus indicates how many clusters are most reasonable to infer (Palmisano 2017: 228).

In some cases, there will be an obvious additional spike in the average silhouette width curve, indicating the optimally selected cluster solution (e.g., Palmisano 2017: 229-232, Figures 8 and 11). But in situations where the distributions are less strongly clustered, there is often no solid basis for selecting which of the peaks is the most appropriate clustering solution. In such cases, of which there are many here, I have chosen in the spirit of the method’s multi-scalarity, to accept all such “peaks” as potential cluster solutions and to proceed accordingly. This workaround does not on its own provide a basis on which to distinguish between better and worse clustering solutions a priori, though certain cluster solutions can be ruled out as less than optimal, e.g., where either too many points are not assigned to a cluster where too many clusters have only one or two points. We may also discriminate better from worse clustering solutions via comparison with other methods of spatial grouping to observe where the results
from k-means and other cluster analyses converge and/or diverge. Recalling Palmisano’s observation that these clusters do not produce a straightforward map of territories, there is also utility in not selecting a single solution as the “correct” level, and instead examining all of the levels together to examine how groupings vary across multiple dimensions.

While this will be discussed again briefly in Chapter 6, the ultimate result of the deployment of Palmisano’s k-means script was the identification of three equally-sized sub-zones of the Gorgan Plain, i.e., western, central, and eastern (Figure 6.15). In all periods except for the Chalcolithic, the k-means script returned a $k$ value of three, though there were additional peaks in some cases at k-solution levels ranging between 5 and 20. At first, I decided to model each of these possible configurations of clustering by joining the k-cluster grouping results to the settlement data and generating convex hulls to represent territorial units. The convex hull algorithm draws a polygon around the minimum bounding geometry of the point cluster; the areal extent of this polygon can then be derived via the Field Calculator and automatically appended to the attribute table. Given the number of solutions per period, and the number of periods involved in the analysis, this introduced a level of complexity to the analysis that I was not able to wrangle with computationally, and which seemed to violate the spirit of the results, which clearly showed that the optimal clustering solution was either $k = 2$ or $3$ in all cases. While this was a useful result, especially in confirming the intuition derived from visual analysis that the Gorgan Plain ought to be subdivided into smaller units for more fine-grained analysis, it did not produce a model of territoriality that was useful on the one hand for evaluating Tosi’s territorial predictions or anything that could not have been derived from simple visual analysis of the settlement distributions on the other.

4.1.1.2.2 Catchment Buffer Clustering
In this section, I describe the procedure used to perform a variant of hierarchical cluster analysis derived from the results of a simplified Site Catchment Analysis. I chose this method because, as discussed in Chapter 2, a geographically emplaced community may be reasonably defined as one in which there is at least the possibility for routine intensive social interaction with members of a particular group. This possibility is often defined within certain spatially bounded parameters, i.e., the limits of a day’s walk as delimiting the outer boundaries of the zone which people in premodern agrarian societies could maintain regular face-to-face interaction. This spatial threshold, therefore, can serve as a proxy for the zone within which the practices of affiliation discussed in Chapter 2 could occur. Thus, insofar as Site Catchment Analysis (SCA) is a form of modeling which identifies and describes the area, i.e., “catchment,” routinely exploited by the inhabitants of a given settlement, this seemed a particularly attractive option for studying these thresholds and what kind of territorial patterns they might produce (Ullah 2011: 624; see also Renfrew and Level 1979).

SCA is typically performed today using GIS models of walk-time which bring together cost-friction surfaces and locomotion algorithms to estimate the boundaries of a site’s potential catchment zones at increasing radii of cost-distance translated into walk-time (e.g., Becker et al. 2017; Ullah 2011; Volkmann 2018). I experimented with the use of a number of different methods of generating walk-time using scripts such as r.cost, r.walk, r.catchment,44 or SiteExploitationTerritories.45 Suffice it to say here that in the context of the Gorgan Plain, the output of these methods was almost always near perfect circles or nearly circular ellipses, given flat terrain in the area of main settlement concentration. Future analyses would most certainly benefit from returning to these models with the Gorgan Plain site distribution and include other

44 https://grass.osgeo.org/grass76/manuals/addons/r.catchment.html
45 https://github.com/eScienceCenter/SiteExploitationTerritories
variables in the generation of the cost-friction surface: e.g., land cover, the Topographic Wetness Index, and other such factors with known effects on locomotion (see White and Surface-Evans 2012). Thus, again, remembering that the forms of analysis here have been simplified according to the ultimate objective of evaluating Tosi’s model rather than making an intervention at the cutting edge of spatial analysis, I modeled the catchments based solely on distance radii.

Regardless of what method is used to generate the concentric rings extending out from site points that are understood to approximate catchments or territory, the radius thresholds must be defined. Given my objective to model the territory of (presumably) agrarian communities and early complex polities, it makes sense to look for where scholars have proposed explicit territorial size thresholds for these types of social groupings. Palmisano argues that the territory of a city-state ranges between 10 and 3000 km², corresponding to radii of ca. 1.75 km and ca. 30 km respectively (Palmisano 2017: 221, note 1). Another estimate suggests that early complex polities in Mesopotamia were small enough that one could walk from the center to its outer boundary in a single day (Scott 2017: 119; see also Renfrew 1975: 19). A “day’s walk,” is not an uncomplicated estimate of distance, however. This measure varies ethnographically, historically, and depends heavily on terrain and mode of locomotion; figures for a day’s walk range between 18 and 25 km (Kintigh 2003: 106; see also Malville 2001; Wilcox 1993: 81), though Drennan argues for a higher figure, i.e., 36 km, as the furthest the average person could walk in a single day (1984). Other estimates include those such as the “Biblical Day’s journey,” i.e., between 32 and 40 km, and averages of the distances between known caravanserais, between 16 and 40 km. Thus, a “day’s walk” is a somewhat difficult figure to operationalize, given the wide range of variation in its estimation.
A slightly different approach to the question also uses the day as a relevant unit of time and considers walking distance as an important limiting factor but conceives of territorial boundaries in terms of a “day’s round-trip” instead. For example, Quinn and Fivenson have recently argued that early complex polities are usually limited in their spatial extent by travel and organizational constraints on the delegation of authority to an upper-level distance of a half-day’s journey, or the outer boundaries of single day’s round-trip. In social terms, this correlates to the distance that an authority could travel to interact with all of the communities of a polity without having to impose on their hospitality to stay the night; for non-elites, this half-day’s journey to the authoritative center allows them access to the social and economic opportunities of the center (Quinn and Fivenson 2020: 70; see also Livingood 2012: 174-175).46

A similar approach for defining the possible territorial boundaries of communities is based on the distance thresholds within which the “regular interaction entailed by most definitions of community” could occur (Kintigh 2003: 105). Kintigh estimates that the size of a residential community involved in an agricultural mode of production is under approximately 7 kilometers (see also Mahoney 2000; Varien 1999). An important point here is that this is an upper limit, and particularly applicable to extensive agrarian system; for more intensive systems, we might expect considerably smaller communities (bounded within a ca. 2 km radius). This range of limits provides some basis for understanding the scale of community territory (Kintigh 2003: 106; Varien 1999). It is important to remember, however, Kintigh’s caution that the primary value of these distance thresholds is heuristic and that the logic connecting any of these

distances to social boundaries is underdeveloped. Nevertheless, a range of archaeologists agree that distance thresholds are a key part of modeling the geography of early complex polities and communities.

In my model, I tested how configurations of community and polity catchments might appear using three different thresholds adapted from the literature (Wilcox et al. 2007: 172; see also Hill 2000). These were 3 kilometers (the limit of intensive daily interaction), 6 kilometers (the upper limit of daily movement within an extensive agrarian agricultural system), and 9 kilometers (the upper limit of a day’s round-trip). In the case of the former two thresholds, these correspond to estimates of the lower and upper boundaries for community territories (Kintigh 2003; Ullah 2011), and in the case of the latter, this corresponds to Hansen’s estimation of the territorial size of Mesopotamian peer-polities (Hansen 2000; Palmisano 2017).

The careful reader will here note that 9 kilometers seems a drastically reduced figure from that discussed previously in the section. This distance was chosen as a threshold because the first version of this model used the 18 km figure following Wilcox et al. (2007) after Drennan (1984) as the definition of the outer boundary of a day’s walk. As will be discussed in Chapter 7, this parameter had the result of turning the entirety of the Gorgan Plain into a single territorial unit under almost every different modeled configuration of space-time and was thus discarded as a useful threshold. Recall that a number of estimates of a day’s walk fall in the 16-18 km range, and that following Quinn and Fivenson (2020), the operative category is a day’s round-trip, rather than the full distance of a day’s march. Thus, 9 km can be defended as a reasonable estimate of this outer boundary for the distance a person could walk and return in a single day. This also conforms to Postgate’s estimate of the catchment of Abu Salabikh, i.e., bounded within a catchment defined by a radius of ca. 10 km (1996).
Given that the cost-path model produced concentric circles, I decided to model this process using as-the-crow-flies buffer radii for the sake of computational simplicity. First, I reprojected the QGIS working environment in Universal Transverse Mercator (UTM) so that distance and areal measurements could be computed in meters. Second, I subdivided the sample by period. Third, I performed a buffer operation on the sample of points to a distance of 3 kilometers (e.g. Figure 4.2). This step produced a set of circular polygons with the individual site-points as centroids and an area of 28.27 km$^2$. Many of these polygons overlapped with each other, and it is precisely this overlap that provides the basis for aggregating the buffers into territories. Fourth, I dissolved these overlapping polygons, such that intersecting sets of buffers
were merged into a single polygon, and then I assigned each of these polygons a unique identifier. These merged polygons, or what I refer to as settlement clusters, form the basis for multi-site community territories, and ultimately serve as the basis for the modeling of multi-community polities.

To derive the larger communities based on the upper boundary of 6 km, the procedure is then to buffer the output of the fourth step an additional 3 kilometers (Figure 4.2 – Step 5a). A similar process was used to derive multi-community polities, where the original 3 km site-catchments are merged with all intersecting polygons and then buffered an additional 6 kilometers and merged again (Figure 4.2 – Step 5b). The reason that this procedure was used to arrive at the 9km radius is because if one were to perform steps 3-4 with the buffer radius of 9km, nearly all of the site buffer polygons would be linked in a contiguous chain, resulting in a gigantic region-wide polygon that tells us little about the sub-regional patterns. The output of Figure 4.2 Step 5b, what I call a settlement group, is then a basis for reasoning about higher-order territorial organization. The output of step five could be understood on its own terms as a model of micro-regional territorial clusters, i.e., contiguous geographical zones within which individual sites are within a day’s round-trip walk of each other. Obviously, if the 9km buffers around a contiguous cluster do not overlap at all with that of another cluster, we have grounds to divide these clusters into distinct settlement groups.

Now, there is a question about the degree of overlap required to consider settlement clusters as part of the same settlement group. The principle of inclusion that I have used is as follows, which is visually demonstrated in Figure 4.3. Many of the 9km settlement cluster buffers intersect with each other, but not all of the 9km settlement cluster buffers intersect with the 3km buffer of other settlement clusters; thus, two settlement clusters are only considered
part of the same settlement group if their 9km and 3km buffers overlap, if only the 9km buffers overlap, they are part of distinct groups. The difference between the left and right sides of Figure 4.3 on the top row is that on the left the bottom two site points are closer to the top two than on the right. This results in an overlap between their 9km and 3km buffers, resulting in their inclusion in a single polity. Contrast this with the top row on the right where the bottom two site points are slightly further away, meaning their 9km buffers do not overlap with the 3km buffers of the top two site points, meriting their discrimination as a separate polity qua settlement group.

Figure 4.3 Principle of Inclusion for discriminating settlement Groups

The output of this procedure is a table in which each row represents an individual site and each column is a combination of time period and grouping-level. The cells thus contain the
cluster/group ID, such that in the rank-size analysis, the sample of sites belonging to an individual cluster/group can be isolated for the next steps in the model. This group ID is the key that allows for not only the generation of summary statistics, such as computing the number of sites in a group, the maximum size of a site in a group, the mean size of sites in a group, but also provides the anchor for the assignment of the rank-size evaluations to these units thereby affording the analysis of covariance between rank-size curve shape and these other measures.

4.1.1.3 Rank Size Modeling

As discussed in Chapter 2, rank-size modeling is used to examine the organizational structure of settlement groups and is often understood as an index of the degree of political integration manifest in this structure. Rank-size analysis is based on the assumption that well-integrated settlement hierarchies will exhibit a consistent log-normal distribution in the relationship between the size of a site and its position within the sample of sites arranged from largest to smallest by size (Crumley 1976; Johnson 1973; Pearson 1980). That is, under the conditions of a perfectly integrated hierarchical settlement system, the largest site will be twice as large as the second largest site, and the second largest site will be twice as large as the third largest site, and so on down the line (Zipf 1949; see also Falconer and Savage 1995; Savage 1997). Such a rank-size distribution is rarely found in the empirical record, however; thus, what is more interesting to chart are deviations from this ideal distribution (see Figure 4.3). The main forms of deviation from the log-normal rank-size distribution are primate and convex distributions; primate distributions produce a rank-size curve that is steeper than the log-normal distribution, and convex distributions have a shallower distribution relative to the rank-size rule (Falconer and Savage 2009: 134). There are many additional possible configurations, which will be introduced (Figure 4.4) and whose social implications discussed in due course (Table 4.2).
A number of tests have been developed to assess the statistical significance and rigor of these measures. These tests allow us to evaluate which measures are likely due to chance and which represent a true deviation from log-normality (e.g., a-coefficients, KS tests, bootstrapping, and so on; see Drennan et al. 2015: 70-72; Drennan and Peterson 2004; Palmisano 2017: 226; Savage 1997). While there is some value to these tests, they rarely result in the identification of patterns that are due only to chance. Thus, they tend to impute an unwarranted degree of scientism to what is ultimately a descriptive rather than predictive endeavor (see Crema 2013).

In any case, under the best of circumstances, rank-size analysis can characterize the variations in hierarchical/heterarchical spatial structure within and between settlement clusters over time and gives us a rough measure by which to examine trajectories of political variability manifest at the landscape or regional scale (Falconer and Savage 2009; Wossink 2009). As the theoretical aspects of Central Place Theory and rank-size modeling have already been addressed in Chapter 2, this section focuses on the method used to perform rank-size analysis and on reviewing how deviations from log-normality in settlement distributions have been interpreted in the literature.
Figure 4.4 Rank-Size Curve Shapes derived from Actual Examples in Gorgan Plain Settlement Data
The first step selected the sample of sites and their sizes according to cluster or group membership. Thus, in the example of Table 4.1, at the level of settlement groups, sites 7 and 15 belong to the same group, so the selection would pull the cells of the rows from the first two columns into a temporary storage vector. The second step would then manipulate this temporary storage vector by arranging these sites in order from largest to smallest and computing the log-normal distribution based on the relationship between the largest site size and the number of sites in the group or cluster. The third step was to plot the log-normal distribution (i.e., the dashed lines in Figure 4.3) and the actual settlement distribution (i.e., the colored lines in Figure 4.4) on the same log-log scaled plot with size on the y axis and rank on the x axis. Each of these plots was saved as an individual unit, and then combined according to time period and buffer-threshold (see Appendix to Chapter 7 for the full list). After this was complete, I went through and appended the rank-size shape to the summary statistics table for each of the clusters so these results could be evaluated in relation to other variables such as number of sites in a group, largest site size in a group, group area, geographic zone and so forth (e.g., Table 4.2). See Electronic Supplementary Files folder “rank_size_script” for the .rproj and .R files that were used to conduct this analysis.

**Table 4.1 Example Rows from Rank-Size Shape Output Table**

<table>
<thead>
<tr>
<th>Period</th>
<th>Level</th>
<th>Cluster ID</th>
<th>Sites n</th>
<th>Max Size (ha)</th>
<th>Area (km²)</th>
<th>Geog. Zone</th>
<th>Curve Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>3km</td>
<td>3</td>
<td>4</td>
<td>2.19</td>
<td>486.7</td>
<td>west</td>
<td>primo-convex</td>
</tr>
<tr>
<td>T₁</td>
<td>3km</td>
<td>15</td>
<td>2</td>
<td>1.68</td>
<td>349</td>
<td>west</td>
<td>convex</td>
</tr>
<tr>
<td>T₂</td>
<td>6km</td>
<td>1</td>
<td>18</td>
<td>6.24</td>
<td>762.3</td>
<td>west</td>
<td>zipfo-convex</td>
</tr>
<tr>
<td>T₂</td>
<td>6km</td>
<td>2</td>
<td>8</td>
<td>34</td>
<td>564.6</td>
<td>west</td>
<td>primate</td>
</tr>
<tr>
<td>T₃</td>
<td>9km</td>
<td>10</td>
<td>2</td>
<td>0.95</td>
<td>372.9</td>
<td>east</td>
<td>convex</td>
</tr>
<tr>
<td>T₃</td>
<td>9km</td>
<td>11</td>
<td>2</td>
<td>12.4</td>
<td>387.4</td>
<td>east</td>
<td>primate</td>
</tr>
</tbody>
</table>
The interpretation of rank-size distributions in socially legible terms has been an ongoing debate since this form of analysis first emerged (see discussions in Crumley 1976 and Wossink 2009). The first point to note is that log-normal or “Zipfian” rank-size distributions "appear to be typical of larger countries with a long tradition of urbanization, which are politically and economically complex" (Berry 1961: 582). Pre-modern settlement patterns often do not conform to the values expected, however; most archaeological inferences are therefore derived from the manner and degree to which rank-size distributions depart from log-normal (Falconer and Savage 1995: 40).

Table 4.2 (Adapted from Savage 1997)

<table>
<thead>
<tr>
<th>Curve Shape</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Primate     | • “Simple” economic and political development  
              • Short history of urbanization  
              • Settlement system confined to small territory  
              • Partially recovered settlement system  
              • Typical of “core” areas  
              • High order sacred ceremonialism, macroregional elite exchange, foreign diplomacy, war focusing chiefly on centers |
| Convex      | • Pooling of more than one settlement system  
              • Low levels of system integration  
              • Typical of “peripheral” areas  
              • Excluding a primate center from settlement system  
              • Predicted by Central Place Theory |
| Primo-Convex| • Pooling of more than one settlement system  
              • Simultaneous operation of two distinct settlement systems in a single region  
              • Centralized system superimposed on loosely integrated or central-place distribution |
| Double-Convex| • Multiple Settlement Systems operating within a single region |

Palmisano summarizes the baseline descriptive interpretations of these distributions:

- a settlement system manifests a **primate** rank-size distribution if there are one or only a very few large centers and a many more smaller settlements;
- a settlement system manifesting a **convex** rank-size distribution is characterized by many large settlements of roughly the same size relative to the number of small settlements;
• a settlement system manifesting a **primo-convex** rank-size distribution is characterized by the nesting of two settlement systems within a region, i.e., a higher-order primate arrangement superimposed on a lower-order system numerically dominated by many settlements of roughly the same size;

• a settlement system manifesting a **double-convex** rank-size distribution either has more than one settlement system in a region where there are many large and small sites, few in between, and with little variation within these size-classes within a single region, or, results from the fact that there are two primate systems in the same region at different scales;

• a settlement system manifesting a **convexo-primate** rank-size distribution appears to be characterized by several or many equivalently large sites and a drop-off in site size between these centers and the numerically less prevalent small sites (2017: 225-226).

This still leaves a number of types to be explained which are less often discussed in the literature, but which are reported in several studies, and that are also found in the Gorgan Plain rank-size distributions (e.g., Palmisano 2017):

• **zipfo-convex**: settlement systems where the upper zone follows log-normality, with one or more large centers and a large number of intermediate-sized sites relative to a smaller number of small-sized sites

• **zipfo-primate**: settlement systems where the upper zone follows log-normality, with one or more large centers, and a small number of intermediate-sized sites relative to a larger number of small-sized sites

• **zipfo-convexo-primate**: a variant of the convexo-primate distribution, with the primary difference being the log-normal relation between the largest two or three sites in the system

• double-primate: this appears to be the closest distribution to what archaeologists have typically imagined with respect to a “tiered” settlement hierarchy, wherein two or more primate systems are vertically superimposed upon each other

• **double convexo-primate**: similar to double-primate, but where two primate or primo-convex systems may be heterarchically superimposed upon each other

Social and political interpretations can be stacked on top of these basic rank-size types.

Following Palmisano, primate distributions are often understood to indicate the presence of “strong vertical integration and extraordinary centralization of political and economic functions exerted by a dominant centre over many others” (Palmisano 2017: 225; see also Berry 1973; Drennan and Peterson 2004; Falconer and Savage 1995; Johnson 1977). Primate distributions may result from artificially or accidentally restricted spatial windows of analysis (Johnson 1977).
In contrast, convex distributions index a dispersion of population in settlements of roughly similar size and thus represent a settlement system less likely to be an integrated or centralized socio-political entity, insofar as they contain more intermediate-sized and large settlements than predicted by the rank-size rule (Crema 2013; Wossink 2009; see also Falconer and Savage 1995). Convex distributions can also result from the “pooling” of more than one settlement system in the same spatial window of analysis, meaning that convexity could potentially indicate the presence of several independent communities which have been unduly lumped together by the analyst (Johnson, 1977: 498; see also Wossink 2009). Convex distributions may also be seen to represent “stepwise ranking,” in which the highest-order large sites of equivalent political-economic function are both numerous and equivalent in size and do not feature “vertical” (i.e., hierarchical) integration (see Crumley, 1976; Johnson, 1977; Falconer and Savage, 1995, 40–41; as in Palmisano 2017: 225). It is also possible that convex distributions result from the failure to correctly include a central place in a sampling window, giving the impression of independence to what is actually a subordinate settlement sub-system (Falconer and Savage 1995: 40).

Primo-convex distributions result from the combination of a primate distribution at the top of the size range within a settlement sample and convexity toward the bottom of the size range (e.g. Figure 4.3, Middle Second Row). Such distributions could be produced by another type of “pooling,” in this case the superimposition of a centralized or hierarchical system (i.e., the upper primate zone) on a lower-level system that is more loosely integrated (i.e., the lower convex zone). Falconer and Savage suggest that this could indicate the operation of two distinct settlement systems within a single region (Falconer and Savage 1995: 39-41). Finally, the double-convex settlement distributions are understood to represent either multiple settlement
systems arranged according to different rank-principles, or to be the result of accidental/mistaken analytical pooling of distinct distributions into a single window of analysis (Palmisano 2017: 225-226).

Furthermore, there are processual aspects to rank-size and Central Place modeling; for example, the concern of many studies was to examine the historical change in the rank-size distributions of settlement systems. In archaeology specifically, it has been observed that as settlement systems become increasingly hierarchically integrated, they will shift from convexity to log-normality, and finally to primacy (e.g., Johnson 1980). While this processual model could be seen as the basis for understanding the relationship between changing rank-size distributions over time and the emergence of states or proto-state structures qua “well-integrated settlement systems,” it has actually been known for some time that a variety of settlement systems can support “the state level of organization,” with the urban-focused primate system being just one among many spatial-structural configurations (Crumley 1976: 69). Many investigations since Crumley’s observation seem to have followed her suggestion that future investigation should focus on systemic questions concerning the type of settlement system as a reflection of the natural resources, environment, social organization, management techniques, land tenure, etc., on the one hand, and the particular functions of the centers in that system on the other. Since Crumley’s critique, the objective of many archaeological studies of rank-size dynamics has shifted away from the assumption that there will necessarily be a standard progression or set of progressions toward “urbanization” or “state formation” that will be readily identifiable in changing rank-size signatures. Rather, most scholars have followed her lead in identifying and describing distinctive functional lattices and the range of variation over time and space as the basis for more dynamic models of change in
both state and nonstate contexts (Crumley 1976: 69; see Crema 2013; Drennan and Peterson 2004; Falconer and Savage 2009; Palmisano 2017).

4.1.2 Contemporaneity

All three of the analyses discussed in Section 4.1.1., i.e., exploratory data analysis, territorial modeling, and rank-size analysis are complicated by both practical and conceptual factors. On the one hand, our knowledge of a given settlement record is biased by the complex interactions between formation processes, taphonomy, and recovery procedures (Athanassopoulos and Wandsnider 2004: 5-8; Banning et al. 2017: 468-473; Duffy 2015; Dunnell and Dancey 1983; Hodder 1978; Markofsky 2014; Orton 2000; Schiffer 1983). On the other hand, and perhaps most fundamentally, each form of analysis either assume or bracket the question of simultaneous settlement, known as the “contemporaneity problem” (Dewar 1991; Schacht 1984). Under ideal circumstances, accounting for each of these factors would be necessary to draw firm inferences about the correlation between observed settlement distributions and past social reality (Kouchoukos 1999: 21). In practice, few studies – including this one – have the resources or the information to fully account for all four of these confounding elements (i.e., formation processes, taphonomy, recovery bias, and contemporaneity).

In terms of the first two problems, while it would be ideal to incorporate for each of these factors in the study of settlement distributions, given the present conditions of (in)access to the region and the nature of the published record on the historical geomorphology the Gorgan Plain, making substantive sense of these factors would be difficult. For example, we know that significant alluviation and colluviation have occurred in parts of the Gorgan Plain over the past 5,000 years, primarily through the deposition of riverine and wind-blown loess
sediments (Asadi et al. 2013; Lahijani and Tavakoli 2012; Vlaminck et al. 2016). These processes have not, however, been systematically related to the archaeological record, notwithstanding a few notable and period-specific exceptions (e.g. Hopper 2017; Leroy et al. 2019; Shumilovskikh et al. 2016; Wilkinson, T.J. et al. 2014). The main reason for this is that paleoenvironmental studies of this region have typically focused either on: a) more recent climate history, b) petroleum geology, or c) the effects of climate change on the natural resources of the Caspian Basin, rather than on reconstructing the climate and geomorphology of the Middle Holocene (bounded by ca. the 8.2 and 4.2 ka BP climate events, see Walker et al. 2019). I have thus bracketed site formation processes and taphonomy from this analysis, leaving these important concerns for future investigation.

The fourth element, simultaneity of settlement occupation, has not been addressed in any previous study of the Gorgan Plain. Despite the many chronological issues discussed in Chapters 5 and 6, the present study has the most control over this factor. In general, contemporaneity is a major confounding factor for settlement distribution studies, which has long been acknowledged, first as the “map-overfilling” problem (e.g., Ammerman 1981; Schacht 1984, 1987; Plog 1973, 1974; Pollock 1999: 63). Settlement simultaneity has been a thorny problem for territorial and rank-size modeling in particular, as both either presume or require a set of simultaneously occupied settlements as their input (Grove 2011). This is in principle not a problem, but settlement distribution maps often do not constitute such a set (Crema 2015). Instead, most site distribution maps, assuming they can be temporally subdivided at all, represent palimpsests of occupation history rather than synchronic snapshots of simultaneous settlement, unless the periods are extraordinarily short (Dewar 1991; see also Duffy 2015; Kouchoukos 1999: 28).
This feature of distribution maps complicates our ability to conduct territorial analysis because it makes difficult not only the identification of meaningful units, but also the characterization of the structure of these units and change over time (Kouchoukos 1999). This unit-problem in territorial dynamics can affect rank-size modeling because the shape of rank-size curves has been shown to depend on the scale of the window of analysis (Drennan and Peterson 2004; Palmisano 2017). Thus, when performing spatial analysis with the goal of constructing a meaningful social-historical model, given that we cannot assume that all sites of a given period were simultaneously occupied, we must take care that synchronicity is not falsely imposed upon temporally heterogenous data. Without recourse to written records, coins, dendrochronology, or fine-grained ceramic seriations tied to radiocarbon chronologies – none of which are available in this case – we cannot discern precisely which sites are strictly contemporaneous with each other.

Several solutions to this problem have been proposed. The first involves “normalization” of counts by dividing the number of sites by the length of the period to produce a measure of sites occupied per year (Weiss 1977). While Weiss’s solution renders a figure that is more amenable to comparative analysis, it does not solve the underlying problem. Another solution to this problem uses a simple Monte-Carlo simulation based on when a site was founded or abandoned relative to the period in question, which produces an estimated count of simultaneously occupied sites, the rate of founding/abandonment of sites and mean occupation length of sites in a given period of interest (Dewar 1991, 1994; Kintigh 1994).

Robert Dewar proposed one of the most widely cited solutions to this problem (1991, 1994; see also Kintigh 1994), consisting of a simple simulation to estimate the average number of simultaneously occupied sites during a given period \( \bar{OC} \). The simulation derives this output
in three steps. First, it assigns the settlements dated to the period of interest to one of four categories (Figure 4.5):

- $a$ is the number of occupied villages at $t_1$, but not at $t_2$ (sites occupied in phases X and Y),
- $b$ is the number of villages occupied at $t_1$, and at $t_2$ (sites occupied in phase X, through all of Y, and into Z),
- $c$ is the number of occupied villages at $t_2$ but not at $t_3$, (sites occupied in phases Y and Z),
- $d$ is the number of villages occupied after $t_1$ and abandoned before $t_2$ (sites only occupied for part of Y).

Second, the simulation uses the distribution of sites across these categories and period lengths in years ($p$) to compute rates of village establishment ($E_{occ}$) and abandonment ($A_{occ}$) as follows:

$$E_{occ} = (c + d)/p$$
$$A_{occ} = (a + d)/p$$

Figure 4.5 Schematic of Dewar’s Categories

Third and finally, the simulation starts at $T_1$ (i.e. year 1) counting the number of simultaneously occupied sites at that time as the sum of $a$ and $b$. The simulation then proceeds
iteratively to step from year 1 of Period Y (i.e. $T_1$) for a total of steps equaling the number of years $p$, stopping at the end of Period Y (i.e. $T_2$), calculating the likelihood of a village being established or abandoned at each year-step. The simulation stores the number of settlements occupied for each year in an array and at the end (i.e., the $p$th year, or $T_2$), the average number of settlements per year is calculated as the mean of the values accumulated in the array. The simulation is then repeated up to 500 times (or more) and the overall “grand” mean number of villages occupied ($\overline{\text{occ}}$) per year and the standard deviation of that mean ($\sigma$) are computed from the sum of all the simulations (Dewar 1991: 608-610).

An additional statistic that Dewar computes on the basis of $\overline{\text{occ}} \pm \sigma$ is mean occupation span (Dewar 1991: 610). This can be calculated as a function of the reciprocal of $A_{\text{occ}}$ divided by $\overline{\text{occ}}$ or alternatively, it can be expressed as a range of variance within $1-\sigma$, i.e.:

$$1 / (A_{\text{occ}} / (\overline{\text{occ}} - \sigma)) = \text{lower end of 68% confidence range for mean occupation span}$$

$$1 / (A_{\text{occ}} / (\overline{\text{occ}} + \sigma)) = \text{upper end of 68% confidence range for mean occupation span}$$

Several points should be noted with respect to these calculations. First, the higher the abandonment rate, generally speaking, the shorter the estimated occupation spans will be. Second, for any given rate of abandonment, an increase in $\overline{\text{occ}}$ will increase the absolute value of the lower and upper ranges of the confidence interval for the mean occupation span. Third, for a given rate of abandonment and $\overline{\text{occ}}$, increases in the value of $\sigma$ will correspondingly stretch the span of the upper and lower confidence interval.47

47 Using dummy numbers (i.e. $A_{\text{occ}} = 0.25$, $\overline{\text{occ}} = 5$ or 10, and $\sigma = 2$ or 5, these points may be observed from the following calculations:

1 / (.25 / (5 - 2)) = 12 and 1 / (.25 / (5 + 2)) = 28
1 / (.25 / (10 - 2)) = 32 and 1 / (.25 / (10 + 2)) = 48
1 / (.25 / (10 - 5)) = 20 and 1 / (.25 / (10 + 5)) = 60

241
The outputs of Dewar’s original model are interesting and potentially useful (i.e. $E_{occ}$, $A_{occ}$, $\delta_{occ}$ and span), but they have two key drawbacks. First, with respect to the calculation of the figures, Kintigh notes that the model only allows the settlement system to grow or decline by one site per year, which is an unrealistic assumption of settlement dynamics, which ultimately leads to a depressed $\delta_{occ}$ and to overly conservative estimates of $\sigma$ (Kintigh 1994: 146-147; Wossink 2009: 52). Kintigh’s solution to the problem doesn’t quite resolve this issue, however, especially with regard to estimated use-span. Second, and perhaps more importantly, on the basis of Dewar’s simulation we still can’t know which sites were contemporaneous. Moreover, his model assumes a continuous rate of founding and abandonment, and it cannot account for multiple independent occupations within a single phase (Lawrence 2012: 75; Wossink 2009; Yukich 2012: 164).48 All three of these shortcomings can be somewhat mitigated by using the shortest possible chronological units (e.g. Plog et al. 1982), or by using one of a number of statistical simulations to spatialize Dewar’s formula (see Cowgill 2015). Despite these problems, Dewar’s simulation is widely recognized as a useful model, provided it is not applied mechanistically (Lawrence 2012: 75; see also Wossink 2009: 53). Indeed, aspects of the model can be repurposed to related but distinct ends; in particular, one of these is the establishment of “strict contemporaneity.” As discussed above, this is a necessary condition for felicitous synchronic spatial analysis, and Dewar’s model does afford a rudimentary inferential structure for determining which sites are simultaneously occupied. While Dewar’s original calculations do provide a useful estimate of the number of simultaneously occupied sites during a particular

48 Another issue it doesn’t resolve is changing size estimates between different phases of a site’s occupation, but there really is no good solution for this problem without conducting new fieldwork (Drennan et al. 2015: 38-40; Yukich 2013: 165).
time period, they do not by themselves give us an account of *which sites were contemporaneously occupied*.

Despite the problems with Kintigh’s proposed revisions to Dewar’s calculations (see Kouchoukos 1999: 30), Kintigh’s article does make a crucial contribution: within the span of Periods X-Z, there are two points at which we do know *which sites were simultaneously occupied* (Kouchoukos 1999: 42; Sumner 1990: 9; Wossink 2009: 50), i.e. for a span of Periods X-Z, at T₁ and T₂, or in this case for a span of Periods W-Z, at T₁, T₂, and T₃ (Kintigh 1994: 146-147; Kouchoukos 1999: 31; cf. Wossink 2009: 53). That synchronicity can be inferred at these points is based on two assumptions:

1) if a site was occupied at the beginning and end of a period, the site should also be occupied for the intervening duration, and

2) if a site is occupied during two consecutive phases are present at a site, then it follows that the site was occupied at the transition point between these phases (Wossink 2009: 50). In the case of this study, with four periods, T₁-T₃, the points of synchronicity are as follows:

<table>
<thead>
<tr>
<th>P...</th>
<th>Pₚ</th>
<th>Pₓ</th>
<th>Pᵧ</th>
<th>P₂</th>
<th>Pₚ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neolithic</td>
<td>Chalcolithic</td>
<td>Early Bronze</td>
<td>Middle Bronze</td>
<td>Late Bronze</td>
<td>Early Iron</td>
</tr>
<tr>
<td>T₀</td>
<td>T₁</td>
<td>T₂</td>
<td>T₃</td>
<td>T₄</td>
<td></td>
</tr>
</tbody>
</table>

At T₁-T₃ we have grounds to argue exactly which sites were occupied. At T₁, we derive simultaneous settlement as all type *a* and type *b* sites for the Early Bronze Age, at T₂ as all Early Bronze Age type *b* and type *c* sites, and at T₃ as all Middle Bronze Age type *b* and type *c* sites. Naturally, one of the drawbacks of this approach is that it does not account for type *d* sites at all, which Kintigh argued was a flaw of Dewar’s overall approach. Unfortunately, Kintigh’s
solution to this particular problem creates more issues than it solves; without getting into all the
details here, suffice it to say that the matter of including type d sites in this model can only be
resolved using much more sophisticated modeling techniques which far exceed the scope of the
present discussion. Absent such a simulation, T1-T3 represent our best snapshots for synchronic
spatial analysis of settlement distributions and represent the chronological framework which
will be used in Chapter 7 for territorial and rank-size modeling.

4.2 Methods for Comparative Study of Legacy Regional Survey Data

In addition to its theoretical and culture historical interventions, this dissertation aims to
make empirical contributions by digitally integrating the results of excavations and regional
surveys in the Gorgan Plain. Synthetic research of this kind, comprising the integration of diverse
sources of legacy data for both management and analytical purposes, has increasingly become a
priority in the field of archaeology in recent decades (Altschul 2016; Cooper and Green 2016;
Green 2018; Kansa et al. 2011; Kintigh 2006; Kintigh et al. 2014; Kintigh et al. 2015; Petrie and
Green 2018; Ullah 2015). The following discussion reviews the current state of thinking in the
field on integrative and synthetic research using legacy data, regional comparative survey, and
remote survey as a prelude to presentation of the methods used in this dissertation.

This section reviews three overlapping domains of archaeological praxis. It first begins at
the most general level, with a synoptic view of issues relating to conducting new research with
legacy data. Attention then turns to the integration and comparison of regional survey data
before moving on to discussing the burgeoning field of remote survey and the ways its results
can complement and augment legacy data and facilitate regional comparative survey.

4.2.1 Legacy Data Integration in the Service of Synthetic Research
Kintigh and colleagues recently identified twenty-five “grand challenges” for archaeology in the 21st century (2014). While their methodology, authorship, citational practices, and results have been subject of critical scrutiny (e.g. Cobb 2014), their more general call to action has been well received. They argue that the most important direction forward for archaeology to meet these challenges is to invest in infrastructure to facilitate access and re-use of systematically collected archaeological data to promote synthetic research (Dallas 2015; Faniel et al. 2018; Green and Petrie 2018; Grosman 2016; Huggett 2015, 2018). In other words, not only is so-called “second generation analysis” needed (Diacopoulos 2004), but such work is required at ever greater scales if we are to meet these grand challenges. This proposal takes on a greater urgency in light of the ongoing “curation crisis” (Bauer-Clapp and Kirakosian 2017; Childs 1995; Kersel 2015) and anxieties related to the accelerating “deluge of data” (Bevan 2015; McCoy 2017) which are concerns for a wide range of archaeological practitioners in the academy and beyond (MacFarland and Vokes 2016; Schlanger et al. 2015).

The future of archaeological field research undoubtedly requires a greater sensitivity to data management concerns, especially as digital recording increasingly becomes a disciplinary norm (Averett et al. 2016; Roosevelt et al. 2015). This will require greater disciplinary valorization of not only well-planned data preservation measures (Clarke 2015), but also the facilitation of discovery, access, and re-use of these data (Kintigh et al. 2018). While this is a welcome development, there is also a quantitatively staggering backlog of archaeological material curated in museums around the nation and the world whose rehabilitation is just as much an ethical imperative for the discipline (Bauer-Clapp and Kirakosian 2017; MacFarland and Vokes 2016). As Kintigh and colleagues note, grand challenges in archaeology cannot be met without increased integration and synthesis of legacy data, much of which is immobilized in
restricted storehouses and in relatively inaccessible grey literature (Kintigh et al. 2015; Kintigh et al. 2018). The remainder of this discussion therefore focuses on issues related to the rehabilitation of legacy data in general, and to regional survey records in particular.

Synthetic research is that which bridges the study of individual cases and brings together data and information from a variety of scales (Kintigh et al. 2018: 31). Recent work has shifted the focus of synthesis from summarizing and collating others’ work, turning instead to direct examination of the data on which particular arguments are based (Kintigh et al. 2015: 5). This shift to direct examination and comparison of data generated by different projects as a focus of synthetic research entails several key requirements:

- The need to integrate primary data;
- The need for discovery and access to data;
- The need for comparable observations;
- The need for adequate metadata (see below);
- The need for general-purpose data integration tools (Kintigh et al 2018: 31).

While each of these areas is critical to the disciplinary project of fostering synthetic research, they will vary in importance relative to each other depending on the needs of particular projects over the course of their life-cycles. This project’s principle concerns in this domain relate to the integration of primary data, the discernment of comparable observations, and the reconstruction of adequate metadata; the remainder of this section primarily addresses these three areas of concern. The discussion in this subsection will be followed in subsequent subsections by a review of how these synthetic requirements are activated in the two primary empirical domains under consideration, regional comparative survey (4.2.2) and remote survey (4.2.3), before moving on to demonstrating how these discussions have informed the methods used in this dissertation (4.3).
In the service of direct examination of data as a mode of integrative research, there are two broad domains to consider. The first is data published in monographs, reports, and articles (Kansa 2005); the second is data comprised of orphaned (Green 2015; Jamieson 2015; Kersel 2015) and legacy collections (Allison 2008; Altschul et al. 2018; Kansa 2005; Kintigh 2006; Pozza 2014; Voss 2012; Voss and Kane 2012). While these two domains necessarily engender the use of different techniques for the integration of data, they share common concerns relating to the transformation of unstructured or poorly-structured data into structured data (Batiuk et al. 2017; Sobotkova 2018), i.e. the creation of relational database management systems with adequate metadata to facilitate the efficient use and re-use of the data across digital platforms (Green and Petrie 2018).

There are two main types of databases to consider in synthetic research: archival and integrative. Archival databases are constructed through the concatenation of distinct databases which retain their individualized structure in a single repository with centralized query functions, whereas integrative databases continuously intake new information, compiling a single master-database (McCoy 2017: 76-77). Both have their advantages and disadvantages relative to differing project objectives, as well as the nature and relative structuredness of input data (see Zaina 2018). In this dissertation, an archival database system was constructed during the data retrieval, normalization, and cleaning phase, but the desired product for synthetic analysis and ongoing research is an integrated database.

Fortunately, the two types of databases, while differing in structure at high levels of abstraction, share similar concerns regarding how information is brought into these information environments and how data are subsequently handled therein. These concerns include the creation of suitable object-ontologies that both reflect the source-categorization of different
types of artefacts, ecofacts, and other categories of archaeological materials but which also facilitate queries that can cross different domains within the database to pull data from any number of different sources. This is important because of the heterogeneity of source materials, the diversity of data types, and the ways in which these are reported (e.g. Atici et al. 2013; Cooper and Green 2015; Green and Petrie 2018). For example, this could be as simple as having a data structure that recognizes that “ceramics” and “pottery” overlap considerably but not absolutely, or it could be as complex as accounting for the myriad ways in which chronological information is reported (e.g. “Early Bronze Age”, versus “First Half of the Third Millennium” versus 3000-2500 BCE as denoting the same chronological interval).

From a theoretical perspective, this “multiple-names-for-the-same-thing” issue has been addressed through discussions of the distinction between standardization and formalization (Kansa 2015: 7). Standardization refers to the process by which classifications and labels are synchronized and made consistent across multiple domains and projects, such that data produced by fieldwork and collections research would be more easily manipulated in database systems. This consistency is seen as having the primary advantage of facilitating SQL queries by reducing the number and variety of terminologies deployed to describe what are ultimately the same concepts and objects. Many archaeologists have, however, rejected the idea of using standardized recording and reporting schema, as the categories used in research design and methods are necessarily emergent from the specific research questions and field conditions of a given project (e.g., Shaw et al. 2016). Consequently, archaeologists have moved toward formalization as a disciplinary objective for categorization and classification, i.e. preferring to make observations and classification schemes explicit and precisely-documented rather than systematically homogenized in order to facilitate the use and reuse of archaeological data in
both archival and integrative databases. Nevertheless, standardization still has an important role to play in both archival and integrative databases on the level of metadata.

While standardization is not necessary for project-specific data-recording vocabularies and protocols, metadata standards are critical to the successful creation and (re-)use of both archival and integrative databases, as these standards “specify a uniform language for the documentation of datasets” (Kintigh 2006: 574; see also Huggett 2018; Whitcher-Kansa et al. 2014). This is because metadata includes information regarding the resolution, precision, intensity, format, syntax, semantics, and ontology of archaeological observations and objects to be modeled in databases (Kansa 2005; Kintigh et al. 2018). Metadata also details how databases are formatted, in terms of what the basic units of temporal, spatial, cultural, and environmental observation are and how they can be scaled, as well as the ways that different data fields are related to each other.49 These types of metadata, along with documentation of data collection and sampling strategies, are essential for the confident and successful reuse of data repositories, as without them, there would be no consistent basis upon which to evaluate the quality and reliability of retrieved data (Kansa 2015: 8). Furthermore, without the use of standardized metadata there would be little basis on which to compare observations between different data sets and most importantly, it would be exceedingly difficult to ascertain the means by which they may be synthesized or aggregated to answer new research questions (Kintigh 2006: 573; see also Kansa and Kansa 2013; Kansa et al. 2014).

49 Crucially for archival databases and work with legacy data sets in general, metadata also include technical information, such as file formats and character sets used. They also include semantic documentation of individual tables, columns, and nominal values in a relational database or spreadsheet. Is a variable a count, a measurement, or a nominal value? If it is a measurement, what are the units, and how were they measured? If it is a code, what does each different value of the code represent, and how were the values distinguished?” (Kintigh et al. 2018: 31)
4.2.2 Legacy Data and Regional Comparative Survey

One area of archaeology in which the issues relating to legacy data integration and synthetic research have long been a concern is in the comparison of regional surveys. Regional analysis emerged in archaeology as a major focus of field research in the 1970s and 1980s as archaeologists shifted from seeing survey primarily as a method to identify site locations toward developing approaches to better understand relationships between people and between people and the physical environment at greater scales (Kantner 2008: 37). Leaving aside for now historiography of the definition of a “region” (Cowgill 2009; Wandsnider 2004), the different orientations within regional archaeology, e.g. historical ecology, landscape archaeology (see Kantner 2008), and the different field strategies of regional archaeology, e.g. full-coverage versus sampling (Kowalewski and Fish 2009), this discussion focuses on a specific set of issues within regional archaeology, namely the comparison of legacy regional survey datasets.\(^{50}\)

Comparative regional survey has been used to think through theoretical and methodological questions concerning the structure and variability of settlement organization, economy, demography and other important socio-political domains. Many of the concerns raised in the initial rounds of scholarship on comparative regional survey are thus pertinent to the integration of legacy data.

In recent years, this category of legacy data has assumed an important role in archaeological research due to the simultaneous increase of the geographic scale targeted by research questions and the deterioration of the archaeological surface record in many parts of the world (Huggett 2018: 99). These two factors have led to ever-greater reliance on others’ data, which in combination with the growing use of GIS techniques in the discipline, has resulted

\(^{50}\) Also work in Cowgill 2009: 249-259 and also Michael E Smith Comparative Archy book
in the widespread digitization and geospatial analysis of data from legacy surveys (Witcher 2008). This digitization and analysis engendered a re-evaluation of the original methods and results of these legacy surveys, and in the process generated a useful set of concepts and heuristics for thinking through how to both compare the results of different surveys – whether these were multiple surveys of the same area conducted at different times or surveys of altogether different regions (Alcock and Cherry 2004: 5) – as well as how to integrate these data for synthetic research (McCoy 2017).

It has long been recognized in this domain both that a vast and ever-increasing trove of data of variable quality has been accumulating and that the way these data have been published hasn’t always afforded viable comparison between datasets, let alone their integration (Atici et al. 2013; Batiuk et al. 2017; Cherry 1983: 406). As is true of legacy collections in general, whether published or unpublished, legacy survey data can offer substantive datasets to be integrated into modern research projects, exhibits, and outreach (MacFarland and Vokes 2016: 163). But as substantial as these offerings may be, these collections may just as often be more of a window into past research strategies and outdated data management standards. Information about these strategies and standards, however, is crucial to making sense of these data sets in relation to each other. Indeed, without some notion of how the legacy data were created, it is extraordinarily difficult to discern whether patterns reported are of any significance cultural significance, or whether they are more reflective of the methods used (Witcher 2008). Put differently, given that the basis of comparison is often on the face of it quite simple, for example: measures of increase or decrease in total numbers of sites or an index of site density.

between periods or regions, how would we know if these measures were reliable or whether they have been confounded by unaccounted for variables?

The most fundamental stumbling block in comparative work is the diversity of survey methodologies, and our ability to reconstruct them from remaining records (Kouchoukos 1999). The material required for this kind of work is metadata, or “data about the results” (Wise and Miller 1997). Metadata includes information related to field protocols such as field-walker spacing, artifact sampling strategies, and intensity of coverage (Witcher 2008). It also includes conceptual schema relating to how archaeologists use survey data to define the size of a site, its duration of occupation, the size of different chronological components, and the spatial configuration of sampled units in the landscape. Other important considerations include the relationship between on-site and off-site features, intensity of search procedures (i.e. “person-days” per square kilometer), representativeness of sampling, relative confidence of dating, problems of determining contemporaneous occupations, and the effect of geomorphology on preservation and visibility (Alcock and Cherry 2004: 5; Kindon 2002: 63-87; Kouchoukos 1999; Wilkinson, K. et al. 2006).

In some cases, this metadata will be explicitly presented in reports; in other cases, it will have to be built up through data characterization, or what Alcock terms “source criticism” (Alcock 1993: 49-53). Source criticism involves probing the records for traces of these field protocols and conceptual schema, or the processes by which units of archaeological significance were recognized and measured by the original surveyors. Source criticism is especially necessary when comparing multiple datasets, especially between those using more intensive and systematic methods and those whose approach was more extensive and less systematic (Alcock and Cherry 2004: 5). In the case of the latter, a flexible approach is needed to accommodate
different levels of precision and accuracy in the recording of geographic coordinates, as well as in the use of inconsistent or outdated terminologies. It is also important to strike a balance between preserving the complexity of the original data while at the same time introducing sufficient order so that the data can be re-used efficiently and effectively (Witcher 2008).

Source criticism using metadata, when present, and data characterization when not, helps us to avoid the problem of comparing apples to oranges and thereby arrive at understandings of the entanglement of past and present action insofar as each affect the distribution of archaeological materials we seek to analyze at a regional scale. This becomes even more important when we consider the needs of integrative research, when the objective is not only to compare surveys and their results, but to actually re-use their data in so-called “second generation analysis”. In other words, to get the most use out of this survey evidence, it must not simply be legible for comparison, but rather, be made available to and useable by scholars who weren’t involved in the original field research (Diacopoulos 2004: 59; see also Green 2018; Green and Petrie 2018; Lawrence 2012; McCoy 2018).

4.2.3 Legacy Data and Remote Survey

Virtual and remote survey refer to the systematic visual inspection of satellite imagery (Abu-Azizeh 2010; Ansart et al. 2016; Casana 2013; Franklin and Hammer 2018; Hritz 2010, 2014; Hritz and Pournelle 2015, 2016; Menze et al. 2006; Parcak 2009, 2019; Pournelle 2003, 2007; Thomas and Kidd 2017; Ur 2003). This method involves a kind of digitally mediated facsimile of pedestrian landscape survey, involving mapping the location and features of sites and monuments from a vertical perspective (Hanson and Oltean 2013). While under the best of circumstances, techniques of this kind would serve as merely the prelude to ground-truthing, field surveys, and excavations (e.g. Ansart et al. 2016: 699; Franklin and Boak 2019; Wilkinson, K. 253
et al. 2006: 749), this form of research is increasingly being deployed to analyze inaccessible landscapes, whether these are inaccessible due to conflict, remoteness, or geopolitical conditions (Franklin and Hammer 2018: 60; Myers 2010; Thomas et al. 2008; Thomas and Kidd 2017: 40; Ur 2006). The number of and valuable contributions made by such projects in the Middle East has notably increased in recent years as high-quality satellite imagery has become more accessible and as humanitarian and heritage crises have unfolded over the past decade (Al Quntar et al. 2015; Casana 2014; Casana and Panahipour 2014; Casana et al. 2017; Danti et al. 2017; Myers 2010; Stinson et al. 2016; Wilkinson, K. et al. 2006).

One of the aims of the present project is to demonstrate that virtual survey also has an important role to play in the process of legacy data integration and synthesis, especially in zones inaccessible to pedestrian survey. It is important to note, however, that the potential value of virtual surveys is highly dependent upon the landscape to be surveyed and the relative obtrusiveness of archaeological features of interest in that landscape (Beck and Philip 2013). In the case of landscapes of tells, such as the Gorgan Plain or in much of Northern Mesopotamia it has been clearly and repeatedly demonstrated that systematic visual inspection of satellite imagery, whether archival (e.g. CORONA) or commercial (e.g. QuickBird), is the most effective method of identifying both short and long-lived tell settlements (Beck et al. 2007; Beck and Philip 2013; Casana 2014; Wilkinson, T.J. et al. 2004; Wilkinson, K. et al. 2006; Ur 2003).

The types of imagery that can be used in remote and virtual survey vary considerably in their quality, geographic coverage, temporal range, ease of access/use, and cost. It should also be noted that multispectral imaging missions, such as LANDSAT, ASTER, and MODIS are of limited utility for visual inspection of this kind due to their relatively low resolution, though they
do have their uses for other purposes. For systematic visual site prospection, CORONA spy-satellite imagery has long been established as a valuable source, especially given its extensive geographic coverage and the fact that it serves as a witness for now-vanished archaeological landscapes in many parts of the world (Casana and Cothren 2013; Hanson and Oltean 2013; Ur 2003; Wilkinson, K. et al. 2006). In terms of contemporary imagery, there are numerous commercial and research-grade imagery sets suitable for site prospection, including QuickBird, DigitalGlobe, IKONOS, SPOT, and BuckEye, among others. As a general principle, the capacity for successful site prospection through systematic remote and virtual survey increases directly in proportion with the quantity and resolution of imagery used (Franklin and Hammer 2018: 60). However, it is also true that in many cases working only with freely available imagery and software (e.g. Google Earth, USGS Earth Explorer, CORONA, QGIS), archaeologists can easily conduct detailed and cost effective virtual remote surveys (Thomas and Kidd 2017: 39-40).

Much as in traditional on-the-ground survey, systematic remote site prospection is typically conducted by delineating bounded survey units and proceeding with an observation protocol within these zones. As in traditional survey, a given landscape may be sampled with representative subunits (e.g. Ansart et al. 2016) or may be subjected to full coverage (Franklin and Hammer 2018; Thomas and Kidd 2017; Casana 2014). There is no established consensus about standards and best practices for the size of such units, nor about intensity of inspection, but as in the discussion of legacy data and comparative survey, recording metadata related to these protocols is essential. Such metadata are crucial knowledge transfer tools that aid future

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52 For example, multispectral imaging has been used for automated detection to some success (e.g., Howey et al 2020), but it does have its detractors (Menze and Ur 2014; see Beck and Phillips 2013: 266-267; Wilkinson et al. 2006; cf. Casana 2014: 230-31, 2020).

53 Many of these sources of imagery are military-grade, or otherwise subject to restricted access for security purposes or due to prohibitive cost and complexity in their procurement (Hammer 2016; Parcak 2009).
researchers in understanding previous interpretations of sets of imagery and developing their own (Beck et al 2007: 174).

In the case of “full-coverage” remote survey, the use of an artificial grid superimposed over the study area has been recognized as a valuable research tool to enhance systematicity, whether at intervals of 1x1 km² (Franklin and Hammer 2018: 60) or 10x10 km² (Casana 2014: 228). The use of such grids segments the prospection operation into manageable chunks and makes it possible to track the “intensity” of the survey in a given grid square (i.e. the number of minutes spent visually inspecting the square prospecting for sites). Once sites have been identified and located, researchers should document all elements observable in the imagery, including principally but not limited to: a confidence ranking in the identification, classification and description of a standard set of morphological criteria (i.e. presence and shape of mounding, visible architecture, presence and severity of erosion, presence and severity of looting, off-site features), and to the extent possible measurements (e.g. the base area of a tell can be roughly approximated by drawing a polygon around the site in Google Earth and recording its extent in hectares) (Casana 2014: 224-228). It should be noted also that this recording protocol is just as useful for re-examining the results of legacy surveys as it is for the identification of new sites.

For all the potential that they have, remote and virtual survey have not been without their critics. Franklin and Hammer (2018: 71-72) recognize two of the most salient criticisms of remote survey as: 1) the lack of chronological control resulting in a flattened view of settlement history and land use; and 2) the method’s roots in a western cartographic perspective incompatible with how past peoples’ lived experience of the landscape. These drawbacks can be mitigated to an extent, for example through the use of multitemporal image sets (i.e. sets of
imagery from different years and different seasons) and by the judicious use of local historical sources where available rather than travelers’ accounts to aid interpretation of sites and monuments. Neither of these mitigation strategies will fully unflatten the archaeological palimpsest or overcome the emic-etic tension inherent in all anthropological and archaeological fieldwork, but there is no guarantee that traditional on-the-ground survey fully solves either of these problems in the first place (Franklin and Hammer 2018: 72). The upshot, however, is that remote survey can be used to document “small rural sites and previously overlooked marginal areas”, which may provide a basis to better understand how these places fit into regional communities (Franklin and Hammer 2018: 72).

Other methodological and interpretive concerns regarding remote survey concern the coverage and quality of imagery used (Kaimaris et al. 2011; Lasaponara and Masini 2006), as well as the differential potential for the detection of sites in varying geomorphological zones, vegetation regimes, and under the effect of varying taphonomic processes (Ansart et al. 2016: 704; Thomas and Kidd 2017: 37). Archaeological materials will manifest considerably differently depending on whether the geomorphological setting of the survey is an area of active alluviation, dune formation, or a relatively stable rocky plateau (Beck and Philip 2013: 273). Admittedly, this method tends to work best in relatively arid and vegetation-poor areas (Ansart et al. 2016), but as this dissertation will go some way toward demonstrating, this is not necessarily the case. Other factors that impact visibility of archaeological signatures include anthropogenic geoengineering, i.e. the creation of “signature landscapes” which can “overwrite” or partially mask previous landscapes (Alizadeh and Ur 2007; Wilkinson, T.J. 2003). Other factors that impact detection and interpretation include modern climate conditions, insofar as particular times of year afford better image quality or better prospection conditions,
but that these windows may or may not overlap (Beck and Philip 2013). All these factors notwithstanding, remote virtual survey – when conducted systematically and rigorously using the best imagery available by an engaged archaeologist who has a reasonably good understanding of the history of local settlement and land-use practices in the study area – is a proven method for detecting and documenting evidence of past cultural activities at a variety of scales (Casana 2014: 230-31).

4.3 Data Integration of the 3rd millennium in the Gorgan Plain

In this section I discuss two of the three primary empirical components of the data integration and recording procedure employed in this dissertation. First, I describe the methods used to digitize and restructure the legacy survey data, and second, I present the remote survey protocol used to engage in source criticism and data characterization and to prospect for new sites. The third component, i.e., the collections restudy program used to refine the regional ceramic chronology is described in greater detail in Chapter 5 and discussed again at length in Chapter 6. Throughout the discussion that follows, I lay out the procedures by which the various sources of data were integrated to facilitate the synthetic analysis to be presented in Chapter 7.

4.3.1 Construction of Databases to Model Gorgan Plain Surveys

The process of constructing a master database for the Gorgan Plain Survey data consisted of digitizing and formalizing each of the sources of survey data individually before integrating the information into a single data environment and “re-recording” the information for both quality control and augmentation of the original records. This procedure involved a number of concrete steps, using a combination of PostgreSQL, Microsoft Access, QGIS and Google Earth Pro to prepare the original records, transform them into an interoperable format,
link them to coordinate data, and systematically examine the reported site locations and attributes using QuickBird satellite imagery. While CORONA imagery is available for the region, I chose for the purposes of this study to restrict analysis to the QuickBird imagery; this was largely due to constraints of time and labor, in an ideal situation, both sources of imagery would have been used.

Each of the source surveys was first modeled individually in PostgreSQL. By “modeling” here I mean that a “map” of the data structure was devised and used to organize the relational table schema that would be used to store the information presented in the original surveys in a format that would facilitate their subsequent integration into a single information environment.

Figure 4.6 Abbasi Database Table Schema
It was necessary at first to keep the surveys separate from each other in order to enter the reported data itself and to retain the specificities and idiosyncrasies of the original sources. I used this strategy because when working with legacy survey data, especially in the context of digitizing old paper records, “the pressing issue [...] is not the attainment of accuracy, but the assessment and management of inaccuracy” (Kouchoukos 1999: 23; see also Brouwer-Burg 2017). By first reviewing the data structures of the original survey reports it was determined that several major categories of inaccuracy (and uncertainty) can be discerned in the data available at present: 1) inadequate description of surveyed sites, 2) uncertain chronological criteria, 3) inaccurate maps and conflicting site identifications, 4) difficulties with satellite imagery, 5) characterization of sites observed only in satellite imagery but not reported in previous surveys. The schema used to model these data was designed with mitigating these concerns in mind.

In short, this modeling procedure involved the creation of a separate database table schema for each survey, wherein the “flat” data structures inherent in the sources were transformed into “relational” data structures (Figure 4.5). The first step in this process involved studying the data structures of each of the sources and determining how each of the different types of information and observations presented in these sources were related to other observations. Fortunately, in all cases, the basic unit-entity was “the site,” meaning that a master table could be used to link all observations, information, and attributes stored in dependent tables to the unique record identifiers that correspond to individual sites.54 The next

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54 One problem, of course, is that in three of the sources a “single site” was reported where in fact the entity in question was a mound-group; in one of the sources, each individual mound in a mound-group was assigned a unique identifier and unique chronological information. A major area of work in the next phase of the study of regional settlement in the Gorgan will be to untangle the internal chronological relationships of these mound-groups and to perhaps re-record all individual mounds as unique entities.
step was to create additional tables for each of the sources to store all of this ancillary
information related to different categories of recorded attributes, e.g., physical measurements,
surface finds, taphonomic indicators, chronology, etc. After the creation of this relational table
structure, I populated each of these tables with the “reported” information from the sources.

Three additional elements were added to each of the survey models: 1) a table for recording
erosion observed either as reported in the original sources (e.g., Arne 1945, Shiomi 1974-76) or
via satellite imagery during the restudy protocol, 2) a table for recording “Lawrence Indices”
(measures of survey data quality and reliability, see Tables 4.4-4.9), and 3) a modification to all
of the site attribute tables to identify the source of the information, both to distinguish between
the information collected in the restudy procedure and in anticipation of the integration
procedure to come. This final piece is especially crucial for the process of integration described
below and also for the harmonization of chronological information to be discussed further in
Chapter 6.

Figure 4.7 Access Recording Form
Subsequently, I created “recording forms” in Microsoft Access to serve as a front-end client (Figure 4.7) for the PostgreSQL server that hosted the databases (Figure 4.6). These recording forms were then used to enter, normalize, and clean all the data as reported in the individual surveys. In practice, this meant taking the tabular data available from the paper sources and inputting it manually into the different fields of the form and indicating the source of this information. Additionally, all the source maps were scanned and georeferenced to be able to produce point-shapefiles of the site locations. Each of these points was assigned the database primary key of the site they represent; using the vector field calculator in QGIS, geographic coordinates were generated in Decimal Degrees for each of these site locations and imported into the database. Furthermore, these shapefiles were converted to keyhole markup language (.kml) format to be used in the recording protocol that took place in Google Earth Pro (see 4.3.2).

The main objective in modeling these data according to this procedure was to organize the table structure such that the unstructured data presented in the original publications could be normalized (i.e., all entities are unique and all table cells contain a single value) and cleaned (i.e., no redundancies, typos, or any other variances that would prevent efficient queries). This process made explicit the one-to-one, one-to-many, and many-to-many relationships between entities and their attributes inherent in the original data structures legible to a relational database system. For example, in some of the surveys, not all the sites were represented by unique identifiers (e.g., Arne 1945), whereas in others, an individual site might be represented by up to seven different unique identifiers (e.g., Abbasi 2011). This necessitated the imposition of a system of primary keys on some of these surveys (e.g., Abbasi 2011), but not on others, for whom each site identification code could unproblematically serve as a primary key (e.g., Shiomi
1974-1976, Mortezaei and Farhani 1387, Sauer et al. 2013). Thus, one of the main data structuring tasks consisted of resolving the unique identifier problem and identifying the invariant one-to-one properties of each entity, which was typically the primary key, a map ID, map symbol, name in either English or Farsi, miscellaneous observations, illustrations, and satellite images.

**Table 4.4: Reported Geographical Precision (adapted from Lawrence 2012: 53)**

<table>
<thead>
<tr>
<th>Class of Geographical Precision</th>
<th>Evidence</th>
</tr>
</thead>
</table>
| Definite                        | Multiple GPS points  
|                                 | GIS outline drawn in field |
| High                            | Single GPS point  
|                                 | Sites accurately drawn on well rectified topographic map |
| Medium                          | Rectified general sites map based on topographic map |
| Low                             | General sites sketch map only |
| Negligible                      | Text description only |

**Table 4.5: Reported Boundary Certainty (adapted from Lawrence 2012: 55)**

<table>
<thead>
<tr>
<th>Class of Boundary Certainty</th>
<th>Evidence</th>
</tr>
</thead>
</table>
| Definite                    | Multiple GPS points and Topographic Map  
|                             | Multiple GPS points and GIS outline drawn in the field  
|                             | Multiple GPS points and good quality sketch-map  
|                             | Multiple GPS points around outline of simple site shape |
| High                        | 2 or 3 GPS points and Topographic/Topographic-based map  
|                             | Topographic/Topographic-based map with sufficient information to georectify  
|                             | 2 or 3 GPS points and good quality sketch-map |
| Medium                      | Topographic/Topographic-based map  
|                             | Good quality sketch-map with dimensions |
| Low                         | Good quality sketch-map only  
|                             | Dimensions only  
|                             | Overall sites map suggests site sizes, no other information |
| Negligible                  | General area description only |
Table 4.6: Reported Archaeological Significance (adapted from Lawrence 2012: 64)

<table>
<thead>
<tr>
<th>Class of Archaeological Significance</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Clear mound and 2+ artifact types reported</td>
</tr>
<tr>
<td>Medium</td>
<td>Clear mound and 1 artifact type reported</td>
</tr>
<tr>
<td></td>
<td>No clear mound but 2+ artifact types reported</td>
</tr>
<tr>
<td>Low</td>
<td>Mound and no artifact types reported</td>
</tr>
<tr>
<td></td>
<td>No clear mound but 1 artifact type reported</td>
</tr>
<tr>
<td>Negligible</td>
<td>No evidence of mound and no artifacts</td>
</tr>
</tbody>
</table>

After all the reported information was entered into the tables through the Microsoft Access front-end client, I went through and examined each of the site-reports and assigned them “reported” Lawrence Indices, according to their index rating in terms of Boundary Certainty, Geographical Precision and Archaeological Significance (Lawrence et al. 2012: 354-355; Lawrence 2012). The first two indices capture the level of certainty in the spatial extent and location of the archaeological entity under examination, and the third assesses the degree to which the entity identified is of interest to archaeologists (Lawrence et al. 2012: 355). These indices were used to evaluate the reported information according to the following criteria (Tables 4.4-4.6).

For each site reported in the sources, I assigned a rating of high, medium, low, or negligible for each of the three categories. In some cases, there was variation within the sources, for example, with respect to Shiomi’s survey, some of the sites were plotted on a topographic map, with the boundaries clearly indicated via red ink, whereas in other cases, the site locations were reported by simple circles on a non-topographic map-space; consequently, different sites within these survey records received different Boundary Certainty ratings. In other cases, the ratings were uniform throughout the survey, as in the case of Mortezaei and Farhani, where all sites were reported with a single GPS-point location and consequently had
the same degree of Geographical Precision. These categories of data characterization are not only useful for comparing the accuracy, precision, and reliability of the sources, but also for examining the same characteristics of the satellite imagery protocol.

**Figure 4.8 Master Database Table Schema**

After each of the surveys was modeled individually and all of the data from the original sources was digitized and assigned “reported” status and the relevant Lawrence Indices were assigned for each of the sites, the databases were merged into a single “master” database, which assigned new unique identifiers to each site and converted all of the “reported” tags for site attribute-measurements to the name of the source which reported it. The biggest challenge in this step was to review the database manually and resolve any duplicate entries and
inconsistencies between sources regarding the same sites. This involved combing through the
database first using a toponymic query to identify sites with the same name, which were then
checked against the reported site locations in Google Earth to determine whether these
toponyms properly referred to the same site. If yes, then these records were combined in the
master database; this resulted in a large sample of sites for which multiple measurements from
multiple sources were available. I conducted a similar procedure using site coordinates to
identify cases in which a single site was recorded as multiple unique entities as the result of
having been reported in multiple sources, and continued this process until I was certain that all
redundancies had been removed and that the database represented a fully normalized dataset
where each unique identifier in the database referred to a unique site in the archaeological
record. See Electronic Supplementary Files for a version of the database itself and a readme.

4.3.2 Google Earth Survey Restudy Protocol

Even under the best of circumstances re-interpreting old field data is complicated by
challenges in reconstructing the methods by which sites were identified and documented
(Lawrence et al. 2012). In the case of the Gorgan Plain, not only is information on field
procedures sparse, but the documentation is also rather uneven, in the sense that many “sites”
are merely a reported location and a name. As discussed in 4.2.3, when primary field data are
lacking or piecemeal, it is possible to derive a great deal of information just from systematic
visual inspection of satellite imagery (Lawrence et al. 2012). This approach is of course, not
without its drawbacks as discussed above, but it is possible to use the already existing data
(toponyms, maps, coordinates, etc.) in conjunction with the satellite imagery to evaluate and
document reported site locations (e.g., Myers 2010).
The Gorgan Plain Survey Restudy protocol involved a systematic facsimile of pedestrian survey, through the imposition of a sampling grid over the study area. This sampling grid was produced in QGIS and the individual squares measured 10x10 km (total squares reviewed, \( n = 115 \)); much smaller sampling grids have become the norm in systematic remote site prospection in the time since I first implemented this protocol (e.g., Franklin and Hammer 2018). For each of the sampling grid squares, I first conducted a review of all reported site locations and recorded their attributes according to the protocol described below, before prospecting for new or previously unreported site locations and recording them according to the same procedure.

While in many cases, there will be a correspondence between reported information and features discernable in the imagery, or features identified in the imagery can be connected to reports, in others, sites will have been destroyed or obscured by land amelioration, changing hydrological regimes, urban expansion, and modern geoengineering of various kinds (e.g. highways, reservoirs, communications infrastructure). Additionally, there may be conflicts between the reported location and identification of sites, which must be systematically documented. The variation in these correspondences can also be recorded, analyzed and interpreted using the “Lawrence Indices” introduced above (Lawrence et al. 2012: 354).

I developed my protocol following closely from the example of the Fragile Crescent Project (FCP), for a number of reasons, not least of which is that it has been by far the most explicit remote survey publication project with respect to discussion of the methodology used (but see Casana 2014; Green and Petrie 2018; Franklin and Hammer 2018). Moreover, because the Gorgan Plain is a landscape of tells not dissimilar from the primary study areas covered by the FCP, this procedure seemed easily adaptable to my specific study context. Moreover, this manner of recording sites from satellite imagery provides us with a number of categories of
information that can be used to guide future research, insofar as “[b]y manipulating different levels of certainty we can begin an analysis of unvisited sites. Maps can be produced, indicating the likelihood of certain morphologies or particular densities of occupation/settlement to be found across the landscape” (Lawrence et al. 2012: 355). These maps can be used to reason about “empty” zones, patterns of site morphology and archaeological activity that deviate from those expected, and also extend the scope of our basic geographic understanding of vast regions in excess of what can be accomplished through traditional on-the-ground survey techniques.

**Figure 4.9 Google Earth Gorgan Plain Survey Restudy “Site-Visit” Recording Protocol**

1) “Revisiting” each reported site location and recording the following in the survey-specific databases

   a. Preliminary written observations
      i. Any unusual features
      ii. Double-check and cross-reference the source-specific primary keys for sites reported in multiple surveys to mitigate redundancies within the integrated database

   b. Site Morphology
      i. Shape (e.g., assignment of circle, circular, ellipse, square, irregular, complex)
      ii. Count of the number of mounds in close proximity to each other
      iii. Whether site has 4 corners or 3 corners
      iv. Whether the site is terraced (i.e. whether it has ‘fried-egg’ morphology; see Lawrence and Wilkinson 2015 for interpretation of high-mound/low-mound significance)
      v. Whether site is visibly fortified
      vi. Whether site is located within a present-day village, or perhaps partially/fully buried underneath
      vii. Whether site has been re-used as a graveyard

   c. Site Measurements
      i. Base Area (determined by drawing and measuring a polygon around its perimeter)
      ii. Elevation above Sea Level in meters (as reported by Google Earth)

   d. Erosion
      i. Category of Erosion (e.g. fluvial, plowing, excavation, modern structures, looting, roads)
i. Severity of Erosion (e.g. Severe, moderate, light)

   e. Lawrence Indices
      i. Assignment of the ratings for each category as in Tables 4.4-4.9

   f. Screenshot of site and its surroundings with the boundary polygon visible

2) Systematic site prospection of the sampling grid square for unreported sites

   a. Follow same steps as above (a-f)

I modified the Lawrence indices as follows to accommodate the “reported” versus “recorded” distinction. First, note that there are two tracks to follow within these tables. “Recorded” information could apply to my observations of previously reported sites or could apply to my observations of previously unreported sites. Therefore, distinct criteria are manifest in the assignment of Lawrence Index ratings within the categories. For example, with respect to Geographical Precision, a reported site would receive a rating of “high” if the reported GPS or map-point was within 100 meters of the actual site location; a recorded site (i.e., one only identified through satellite imagery analysis) would receive this rating by default if I was confident that it was actually an archaeological site. If I was not able to locate a reported site, it received a “negligible” recorded rating for each of the indices.

Table 4.7: Recorded Geographical Precision (adapted from Lawrence 2012: 53)

<table>
<thead>
<tr>
<th>Class of Geographical Precision</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Reported point on or within 100 m of site GSR ID positive</td>
</tr>
<tr>
<td>Medium</td>
<td>Reported point within 101-1000 m of site</td>
</tr>
<tr>
<td>Low</td>
<td>Reported point further than 1 km from site</td>
</tr>
<tr>
<td>Negligible</td>
<td>Site not located</td>
</tr>
</tbody>
</table>
Table 4.8: Recorded Boundary Certainty (adapted from Lawrence 2012: 66)

<table>
<thead>
<tr>
<th>Class of Boundary Certainty</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Clear site type – e.g. Tell Clear boundary Very similar on multiple satellite images</td>
</tr>
<tr>
<td>Medium</td>
<td>Fairly clear boundary Fairly similar on multiple satellite images</td>
</tr>
<tr>
<td>Low</td>
<td>Diffuse boundaries Different on images</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very diffuse Very different on different satellite images Site not located</td>
</tr>
</tbody>
</table>

Table 4.9: Recorded Archaeological Significance (Lawrence 2012: 64)

<table>
<thead>
<tr>
<th>Class of Archaeological Significance</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Type site clearly visible in all satellite images +/- “Reported” = high/medium</td>
</tr>
<tr>
<td>Medium</td>
<td>Clear anomaly in all satellite images Crosses field boundaries +/- “Reported” = low</td>
</tr>
<tr>
<td>Low</td>
<td>Disturbance follows field boundaries, but less visible</td>
</tr>
<tr>
<td>Negligible</td>
<td>Not located or probably not a site</td>
</tr>
</tbody>
</table>

As a result of following this protocol, I was able to build an information environment that featured a harmonized record collating five sources of legacy data with satellite imagery and which provided a range of variables to be analyzed through Exploratory Data Analysis techniques. Indeed, as we will see in Chapter 6, a great deal can be said about settlement patterns in a given region just based upon simple visualizations of the intersection of the categories of evidence as recorded according to the procedure presented in Figure 4.9. While there are still a number of outstanding problems to resolve, namely the mound-group issue introduced above, the method described in this section has produced a robust dataset that can continue to afford a variety of analyses and the identification of new patterns to be pursued in greater detail in future studies.
4.4 The affordances and limitations of working with legacy data

In this chapter, I have discussed the methods that I will deploy in Chapters 5 through 7 to reconstruct the empirical record of settlement in the Gorgan Plain from the Late Chalcolithic through the end of the Bronze Age and how I will produce the territorial-organization models that can be compared to Tosi’s predictions. The principal interventions I have made in this chapter pertain as directly as possible to this objective. In each of the analytical domains of activity described above (e.g., Exploratory Data Analysis, Territorial Modeling, Rank-Size Analysis, Regional Comparative Survey, Data Integration, Virtual Remote Survey). More sophisticated methods could have been deployed in each case, but I argue that a deeper and more substantive methodological contribution to any one of these domains could be the subject of its own dissertation, and that given that this is not my primary aim, I chose to reduce the scope of potential analytical and computational complexity at every turn.

Naturally, such a rhetorical move leaves this overall methodology open to critique from a number of angles, particularly with respect to territorial modeling, rank-size analysis, and the virtual survey protocol. While I welcome such dialog, I argue that any deficiencies in one domain are more than made up for the harmony that has been achieved by their action in concert. Moreover, the most lasting contribution here is the concrete steps taken toward the construction of an integrated geospatial database for the prehistoric settlement record of the Gorgan Plain, which is flexible enough to be continually added to, augmented, restructured and worked over in the future. Indeed, this represents a major area to continue developing our understanding of regional processes in Bronze Age Iran more generally. As long as access to the field continues to be restricted, this kind of integrative and synthetic research, combining the study of legacy survey and excavation monographs, their associated collections, and satellite
imagery represent one of the best chances we currently have to expand our knowledge base of the archaeology of Iran.

I hope that work can continue on the database constructed for this dissertation and that it might inspire researchers to undertake similar projects in other parts of Iran which have also been surveyed multiple times over the past 150 years but have similarly not been the subject of rigorous descriptive examination or systematic spatial analysis. More broadly, the intervention I have pursued here draws upon and contributes to the burgeoning field of legacy data studies in archaeology (e.g., Allen and Ford 2019). In this age of the “curation crisis” (Childs 1995; Kersel 2015) and given the shrinking horizon of archaeological discovery (e.g., Surovell et al. 2017), methods such as those discussed in sections 4.2 and 4.3 above will become increasingly important in pushing the field forward. Indeed, I argue that such approaches to archaeological projects have already become and will continue to be increasingly important ethical imperatives for the future of the discipline (see Bauer-Klapp and Kirakosian 2017).
CHAPTER 5. REGIONAL CERAMIC CHRONOLOGY OF THE GORGAN PLAIN CA. 3200-1600 BCE

One of the central problems in the archaeology of the Gorgan Plain is the lack of a coherent and agreed upon regional chronology for the pre-Iron Age periods (Abbasi 2011, 2016; Deshayes 1967, 1969b; Shahmirzadi 2004; Tala’i 2006). Regardless of which account is considered, the Chalcolithic and Bronze Age sequence of the Gorgan Plain is anchored in the stratigraphy of Tureng Tepe, spanning the interval between Tureng IC and Tureng IIIIC2. Significant aporias remain in our understanding of this sequence, however, due to the fact that the Wulsin excavations were not stratigraphically controlled and because the results of the Deshayes excavations remain underreported (cf. Bessenay-Prolonge forthcoming; Martinez 1990). Furthermore, because Tureng Tepe is the only excavated site in the region that features a column of radiocarbon dates that can be used to construct an internally consistent absolute chronology, much of the work to be done in resolving chronological lacunae and inconsistencies must focus on parallels in material culture between sites. For this and other reasons, Tepe Hissar has long been used as a chronological anchor for the relative chronology of the region and the pivot to understand the Gorgan Plain’s interregional connections over time. As a result of these factors, there has been no systematic or authoritative regional synthesis of the prehistoric chronology of the Gorgan Plain, impeding attempts to understand the distribution of settlements during any given period.

Complicating matters further, the surveys of the region present chronological information in diverse and at times incommensurate fashions. One source in particular represents a significant challenge (Abbasi 2011). On the one hand, Abbasi’s site gazetteer is the most comprehensive record of regional-scale site chronologies; on the other hand, it only
provides dates for sites according to the Three-Age System (i.e., Chalcolithic, Early Bronze, Middle Bronze, Late Bronze, Iron I, etc.). Furthermore, Abbasi’s gazetteer chronology diverges from the other sources in how it correlates these eras to strata at Tureng Tepe, as well as from Abbasi’s own later publication (e.g., Abbasi 2016). In addition, each of the other sources of survey data has its own particularities with respect to the quality and reliability of its reported chronological information as well (e.g., Arne 1945; Mortezaei and Farhani 2008; Sauer et al. 2013; Shiomi 1976, 1978). Out of these five sources, only Arne’s collection of surface pottery was available for restudy; unfortunately, this source turned out to be less useful than anticipated for two reasons: (1) the sample of survey pottery was smaller and less diagnostic than expected and (2) the excavated material from Shah Tepe created more chronological problems than it resolved.

Thus, the regional settlement chronology of the Gorgan Plain must be parsed from patchy and overall low-quality data. The primary objective of this chapter therefore is to extract the maximum volume of chronological data from the extant sources and to evaluate the reliability of this reported information (Abbasi 2011: 239-241; Arne 1945: 306-323; Mortezaei and Farhani 2008: 181-184; Sauer et al. 2013: 102-121; Shiomi 1976, 1978). This requires asking several interrelated questions: First, how does Abbasi define the key culture-historical periods in terms of their correlation to specific cultural strata at excavated sites? Second, how does Abbasi’s chronology differ from the other sources? Third, can we confidently correlate diagnostic ceramic types with specific strata, and thus culture-historical periods? And fourth, can this information be used to date surface ceramics?

The procedure designed to answer these questions involves several steps. The first step introduces the reported chronological categories through the assessment first of the
chronologies used in Abbasi’s gazetteer and Arne’s monograph (5.1). This provides the baseline for linking the survey data to chronologies based on excavated material. The second step evaluates these reported linkages between the eras (e.g., Early Bronze Age) and culture-historical strata (e.g., Tureng IIIB) with reference diagnostic ceramic parallels – primarily between categories of whole vessels from burial contexts – to check whether these linkages are valid (5.2). The third step examines reported information that correlates the eras and strata to ranges of calendrical absolute dates. This reported information is then compared to the results of a Bayesian radiocarbon model based on samples reported by Deshayes (5.3). The fourth and final step clarifies the knowns and unknowns of the comparative stratigraphy of the region and relates these back to the two surveys that provide the bulk of the regional-scale chronological information (5.4).

5.1 Understanding the two primary sources of survey chronology data

Out of these five sources of survey data, two provide the bulk of the source material for analysis, as they present both excavation and survey data which can be used to link the stratigraphy of key excavated sites to those dated only by surface ceramics (Abbasi 2011; Arne 1945). Due to the unorthodox nature of data presentation and argumentation in both sources, great care is required in their interpretation. In the case of Abbasi’s site gazetteer (Abbasi 2011: 199-238), it appears in the same volume as a site report for salvage excavations at the site of Narges Tappeh, whose stratigraphy is used to anchor the pre-Iron Age chronology of the region (Abbasi 2011: 61). Unfortunately, the stratigraphy of Narges Tappeh is not directly or explicitly tied to the chronological categories used in the site gazetteer, though it can be reasonably inferred that the schema being used are the same; that is, what Abbasi refers to as Early Bronze Age (e.g. Narges IIIc/Tureng IIA-IIB) in the excavation report is what is consistently identified as
Early Bronze Age in the gazetteer and so forth. Such an assumption may not be advisable, however, because there are some notable differences between the site-gazetteer chronology (Abbasi 2011) and the later regional digest (Abbasi 2016), to be discussed in greater detail below. At any rate, the four periods under consideration here are the Late Chalcolithic, Early Bronze Age, Middle Bronze Age, and Late Bronze Age.

First and foremost, it should be noted that Abbasi’s site gazetteer does not subdivide the Chalcolithic into Early, Middle, or Late phases at the regional level; instead, the map and table that present site-data related to this period are simply labeled “Chalcolithic.” This is a major problem which must be addressed in future research, but about which little can be done at present. In any case, Abbasi most often assigns Narges IV to the Late Chalcolithic (e.g., 2011: 63, 239), though in some diagrams, Narges IIIc is assigned to the Late Chalcolithic with Narges IV assigned to the Middle Chalcolithic (Table 5.1b). The diagnostic Narges IV pottery types are Painted Buff and Painted Red Wares with a small amount of Plain Grey Wares of the Shah III, Tureng I-IIA, Sialk III and Hissar IC-IIA types (2011: 61). In a later publication, Abbasi designates the Late Chalcolithic as Tureng IC (2016), whereas Kohl (1984) designates it as Tureng IIB. Kohl and Abbasi both designate Shah III as Late Chalcolithic.

Abbasi designates Narges IIIc as the Early Bronze Age (2011: 22, 71), and equates it with Shah III and Tureng IIA-IIB, on the basis of the period’s diagnostic ceramics: Caspian Black on Red Painted Ware of the Aq Tappeh II type and Early Burnished Grey Ware of the Tureng IIB type (Abbasi 2011: 77-80). As we have seen, on the basis of material culture parallels, Narges IIIc

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55 It should be noted that this is a suspect identification of a diagnostic ware class. Caspian Black on Red Ware differs considerably from the black-on-red painted wares of the Aq II type (Shahmirzadi and Nokandeh 2001). Caspian Black on Red Ware is a mineral-tempered ware with slipped and burnished external surfaces and Aq II Black on Red Ware is a chaff-tempered ware whose only surface treatment is the black painted decorations.
correlates to both Tureng IIA and IIB as well as Shah III and the earliest part of Shah III-II. Kohl’s assessment of the Early Bronze Age at Tureng diverges from Abbasi, insofar as Kohl assigns Tureng IIIA-IIIB to the Early Bronze Age. Kohl and Abbasi also differ on what should be considered Early Bronze Age at Shah Tepe, with Kohl assigning it to the III-IIb period, compared to Abbasi’s equation of the Early Bronze Age with Shah III.

Table 5.1a Abbasi’s Gorgan Plain Chronology Inferred from narrative description (2011)

<table>
<thead>
<tr>
<th>Period</th>
<th>Narges Tepe</th>
<th>Tureng Tepe</th>
<th>Shah Tepe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Bronze</td>
<td>IIIa</td>
<td>IIIIC₂</td>
<td>IIa¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IIIIC₁</td>
<td>IIa²</td>
</tr>
<tr>
<td>Middle Bronze</td>
<td>IIIb₁</td>
<td>IIIB</td>
<td>IIIb(-IIa²?)</td>
</tr>
<tr>
<td></td>
<td>IIIb₂</td>
<td>IIIA</td>
<td>IIb</td>
</tr>
<tr>
<td>Early Bronze</td>
<td>IIIc</td>
<td>IIb</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IIIB</td>
<td>IIIb₁</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IIIA</td>
<td>IIIb₂</td>
</tr>
<tr>
<td>Chalcolithic</td>
<td>IV</td>
<td>IC</td>
<td></td>
</tr>
<tr>
<td>Chalcolithic</td>
<td></td>
<td>IB</td>
<td></td>
</tr>
<tr>
<td>Chalcolithic</td>
<td></td>
<td>IA</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.1b Abbasi’s Gorgan Plain Chronogram (2016)

<table>
<thead>
<tr>
<th>Period</th>
<th>Tureng Tepe</th>
<th>Shah Tepe</th>
<th>Narges Tepe</th>
<th>Yarim Tepe</th>
<th>Aq Tepe</th>
<th>Bazgir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Bronze</td>
<td>IIIIC₂</td>
<td>IIa²</td>
<td>IIIa</td>
<td></td>
<td>IVA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IIIIC₁</td>
<td>IIa²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle Bronze</td>
<td>IIIB</td>
<td>IIb</td>
<td>IIIb₁</td>
<td>III</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IIIA</td>
<td></td>
<td>IIIb₂</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Bronze</td>
<td>IIb</td>
<td>III</td>
<td>IIIc</td>
<td>II</td>
<td>IVB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late Chalcolithic</td>
<td>IC</td>
<td></td>
<td>IIIc?/IV?</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle Chalcolithic</td>
<td>IB</td>
<td>IV?</td>
<td></td>
<td>II-I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Chalcolithic</td>
<td>IA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceramic Neolithic</td>
<td>IA</td>
<td></td>
<td></td>
<td>I</td>
<td>III</td>
<td></td>
</tr>
</tbody>
</table>

Abbasi equates Narges IIIb to the Middle Bronze Age (2011: 22) but divides the period into two phases. He correlates the earlier phase (IIIb₂) with Shah IIb (Abbasi 2011: 124) and the later phase (IIIb₁) with Shah IIa, presumably IIa² (Abbasi 2011: 106). While Abbasi and Kohl differ
over their assignment of the Middle Bronze Age at Tureng Tepe (i.e., IIIA-IIIB versus IIIC\textsubscript{1}
respectively), both agree that the Middle Bronze Age at Shah Tepe is period IIb.

Lastly, in terms of the Late Bronze Age, Abbasi considers this period to be Narges IIIa
(2011: 22, 129), though curiously he specifically says that it is just the beginning of the Late
Bronze Age. He equates Narges IIIa to Hissar IIIC, Namazga VI (2011: 22), and Shah IIa\textsuperscript{1} (Abbasi
2011: 241). Later, Abbasi more specifically equates Tureng IIIC\textsubscript{1} and Shah IIa\textsuperscript{2} with each other
and with Narges IIIa (Abbasi 2016: 225).

Thus, there are two notable inconsistencies in the relative chronological position of
strata between the key sites with negative implications for the internal coherence of the survey
chronology. The first inconsistency regards the relationship between the Late Chalcolithic and
Early Bronze Ages with respect to Tureng IC-IIIA, Narges IV-IIIC, and Shah III-III/IIb, and the
second concerns the Middle-Late Bronze Age transition relative to the strata of Tureng IIIB-IIIC\textsubscript{2},
Narges IIIb-IIIa, and Shah IIb-IIa\textsuperscript{1}.

Table 5.2 Arne Chronogram (Adapted from 1945)\textsuperscript{56}

<table>
<thead>
<tr>
<th>Dates (BCE)</th>
<th>Shah</th>
<th>Hissar</th>
<th>Tureng (Wulsin Mound C)\textsuperscript{*}</th>
<th>Tureng (Olson and Thornton 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-1800</td>
<td>IIa\textsuperscript{1}</td>
<td>IIIC</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>2300-2000</td>
<td>IIa\textsuperscript{2}</td>
<td>IIIC</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>(IIb-IIa\textsuperscript{2})</td>
<td>IIIB/IIIC?</td>
<td>102-106m (upper)</td>
<td>IIIB-IIIC transition graves</td>
<td>104.5-106m</td>
</tr>
<tr>
<td>29/2800-2300</td>
<td>IIb</td>
<td>IIIA-IIIB\textsuperscript{*}</td>
<td>102-106m (lower)</td>
<td>IIIB graves</td>
</tr>
<tr>
<td>III-IIb</td>
<td>IIIB?-IIIA</td>
<td>98-102m</td>
<td>IIIA graves?</td>
<td>98-102m</td>
</tr>
<tr>
<td>3200-29/2800</td>
<td>III</td>
<td>IIIA?-IIIB\textsuperscript{*}</td>
<td>96-98m?</td>
<td>IIIB graves</td>
</tr>
<tr>
<td>III</td>
<td>IC\textsuperscript{*}</td>
<td>96-98m\textsuperscript{*}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Turning to Arne’s monograph (1945), this source also presents extensive discussion of
the regional chronology of Northeastern Iran and the surrounding areas in relation to the

\textsuperscript{56} *= confident identification (by Arne)
? = underspecified or rated as possible/maybe/probable (by Arne)
+ = Arne’s identification
successive strata of Shah Tepe, with particular reference to Tureng Tepe (Wulsin 1932) and Tepe Hissar (Schmidt 1933, 1937). Unfortunately, one of the cultural strata at Shah Tepe (e.g., the “Ill-IIb transition”) may be more an artifact of the excavation method than a reality (Childe 1946: 196), and the survey chronology (e.g., Arne 1945: 21-22) is not explicitly tied to either the stratigraphy of Shah Tepe or to Arne’s understanding of the region’s chronology (e.g., Arne 1945: 306-312).

Moreover, the chronological information contained in the survey records relating to Arne’s work – both published and unpublished – is woefully underspecified. In the case of the monograph’s presentation of survey data, salient chronological information is most often lacking, and when present, is not terribly determinative: periods are mostly described as being present at \( n \) number of sites, but the list of those sites is not given (see Arne 1945: 12-20). As regards the unpublished collections, the surface ceramics are largely, but not exclusively, non-diagnostic body sherds. Nevertheless, certain judgements can be made on the basis of the available information, and this chapter goes some way toward explicating the reasoning underpinning these chronological assignments.

Thus, the two primary sources of chronological data are difficult to link with each other for two reasons. First, they are not internally consistent, and second, they rely on distinct modes of chronological reasoning, terminology, and presentation of data, which complicates easy or direct comparison between them. Together, both problems represent a major obstacle to regional synthesis, but fortunately they can be resolved with recourse to the data itself.

5.2 Determination of the Relative Position of Cultural Strata at Key Sites

The relative chronology of Northeastern Iran has been a focus for many scholars, especially with regard to how this chronology relates to neighboring regions. For many but not
all periods, however, little progress has been made in determining specific strata-to-strata relationships between sites within the Gorgan Plain, much less beyond, due to the lack of adequate contextual reporting and confusion over diagnostic markers of certain phases at key sites (Schmidt 1937; Arne 1945; Cleuziou 1986, 1991; Deshayes 1968, 1969a, 1969b; Dyson 1968a, Dyson 1968b; Voigt and Dyson 1992; Khlopin 1986, 1997, 2002; Kohl 1984, 2007; cf. Gürsan-Salzmann 2016; Thornton et al. 2013; Thornton 2013; Olson and Thornton 2019).

In recent years, increasingly sophisticated methods have been devised for constructing regional chronologies in archaeology (e.g., Buck and Sahu 2000; Peeples and Schachner 2012). When dealing with legacy data, however, additional preparatory work must be accomplished before more complex matters may be addressed through statistical modeling via correspondence tables, battleship curves, and other related seriation techniques. In what follows, I discuss how I evaluated the state of scholarship on the regional chronology of the Gorgan Plain via compilation and comparison of published chronograms before proceeding to an analysis of parallels.

5.2.1 Chronograms

The published chronograms afford chronological analysis on the basis of several salient types of data, including: in-text narrative or chronogrammatic assignments of equivalency between site-specific cultural strata between two or more sites (e.g., Tureng IIB = Shah III = Narges IIIc), assignments of site-specific cultural strata to absolute dates in either centuries (e.g., 3000-2500 BCE) or millennia (e.g. Late 4th millennium), and assignments of site-specific cultural strata (e.g., Tureng IIIB, Shah IIb, etc.) to the “era” system (e.g. Late Chalcolithic or Early Bronze
The chronograms can be divided into several categories based on the types of information they provide:

**Category 1:** Era System, Absolute Dates (Centuries), and Cultural Strata Equivalences


**Category 2:** Absolute Dates (Centuries) and Cultural Strata Equivalences (Arne 1945; Dyson 1968b, Dyson and Voigt 1992, Gürsan-Salzmann 2016, Luneau 2014, Thornton 2009, Dyson 1970)

**Category 3:** Absolute Dates (Millennia) and Cultural Strata Equivalences (Ohtsu et al. 2010, Orsaria 1995)

**Category 4:** Cultural Strata Equivalences Only (Deshayes 1973, Martinez 1990)

From a relative chronological point of view, the three most important excavated Chalcolithic-Bronze Age sites in the Gorgan Plain are Tureng Tepe, Shah Tepe and Narges Tepe, as each of these three sites spans the interval from the Late Chalcolithic to the Late Bronze Age (purportedly) without interruption. Eight of the fifteen chronograms used in this analysis explicitly link strata at Tureng Tepe to strata at Shah Tepe, and two chronograms link Tureng to Shah to Narges (Table 5.3).

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57 Generally referred to as the “Three-Age System,” a problematic term criticized for its unsound epochalism, reductionism and Eurocentric bias (Kristiansen and Rowlands 2005; Rowley-Conwy 2007). For better or for worse, this tradition of criticism is not widely found in Iranian archaeology; consequently, Three-Age System terminology is prevalent and unquestioned in Persian-language scholarship. It should be borne in mind that the point of the Three-Age system was originally devised to facilitate systematic comparison across vast geographies, particularly in Europe and in the Middle East. Despite this, the key thing to recognize here is that there is no reason to believe that what equals the Early Bronze Age in the Gorgan should be the relative or absolute equivalent of the Early Bronze Age in neighboring or distant regions. This framework has been retained here only – and it is crucially to state only – to afford the harmonization of the different accounts of this region’s own internal chronology.
Table 5.3 Three-Age System Correlated to Key Gorgan Plain Sites

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>LBA</td>
<td>IIIC₂</td>
<td>Ila¹</td>
<td>Ila²</td>
<td>IIIa</td>
<td>IIIa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LBA</td>
<td>IIIC₁</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBA</td>
<td>IIIB</td>
<td>IIc₁</td>
<td></td>
<td>IIIb</td>
<td>IIIb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBA</td>
<td>IIIA</td>
<td>IIc</td>
<td></td>
<td>IIIb</td>
<td>IIIb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBA</td>
<td>IIB</td>
<td>III</td>
<td>III-IIb</td>
<td>IIIc</td>
<td>IIIc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBA</td>
<td>IIA</td>
<td>IIIA-B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCA</td>
<td>IC</td>
<td>III</td>
<td>III</td>
<td>IV</td>
<td>IIIc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA</td>
<td>IIB</td>
<td></td>
<td></td>
<td></td>
<td>IIIC-IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECA</td>
<td>IA</td>
<td></td>
<td></td>
<td>IV</td>
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</tr>
</tbody>
</table>

Despite the importance of these three sites, the relative positions of certain key prehistoric strata remain disputed. For the purpose of aligning the different proposed linkages between the strata at Tureng Tepe and Shah Tepe, I used the chronogram from Abbasi (2016) as the key to arrange the other chronograms for comparison, as it presents the longest set of correlations between the two sites, and also links both Tureng and Shah to the sequence at Narges Tepe (Table 5.4). On this basis, the following conclusions can be drawn: (1) Tureng IIIA-IIIB, Shah IIb, and Narges IIIb are synchronous with each other—all of the sources except for Kohl agree on the equation of Tureng IIIA-IIIB with Shah IIb, though Arne suggests Tureng IIIA may instead correspond to Shah III-IIb (Table 5.4); and (2) Tureng IC, Shah III, and Narges IV are synchronous. All other periods have major discrepancies that require resolution; the links between the strata of Shah Tepe and those of other sites are the least agreed upon and require the most attention.

58 Though as we will see, the position of Narges IIIb requires substantial revision (5.2.2).
Table 5.4 Correlating Abbasi’s Tureng-Shah Linkages to Shah Tepe

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tureng</td>
<td>Narges</td>
<td>Shah</td>
<td>Shah</td>
<td>Shah</td>
<td>Shah</td>
<td>Shah</td>
<td>Shah</td>
<td>Shah</td>
<td>LBA</td>
</tr>
<tr>
<td>IIIc2</td>
<td>IIIa</td>
<td>IIa1</td>
<td>IIIb</td>
<td>IIa</td>
<td>IIa</td>
<td>IIa2-IIa1</td>
<td>EBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIc1</td>
<td>IIa1</td>
<td>IIb</td>
<td>IIa</td>
<td>IIa</td>
<td>IIa2-IIa1</td>
<td>EBA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIb</td>
<td>IIIb</td>
<td>IIb</td>
<td>III-IIb</td>
<td>IIb</td>
<td>IIb</td>
<td></td>
<td>LCA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIA</td>
<td>IIIb</td>
<td>IIb</td>
<td>III-IIb</td>
<td>IIb</td>
<td>III-IIb</td>
<td>Major Discrepancies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIB</td>
<td>IIIb</td>
<td>IIIII</td>
<td>III-IIb</td>
<td>IIb</td>
<td>III-IIb</td>
<td>Minor Discrepancies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIA</td>
<td>IIIb</td>
<td>III</td>
<td>III-IIb</td>
<td>IIb</td>
<td>III-IIb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIC</td>
<td>IV</td>
<td>III</td>
<td>III-IIb?</td>
<td>III</td>
<td>III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIB</td>
<td>(III?)</td>
<td>(III?)</td>
<td>III-IIb?</td>
<td>III</td>
<td>III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>(III?)</td>
<td>(III?)</td>
<td>(III?)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The main outstanding issues to resolve in terms of the relative chronological positioning of the cultural strata between these three key sites are:

Question 1) What is the correct relative positioning of Shah III?

Question 2) What phases at other sites are equivalent to Shah III-IIb?

Question 3) What is the relationship between Shah IIa1 and Tureng IIIc1-2?

Resolution of these discrepancies is important for our ability to make sense of the reported chronological information from the legacy surveys, because the primary source of survey chronology data only provides dates for sites in terms of eras, e.g., Late Chalcolithic or Early Bronze Age (Abbasi 2011). There is some confusion as to what these eras correspond to in terms of cultural strata because Abbasi’s designations diverge from most of the other accounts. Correlating the cultural strata of the key Gorgan Plain sites to the correct eras from the Late Chalcolithic through the Late Bronze Age is therefore of the utmost importance to: (1) be able to
identify what was meant by these chronological periods used in the legacy surveys in culture historical terms; (2) to be able to assign surveyed sites correctly to their cultural strata based on diagnostic surface pottery; and (3) to be able to harmonize the reported (i.e., published) and recorded (i.e., collections-based) chronological information.

The following section begins this analysis with examination of both reported (i.e., explicitly stated in the sources) and newly recorded (i.e., by the author) parallels between diagnostic ceramic types from Tureng Tepe, Shah Tepe, and Narges Tappeh.

5.2.2 Parallels

As discussed above, several important questions must be addressed. With respect to Question 1, Arne (1945: 311) argues that while Shah III has “points of contact” with both Hissar IIA-IIB (i.e., Tureng IIA-IIB), the strongest connection is between Shah III and Hissar IC (i.e., Wulsin’s Mound C 96-98m, see Table 5.2). Abbasi (2016) equates Shah III to Tureng IC-IIB, and possibly earlier. Kohl (1984) equates Shah III to only Tureng IIB. Gürsan-Salzmann (2016) equates Shah III to only the beginning of Tureng IIB. Martinez (1990) equates Shah III to Tureng IC and possibly earlier. Ohtsu et al. (2010) equate Shah III to only early Tureng IIA. Orsaria (1995) and Deshayes (1970) equate Shah III to only late Tureng IIA. This range of proposed equivalencies means that Shah III likely overlaps with both Narges IV and Narges IIIc (Abbasi 2016). Question 1 can be more fully restated as follows: does Shah III begin during Tureng IB, does Shah III begin during Tureng IC, does Shah III encompass all of Tureng IIA or only late Tureng IIA, does Shah III end at the end of Tureng IIA, or does Shah III continue into Tureng IIB, or even longer? What marks the transition from Shah III into Shah III-IIB?

Concerning Question 2, Arne asserts that Shah III-IIB is equivalent to Hissar IIB (Arne 1945: 307) and also to Tureng Tepe Mound C, 98-102m, e.g., IIIA graves (Arne 1945: 310).
Martinez’s chronogram (1990) posits that Shah III-IIb begins as early as the beginning of Tureng IIA (Martinez 1990). Ohtsu places Shah III-IIb’s beginning in the middle of Tureng IIA (Ohtsu et al. 2010). Orsaria’s chronogram maintains that Shah III-IIb is entirely equivalent to Tureng IIB (Orsaria 1995). Most recently, Gürsan-Salzmann has proposed that Shah III-IIb begins during the middle of Tureng IIB (2016). Lastly, Kohl’s chronogram positions Shah III-IIb as overlapping with even Tureng IIIB (1984). To summarize and relate the foregoing to the present analysis: all of these proposals, except for Kohl’s, put Shah III-IIb squarely within Narges IIIc, despite the fact that Abbasi does not specify Shah III-IIb in his 2016 chronogram (Table 5.2). The primary discrepancy to be resolved is: to what degree does Shah III-IIb overlap with either Tureng IIA, IIB, or both, and whether it overlaps at all with Tureng IIIA-IIIB.

Lastly, in terms of Question 3, the discrepancies to be resolved between the sources are: does Tureng IIIC2 only equate to Shah IIa1, does Shah IIa2 overlap with Tureng IIIC2 to any extent, and do both Shah IIa2 and IIa1 relate to Tureng IIIC1 only. It seems unlikely, though cannot be ruled out, that Tureng IIIC1 may also overlap with Shah IIb, as Kohl proposes.59 Furthermore, the precise ceramic connections between these phases at Tureng and Shah with Narges IIIa must also be specified.

In the following analysis, parallels are drawn primarily between whole vessel classes.60 The extant literature does not adhere to anything resembling a type-variety system or any coherent taxonomic method, instead freely blending ware types with vessel classes and using decoration styles to stand in metonymically for both vessel classes and ware types (e.g., so-called “Burnished Grey Ware”). Thus, I have done my best to preserve the categories used in the

59 This may be the result of Kohl working from a small sample size. As Deshayes (1969) convincingly lays out, there are several diagnostic types at Tureng Tepe that span from IIIB through IIIC1, whose parallels at Shah may have caused some confusion.

60 See Electronic Supplementary File “chapter_5_ceramics_typology.xlsx”
literature, introducing new terminology only where necessary to distinguish between categories that previously have been lumped, but which should have been split. Indeed, a proper ceramic typology based on systematic and conventional forms of ceramic analysis would represent a major step forward in this field.

5.2.2.1 What is the correct relative positioning of Shah III? (Question 1)

Abbasi equates Shah III with Narges IV and Tureng IC (2016: 15). Analysis of the published examples of Narges IV pottery shows that this period best correlates to early Shah III and Tureng I, on the basis of the Black/Brown on Buff Painted Wares and the Aq II Painted Red Wares (which are not to be confused with the later Caspian Black on Red Wares).61 This period is only partially known, however, due to the small exposures at each site, a situation resulting from both the overburden of following periods as well as the high water table preventing further excavation.

Table 5.5 Shah III Parallels

<table>
<thead>
<tr>
<th>Shah</th>
<th>Narges</th>
<th>Tureng</th>
<th>Type</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>IV</td>
<td></td>
<td>Aq II-type Black-on-Red painted wares</td>
<td>5.1</td>
</tr>
<tr>
<td>III</td>
<td>IV</td>
<td>I-IIA</td>
<td>Black/Brown-on-Buff painted wares</td>
<td>5.1</td>
</tr>
<tr>
<td>III</td>
<td>IIIc</td>
<td></td>
<td>Bowls, globular/hemispherical with or without carination, plainrim</td>
<td>5.2 (5-8)</td>
</tr>
<tr>
<td>III</td>
<td>IIIc</td>
<td></td>
<td>Bowls, carinated, everted or outturned rim</td>
<td>5.2 (1-4)</td>
</tr>
<tr>
<td>III-I Ib</td>
<td>IV-IIc</td>
<td>IIA-IIB?</td>
<td>Caspian Black-on-Red painted ware62</td>
<td>5.3 (2-4)</td>
</tr>
</tbody>
</table>

---

61 Though there does appear to be at least one Caspian Black on Red Ware sherd in the Narges IV assemblage (Abbasi 2011: 69, Fig. 15[5]), but more sherds of this type are clearly found in Narges IIIc (Abbasi 2011: 78, Fig. 38).

62 Thornton and colleagues put Caspian Black on Red Ware first appearing during the E-D transitional phase at Hissar and continuing to the end of D, e.g., 3400-3100 BCE (Thornton et al. 2013: 137, Fig 8.6). Arne dates this ware type to period III at Shah Tepe (Arne 1945: 168-170, Figs. 281-298). In the Stockholm collection, Caspian Black on Red Ware is found in almost all contexts; this suggestion is reinforced with reference to the monograph, where 25 unique Caspian Black on Red Ware items are referenced in the text, 15 of which are from III, 1 of which is from III-I Ib, 3 of which are from IIb and 6 of which are from generic II. At Tureng Tepe, this type is only securely dated to IIA (Martinez 1990: Pl. 47, Fig. 1, Pl. 48, Fig. 1). Despite some fuzziness on the later end of the range for this ware type, I am confident in primarily assigning it as it appears in Table 5.4.
Abbasi also equates Shah III with Narges IIIc and Tureng IIA-IIB (Abbasi 2016: 15). The equation of Narges IIIc and Shah III appears solid on the basis of a number of types, and four key types connect both of these two strata to Tureng IIA (e.g., Plain Globular Pots, Knobbed Hemispherical Bowls, Squat Rounded Jars with Ridges, and Squat Carinated Jars). The connection between Narges IIIc and Tureng IIB is less convincing on the basis of solidly demonstrable parallels between ceramic types, though there does appear to be overlap between Tureng IIB and Shah III. There are also several parallels that connect Tureng IIB to Shah III-II, which is in turn connected to Narges IIIc on the basis of several varieties of carinated jars and bowls as well as the incurving bulbous rim type on restricted vessel shapes.

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63 These types are presented in the Shah Tepe monograph as belonging typologically to period III, but closer inspection of the burial and contextual records shows that these items belong to the III-II transition (e.g. Trench B burials 19, 20 and 21 [Arne 1945: 116, Appendix to Fig. 73] and Trench C burials 14 and 15 [Arne 1945: 97, Appendix to Fig. 25]).
**Figure 5.1 Ceramics Illustrations (Table 5.5)**

<table>
<thead>
<tr>
<th>Aq Tappeh II Black on Red Wares (Abbasi 2011: Fig. 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Image" /> <img src="image2" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brown/Black on Buff Wares</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Image" /> <img src="image4" alt="Image" /></td>
</tr>
</tbody>
</table>

| Top Left: Abbasi 2011: Fig. 13 (5)                     |
| Top Right: Arne 1945: Fig. 299a                       |
| Bottom Right: Schmidt 1937: Pl. XII                   |
Figure 5.2 Ceramics Illustrations (Table 5.5)\textsuperscript{64}

\textsuperscript{64} See Electronic Supplementary Files “chapter_5_figure_references.xlsx” for sources.
Figure 5.3 Ceramics Illustrations (Table 5.5)\textsuperscript{65}

\textsuperscript{65} See Electronic Supplementary Files “chapter_5_figure_references.xlsx” for sources.
Therefore, the connections between Shah III and Narges IV on the one hand, and
between Shah III and Narges IIIc with Tureng IIA on the other are clear. Overlap between Narges
IIIc and Tureng IIB, however, is less direct; however, as we will see in 5.2.2.2, there is a
connection between Narges IIIc and Shah III-IIb and between Shah III-IIb and Tureng IIB,
suggesting that Narges IIIc and Tureng IIB may in fact overlap to some degree. One other point
to mention is that Narges IIIb2 clearly does not overlap with Shah IIb. Instead, Narges IIIb2 relates
to Shah III and, as we will see below, Shah III-IIb. The types for which Narges IIIb2 relates to Shah
III and Tureng IIA-IIB are not the most diagnostic, however, and are therefore a difficult set of
parallels on which to draw solid conclusions, but these parallels certainly suggest that IIIb2 skews
far earlier than Abbasi posits.

To directly answer the question posed above: Shah III’s beginning is still somewhat
indistinct, though it certainly has begun by Tureng IC, it encompasses all of Tureng IIA, and
continues into Tureng IIB. The transition from Shah III to Shah III-IIb is still somewhat unclear,
but as the latter is a transitional phase, it can be expected to exhibit characteristic elements of
the previous stratum; this transition appears to begin during the middle of Tureng IIIIB and
toward the end of Narges IIIc.

5.2.2.2 What phases at other sites are equivalent to Shah III-IIb? (Question 2)

Shah III-IIb is one of the more confusing periods, and yet, seemingly key to
understanding an important stretch of the Chalcolithic-Bronze Age chronology of the region. As
previously discussed, Shah III-IIb may overlap with Tureng IIB and Narges IIIc, as well as with
Narges IIIb2. Moreover, Shah III-IIb has been associated with Tureng IIIA.

The most diagnostic types for Shah III-IIb are Pedestalled Bowls with Inner Cups, the
Convexo-Biconical Carinated Jars and Carinated Bowls on Pedestals (Arne 1945: 182-185), which
clearly correlate to Narges IIIb.\textsuperscript{66} Shah III-Ilb correlates to Tureng IIB on the basis of Squat Slightly Carinated Jars with Zones of Horizontal Incisions\textsuperscript{67} and Small Oval, Globular, or Convexo-Biconical Jars with Everted or Slightly Flaring Rims.

**Table 5.6 Shah III-Ilb Parallels**

<table>
<thead>
<tr>
<th>Shah</th>
<th>Narges</th>
<th>Tureng</th>
<th>Type</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>III-Ilb</td>
<td>IIA</td>
<td>IIB</td>
<td>Jars, incurving, bulbous rims</td>
<td>5.5 (1)</td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIIc</td>
<td>IIA</td>
<td>Bowls, cylindro-conical, carinated with straight or inverted plain rim</td>
<td>5.4 (1)</td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIIb\textsubscript{2}</td>
<td>IIA</td>
<td>Bowl, carinated, on pedestal</td>
<td>5.5 (5)</td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIIb\textsubscript{2}</td>
<td>IIB</td>
<td>Jars, oval, globular, or convexo-biconical, everted or slightly flaring rims</td>
<td>5.4 (2)</td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIIb\textsubscript{2}</td>
<td>IIB</td>
<td>Bowls, with inner cup, pedestalled</td>
<td>5.5 (7)</td>
</tr>
<tr>
<td>III-?</td>
<td>IIB</td>
<td>IIB</td>
<td>Jars, large, carinated, zones of horizontal knobs and ridges\textsuperscript{68}</td>
<td>5.5 (3)</td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIB</td>
<td>IIIA</td>
<td>Jars, large cylindro-conical, thick outturned rim</td>
<td>5.5 (2)</td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIIA</td>
<td>IIB</td>
<td>Chalices, solid stem, hollow foot\textsuperscript{69}</td>
<td>5.5 (4)</td>
</tr>
<tr>
<td>III-Ilb &amp; IIb</td>
<td>IIIA-IIIB</td>
<td>Jars, convexo-concave, tube-spout</td>
<td>5.5 (7)</td>
<td></td>
</tr>
<tr>
<td>III-Ilb &amp; IIb</td>
<td>IIIIB</td>
<td>Stands, collared solid stem\textsuperscript{70}</td>
<td>5.5 (6)</td>
<td></td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIIIB</td>
<td>IIB</td>
<td>Stands, hollow, flat base\textsuperscript{71}</td>
<td>5.5 (8)</td>
</tr>
<tr>
<td>III-Ilb</td>
<td>IIIIB</td>
<td>IIIC\textsubscript{1}</td>
<td>Spouts, long tubular, tapering open trough</td>
<td>5.4 (12)</td>
</tr>
<tr>
<td>III-Ilb &amp; IIb</td>
<td>IIIIB-IIIC\textsubscript{2}</td>
<td>Jars, biconical, carinated, with or without shoulder to rim handle</td>
<td>5.4 (5-6, 8-9)</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{66} Curiously, this last type, Carinated Bowls on Pedestals, connects Shah III-Ii and Narges IIIb\textsubscript{2} to Tureng IIA, which doesn’t seem to fit as well (Martinez 1990: Pl. 37, figs. 1-7).

\textsuperscript{67} Martinez 1990: Pl. 75 fg 2-5.

\textsuperscript{68} Knobbed and Ribbed Ware appears in graves of period III (Arne 1945: 177) as well as in the settlement levels assigned to period III (Arne 1945: 179), but the precise parallel from Shah Tepe (e.g. Arne 1945: Pl. XLV, Fig. 325) to the specimens from Tureng IIB was labeled period II in the SMVK collection.

\textsuperscript{69} This parallel is not exact, as the two published specimens have different shaped rims, but are otherwise similar enough as to be regarded as the same type (Martinez 1990: Pl. 68, fig. 2; Arne 1945: 184, fig. 350b).

\textsuperscript{70} The precise identification of this type with Shah III-II is less than certain, though it appears in the section of the monograph discussing that period, circumstantially suggesting its date. It is, however, certain that this type belongs to Tureng IIIIB without a doubt.

\textsuperscript{71} Deshayes assigns this type to Category 1 (IIIB-IIIC\textsubscript{1}), which it very well may be, but the IIIB connection is very solid (Deshayes 1969b: 145; Martinez 1990: Pl. 113).
Other strong parallels connect Shah III-IIb and Tureng IIIA, e.g., the Biconical Carinated Jars with Everted Rims and the Egg-Shaped Burnished Bottles with Concave Bellies, a type which continues into and is considered the type-fossil for the following period at both sites, e.g., Tureng IIB and Shah IIb (see discussion in Arne 1945: 194-195). There are several other types that also suggest overlap between Shah III-IIb and Tureng IIIB, namely the “Watering Cans”, the Hollow Stands with Solid Flat Bases, and the Fruit Stand with Collared Solid Stems respectively. Thus, Shah III-IIlb’s most diagnostic items with the best context and parallels to other sites tie this period on the one hand to Narges IIc-IIlb2, and on the other to Tureng IIB-IIIB. What is clear for now is that the Narges IIIc to IIIb transition does not line up with Tureng and Narges the way that Abbasi argues. As demonstrated in the tables, Narges IIlc encompasses parts of both Shah III and III-IIlb on the one hand, and both Tureng IIA and IIB on the other, though primarily IIA.

This analysis has confirmed the fundamental problem with Shah III-IIlb, in that it still appears as a transitional stratum. To answer Question 2, Shah III-IIlb encompasses both part of Narges IIlc and all of IIIb2, as well as a portion of Tureng IIB, all of Tureng IIIA, and a portion of Tureng IIIB. In this regard, Arne was mostly correct to correlate it with Tureng IIIA, though this period certainly seems not to be a ‘transitional’ phase at Tureng, contra to Shah and Hissar (Deshayes 1968, 37; 1969a, 14; see also discussion in Olson and Thornton 2019).72 There do seem to be some types, however, that begin in this period that continue to be manufactured

72 A chance internet search for a personal copy of Arne 1945 led to the discovery that V. Gordon Childe wrote a review of the book in 1946. While he considers it a “full and scholarly publication”, on the subject of Shah III-Ilb, he says the following: “Arne […] wishes to correlate the transitional layer III/Iib with Hissar II. But this layer is not too well defined stratigraphically, and the supposedly distinctive types have not very specific analogues in Hissar II; the pedestal bowls (‘fruit-stands’) with a bulbous enlargement of the foot just below the bowl are not represented at Hissar at all but recall forms of Alişar Chalcolithic and the Harappa civilization of India, while beak-spouted jars occur in Hissar IIIB as well as in II. Both these types are already decorated by stroke-burnishing, a style of decoration characteristic of II; it was little used at Hissar and only in III. […] Unfortunately, in default of certain datable imports, these parallelisms cannot be converted into precise synchronisms; we cannot say whether any given phase at Shah-tepé were a little earlier or a little later than the parallel phase on the plateau” (Childe 1946: 196-197).
and used through subsequent strata at Shah Tepe and Tureng Tepe in particular, suggesting that the upper chronological boundary of this period may be somewhat more indistinct than its lower, earlier boundary.
Figure 5.4 Ceramics Illustrations (Table 5.6)\textsuperscript{73}

\footnotesize{See Electronic Supplementary Files “chapter_5_figure_references.xlsx” for sources.}
Figure 5.5 Ceramics Illustrations (Table 5.6)\textsuperscript{74}

\textsuperscript{74} See Electronic Supplementary Files “chapter_5_figure_references.xlsx” for sources.
5.2.2.3 What is the relationship between Tureng IIIC1-2 and Shah Ila2-1? (Question 3)

Abbasi proposes a straightforward equation between Tureng IIIC1 and Shah Ila2 and between Tureng IIIC2 and Shah Ila1 (Tables 5.1 and 5.3). This stands in contradiction to Deshayes, who argues that both Shah Ila2 and Ila1 are encompassed by Tureng IIIC1, with Shah Tepe being abandoned during the transition from Tureng IIIC1 to IIIC2 (Deshayes 1969b: 159). In this section, these two propositions will be examined and slightly expanded to account not only for the relationship between these strata at Tureng Tepe and Shah Tepe, but also their relationship to Narges Tappeh as well. This is important because as will be discussed below, Abbasi assigns both Narges IIIb2 and IIIb1 to the Middle Bronze Age in the 2011 monograph. Abbasi correlates the earlier phase (IIIb2) with Shah Iib (Abbasi 2011: 124) and the later phase (IIIb1) with Shah Ila2, thus making Narges IIIa the correlate of Shah Ila1 (Abbasi 2011: 106, 241). The table below demonstrates the first of these equations to be incorrect (i.e., Narges IIIb2 does not equal Shah Iib). Interestingly, in the 2016 volume, Abbasi equates Narges IIIa to both phases of Shah Ila and Tureng IIIC (Table 5.4).

What is clear from the tables above is that the linkage between Narges IIIb2 and Shah Ila2 is limited to one type, based entirely on the peculiar morphology of a particular spout type, comprising a diagonally projecting straight or curved tube spout with ridges which opens into an open top, but for which the vessel morphology is entirely unknown at Shah Tepe and varies considerably at Narges Tepe. Instead, Narges IIIb1 correlates best to Shah Ila1. Furthermore, the linkage between Shah Ila1 and Narges IIIa appears quite strong as well (Table 5.8). Thus, Shah Ila1 = Narges IIIb1-IIIa.

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75 For an example dated to the Late Bronze Age from Gohar Tappeh in Mazandaran see Mahfroozi and Piller (2009: 183, Fig. 8[4]).
<table>
<thead>
<tr>
<th>Shah</th>
<th>Narges</th>
<th>Tureng</th>
<th>Type</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIb</td>
<td>IIIA</td>
<td>RHS</td>
<td>Jars, oval/globular</td>
<td>5.6 (11)</td>
</tr>
<tr>
<td>IIb</td>
<td>IIIA-IIIb</td>
<td>RHS</td>
<td>Bottles, collared76</td>
<td>5.6 (14)</td>
</tr>
<tr>
<td>IIb</td>
<td>IIIb</td>
<td>RHS</td>
<td>Jars, cylindrical with or without lugs</td>
<td>5.6 (5-7)</td>
</tr>
<tr>
<td>III-II/IIb</td>
<td>IIIb</td>
<td>RHS</td>
<td>Bottles, egg-shaped, sometimes concave to base</td>
<td>5.4 (10)</td>
</tr>
<tr>
<td>IIb</td>
<td>IIIb</td>
<td>RHS</td>
<td>Bowls, conical or hemispherical, flat base</td>
<td>5.6 (1)</td>
</tr>
<tr>
<td>IIb</td>
<td>IIIb</td>
<td>RHS</td>
<td>Jars, hemispherical, spouted</td>
<td>5.4 (11)</td>
</tr>
<tr>
<td>III-II/IIb</td>
<td>IIIb-IIIc1</td>
<td>RHS</td>
<td>Jars, convexo-concave, biconical, with handle</td>
<td>5.4 (6)</td>
</tr>
<tr>
<td>IIb</td>
<td>IIIB</td>
<td>RHS</td>
<td>Bottles/Jars, conical neck, everted or flaring rim</td>
<td>5.6 (10-11)</td>
</tr>
<tr>
<td>IIb</td>
<td>IIIB-IIIc2</td>
<td>RHS</td>
<td>Jar, cylindrical-concave, pattern burnished horizontal bands</td>
<td>5.6 (5)</td>
</tr>
<tr>
<td>IIb-IIa</td>
<td>IIIb-IIIc1</td>
<td>RHS</td>
<td>Jars &amp; Bottles, with tall cylindrical/conical neck</td>
<td>5.6 (9, 12)</td>
</tr>
<tr>
<td>II</td>
<td>IIIB</td>
<td>RHS</td>
<td>Ladies/Dippers, long handle</td>
<td>5.7 (3)</td>
</tr>
<tr>
<td>IIb-IIa2</td>
<td>IIIB</td>
<td>RHS</td>
<td>Jars, biconical, carinated, outturned rim</td>
<td>5.4 (9)</td>
</tr>
<tr>
<td>IIb-IIa1</td>
<td>IIIB</td>
<td>RHS</td>
<td>Bottle, globular/round, tall neck, round base</td>
<td>5.6 (12)</td>
</tr>
<tr>
<td>IIa2</td>
<td>IIIB-IIIc1</td>
<td>RHS</td>
<td>Jar, tall, cylindrical, with or without rim handle</td>
<td>5.7 (6)</td>
</tr>
<tr>
<td>IIa2</td>
<td>IIIB-IIIc2</td>
<td>RHS</td>
<td>Bowls, deep77</td>
<td>See note</td>
</tr>
<tr>
<td>IIa2</td>
<td>IIIb1</td>
<td>RHS</td>
<td>Jars, ridged tube-spout76</td>
<td>See note</td>
</tr>
<tr>
<td>IIa2</td>
<td>IIIc1-IIIc2</td>
<td>RHS</td>
<td>Pedestals, button-shaped, flat base, concave walls79</td>
<td>See note</td>
</tr>
<tr>
<td>IIa2-IIa1</td>
<td>IIIc1-IIIc2</td>
<td>RHS</td>
<td>Bottles, tall, ovoid, flaring rims</td>
<td>5.6 (13)</td>
</tr>
<tr>
<td>IIa2</td>
<td>IIIB-IIIc1</td>
<td>RHS</td>
<td>Bowls, small beak-trough spout</td>
<td>5.6 (4)</td>
</tr>
<tr>
<td>IIa</td>
<td>IIIB-IIIc1</td>
<td>RHS</td>
<td>Canteens, with lugs and ridges, and/or applied snakes80</td>
<td>5.7 (4-5)</td>
</tr>
<tr>
<td>IIa</td>
<td>IIIb1,IIla</td>
<td>IIIc1-IIIc2</td>
<td>Bowls, large, hemispherical, trough spout</td>
<td>5.6 (3)</td>
</tr>
<tr>
<td>IIa</td>
<td>IIIb1</td>
<td>IIIc2</td>
<td>Jugs, coarse, with handle</td>
<td>5.7 (2)</td>
</tr>
<tr>
<td>IIa</td>
<td>IIIa</td>
<td>RHS</td>
<td>Jars, oval, ring-base, everted or flaring rim81</td>
<td>See note</td>
</tr>
<tr>
<td>IIa</td>
<td>IIIa</td>
<td>RHS</td>
<td>Jar, tube-spout and vertical lugs</td>
<td>5.6 (8)</td>
</tr>
</tbody>
</table>

76 Particularly diagnostic of IIIb. Deshayes reports finding some examples in IIIc1 graves, however (Deshayes 1969b: 151, n. 25).
79 Deshayes 1969: 153, 156, Figs. 56-57 & Arne 1945: 216, Pl. LVII Fig. 453.
80 “Large, tall narrow vases in the form of goblets with cylindrical walls, but slightly enlarged, are provided with a short, very tapered, angular lip (Fig. 28); most often, in the layers of period IIIC1, the wall is decorated with smooth vertical zigzags which recall the decor of the "canteens" of Hissar IIIC and Shah Tepe, One of these vases is pierced at the end of the pause of a row of triangular windows and a second row of small round windows (Fig. 27). No fragment of this very typical form was discovered in the layers of period IIIC2” (Deshayes 1969b: 148, translation by author).
81 Abbasi 2011: 132, Fig. 250-251 & Arne 1945: 207, Fig. 414.
Figure 5.6 Ceramics Illustrations (Table 5.7)\textsuperscript{82}

\textsuperscript{82} See Electronic Supplementary Files “chapter_5_figure_references.xlsx” for sources.
Figure 5.7 Ceramics Illustrations (Table 5.7)\textsuperscript{83}

\textsuperscript{83} See Electronic Supplementary Files “chapter_5_figure_references.xlsx” for sources.
Table 5.8 Number of Confirmed Parallel Types Between Narges IIIb₁-IIIa and Shah IIa²-¹

<table>
<thead>
<tr>
<th>Narges IIIb₁</th>
<th>Narges IIIa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shah IIa¹</td>
<td>4</td>
</tr>
<tr>
<td>Shah IIa²</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 5.9 Number of Confirmed Parallel Types Between Tureng IIIA-IIIC₂ and Shah IIb-IIa¹

<table>
<thead>
<tr>
<th>Tureng IIIA</th>
<th>Tureng IIIB</th>
<th>Tureng IIIC₁</th>
<th>Tureng IIIC₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shah IIa¹</td>
<td>0</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Shah IIa²</td>
<td>0</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Shah IIb</td>
<td>4</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

In terms of the relationship between strata from Shah Tepe and Tureng Tepe during this interval, Shah IIa² appears to best correlate to Tureng IIIC₁, though Shah IIa² appears to overlap with both the preceding (i.e., IIIB) and succeeding (i.e., IIIC₂) phases (Table 5.9). This result should not surprise us, insofar as Deshayes’ discussion of Tureng IIIB-IIIC pottery identifies a number of diagnostic types that are found in all three phases (Deshayes 1969). In terms of the following subphase, Shah IIa¹ appears more likely to correlate with Tureng IIIC₂ types, contra Deshayes, as the purported connections between Shah IIa¹ and Tureng IIIB-IIIC₁ are not the most convincing parallels. For example, the rim type associated with the lugged/ridged canteens, one of Deshayes’s diagnostic IIIB rim forms (see Martinez 1990: Pl. 114, Fig. 8), is known from elsewhere to date to late Hissar IIIc.84 Deshayes argues that Shah IIa¹ more likely overlaps with Tureng IIIC₁ on the basis of burnished curvilinear decorations, and the appearance of alabaster and lead vases (Deshayes 1969b: 158). In Deshayes’s account, Tureng IIIC₂ does not overlap with Shah IIa¹ on the basis of the lack of burnished decorations using irregularly spaced very fine lines from Shah IIa¹ and the complete lack of IIIC₂ vessel shapes in Shah IIa¹ (Deshayes 1969b: 159). Deshayes’s argument is undermined in part by the large hemispherical bowls from Tureng IIIB-

84 See Schmidt 1937: Pl. XL-XLI (H 5140, H 4219, H 4009, H3525).
IIIC₁ that, on the one hand tie these phases to Shah IIa¹ (supporting his assertion), but on the other continue into and are diagnostic of Narges IIIa (calling into question his assessment). The hitherto equivocal evidence suggesting that Shah IIa¹ more properly correlates to Tureng IIIC₂ is strengthened somewhat by the parallels to Shah IIa¹ of the most diagnostic Tureng IIIC₂ characteristics, i.e., the appearance of an increased diversity of coarse ware vessel forms (Arne 1945: 203; Deshayes 1969b: 155). At present, I am not convinced that we can distinguish confidently between the two alternative possibilities for the dating of these phases presented below in Table 5.10.

To answer Question 3, the relationship between the sub phases of Tureng IIIC and Shah IIa is only partially resolvable. Two possible arrangements seem the most likely; in the former, Abbasi’s argument that equates Tureng IIIC₂ with Shah IIa¹ and Tureng IIIC₁ with Shah IIa² is vindicated, but with the difference that Tureng IIIC₂-Shah IIa¹ entirely encompass both Narges IIIb₁ and IIIa (Table 5.10 Version 1); in the latter, Deshayes’s argument that neither IIa² nor IIa¹ overlap with Tureng IIIC₂ holds, but with the difference that Narges IIIa spans both Tureng IIIC₁ and IIIC₂ (Table 5.10 Version 2). In either case, Narges IIIa, appears to tie very closely to Shah IIa¹ and only loosely with Shah IIa², which appears to have more in common with Tureng IIIC₂ than IIIC₁, suggesting that the former model is more correct (i.e., Version 1).⁸⁵ As should be clear, more work on these periods in particular is clearly needed to work out the precise relationships between the phases.

---

⁸⁵ Moreover, a re-examination of Narges IIIb₁ has led me to question whether this phase would be more properly lumped with IIIa than with IIIb₂. There is likely a stratigraphic justification for seeing IIIb₁ and IIIb₂ as phases of the same period, but typologically IIIb₁ is much more similar to IIIa and related periods at Shah and Tureng.
5.2.3 Revised links between strata at Tureng Tepe, Shah Tepe and Narges Tappeh

The relationships between the key Chalcolithic-Bronze Age strata at Shah Tepe, Narges Tappeh, and Tureng Tepe have been clarified to the extent that the available evidence permits, particularly with respect to the relationships between Shah III, III-IIb, IIb, Tureng IC, IIA, IIB, IIIA, IIB, and Narges IV, IIIc and IIIb2. Another significant result of this analysis is that in almost no case does a single stratum from one site perfectly align with a single stratum at another site; indeed, each stratum at each site straddles multiple strata at other sites, with only one possible exception (i.e., Shah IIa1 = Tureng IIIC1 in Table 5.10, Version 2).

Table 5.10 Revised Chronogram

<table>
<thead>
<tr>
<th>Version 1</th>
<th></th>
<th></th>
<th></th>
<th>Version 2</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shah</td>
<td>Narges</td>
<td>Tureng</td>
<td>Shah</td>
<td>Narges</td>
<td>Tureng</td>
<td>Shah</td>
<td>Narges</td>
</tr>
<tr>
<td>IIa1</td>
<td>IIIa</td>
<td>IIIC2</td>
<td>IIa1</td>
<td>IIIa</td>
<td>IIIC2</td>
<td>IIa2</td>
<td>IIIC1</td>
</tr>
<tr>
<td>IIa2</td>
<td>IIb1</td>
<td></td>
<td>IIIC1</td>
<td></td>
<td>IIb1</td>
<td>IIb</td>
<td>IIIB</td>
</tr>
<tr>
<td>IIb</td>
<td>--</td>
<td>IIIB</td>
<td>IIb</td>
<td>--</td>
<td>IIIB</td>
<td></td>
<td>IIIA</td>
</tr>
<tr>
<td>III-IIb</td>
<td>IIIB1</td>
<td>IIIB</td>
<td>III-IIb</td>
<td>IIIB1</td>
<td>IIIB</td>
<td>IIIc</td>
<td>IIc</td>
</tr>
<tr>
<td>IIIc</td>
<td>IIB</td>
<td></td>
<td>IIIc</td>
<td>IIB</td>
<td></td>
<td>IIA</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>IIA</td>
<td></td>
<td>III</td>
<td>IIA</td>
<td></td>
<td>IV</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>IC</td>
<td></td>
<td>IV</td>
<td>IC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This suggests that an entirely different kind of model is required to felicitously represent the chronology of this region in culture-historical, relative, and absolute terms, i.e., one that can capture the overlapping distributions of types between successive strata and to pinpoint moments of actual synchronicity (e.g., Lulewicz 2018). As we will see in the following section,
however, such a regional model may for now be beyond reach, as only one site has a reliable radiocarbon chronology, i.e., Tureng Tepe.

5.3 Absolute Dating of the Gorgan Plain Regional Chronology

There are three versions for the absolute dating of Tureng Tepe from period IIA to IIIC₂: the first two of which are based primarily on comparative stratigraphy and links to other regions dated by radiocarbon or the direct historical method (Kohl 1984; Voigt and Dyson 1992), and the last of which is a combination of Thornton (2009), Gürsan-Salzmann (2016), and Olson and Thornton (2019), all of which are based on calibrated radiocarbon dates from sites in the region (Table 5.12).

Kohl dates Tureng IIB to 3500-3000 BCE, IIIA-IIIB to 3000-2500 BCE, and IIIC₁ to 2500-2200 BCE. Dyson and Voigt date Tureng IIB to 3200-2600 BCE, IIIA-IIIB to 2600-2100 BCE, and IIIC to 2100-1900 BCE. These two accounts diverge considerably on both the start and overall length of Tureng IIB, which drags the entire column high (i.e., Kohl) or low (i.e., Voigt and Dyson) relative to the third group of dates, which are tied into the absolute chronology derived from calibration and Bayesian modeling of the Deshayes radiocarbon samples.

Gürsan-Salzmann and Thornton differ slightly on the timing of different transitions (i.e., Tureng IIIC₁ begins either at 2200 or at 2100 BCE and the Tureng IIIA to IIIB transition occurs either at 2500 or 2700 BCE respectively), but ultimately their account is the same, as both are derived from the Deshayes samples. Both accounts used an older calibration curve and neither constrained the models with posteriors, however, which is what led to both the small differences between their accounts and with the model of Olson and Thornton (2019).

In the Olson and Thornton model, there are no radiocarbon samples for the periods IIA or IIIA, so these periods either do not appear (e.g., IIA), or are left as placeholders between
more securely dated periods (e.g., IIIA). This model was constructed using a sequence of twelve radiocarbon samples collected by Jean Deshayes over the course of excavations under his direction, which have only been presented recently together in one place in a comprehensive analysis (Figure 5.7; see Olson and Thornton 2019). These dates cannot be simply calibrated one-by-one however, because the samples were analyzed at four different laboratories and have large error ranges by today’s standards (in some cases greater than 200 radiocarbon years!). Therefore, to arrive at a satisfactory radiocarbon chronology based on these dates, it was necessary not only to calibrate the given dates (Bronk-Ramsey 2009), but also to construct a Bayesian model to further constrain the probability distributions (e.g., Lulewicz 2018).

In this analysis, the published radiocarbon dates using the IntCal 13 and Marine13 radiocarbon age calibration curves (Reimer et al. 2013). A sequential phase model was constructed using standard rather than sigma boundaries and is reproducible in OxCal (Figure 5.8). The model returns calibrated radiocarbon dates according to the BCE/CE calendrical scale, presenting both 1-sigma (i.e., 68%) and 2-sigma (i.e., 95%) probability ranges, as well as a mean and median value for these ranges (Table 5.11). While the probability ranges for the individual dates are valuable in and of themselves, the main advantage of this modelling technique is that it calculates starting and ending probability ranges for groups of dates (i.e., corresponding to the archaeological strata of interest), which are displayed according to standard rounding convention (Hamilton and Krus 2018; Millard 2014). The interpretation of the results of the model should begin with the most inclusive probability range (e.g., 95%) and work toward the narrower probability (i.e., 68%), and finally to consider the mean/median of these

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86 IntCal20 came online only during the process of revisions of this manuscript and has not been used here. Expect to see its use in future analysis, however.
87 https://c14.arch.ox.ac.uk/oxcal/OxCal.html.
distributions. Conservatively, this procedure results in the following date ranges for the periods represented by radiocarbon samples, rounded and simplified for ease of interpretation: Tureng IIB ca. 3400-3000, Tureng IIIB ca. 2750-2250, Tureng IIIC\textsubscript{1} ca. 2250-1900, and Tureng IIIC\textsubscript{2} ca. 1900-1600. The model therefore correlates well with absolute chronological frameworks for Tureng Tepe previously proposed Deshayes as well as with equivalent culture-historical periods in adjacent regions (Deshayes 1969b: 162; Luneau 2014).

**Figure 5.8 OxCal Code for Constrained \textsuperscript{14}C Model**

```c
## Dates should be read as follows
## (R_Date{"Lab-SampleID (Phase)\", Radiocarbon Years BP, Error Range in Radiocarbon Years})
## Sequence() is used when the order of dates within a phase is known based on stratigraphy and also to signal to OxCal the order of the phases
## Phase() is used when the order of the dates within a phase is not known based on stratigraphy

Sequence()
{
    Sequence()
    {
        Boundary("Start IIB");
        R_Date("Gif-302 (Early IIB)\", 4090, 250);
        Phase()
        {
            R_Date("Gif-301 (Mid IIB)\", 4325, 250);
            R_Date("Ly-96 (Mid IIB)\", 4400, 130);
        }
        R_Date("Ly-97 (Late IIB)\", 4550, 140);
        Boundary("End IIB");
    }
    Boundary("Start IIIB");
    Phase()
    {
        R_Date("Gif-485 (IIIB)\", 3970, 200);
        R_Date("P-508 (Yarim IIIB equiv)\", 3996, 242);
    }
    Boundary("End IIIB");
    Sequence()
    {
        Boundary("Start IIIIC\textsubscript{1}");
        R_Date("Gif-3339 (early IIIIC\textsubscript{1})\", 3880, 110);
        Phase()
        {
            R_Date("Ly-1148 (IIIIC\textsubscript{1})\", 3920, 250);
        }
    }
}
```

306
Aside from the lack of samples to fill the IIA and IIIA gaps, the other problem with this model is the apparent gap between the probability distributions for IIIB and IIIC1. But, as there is no stratigraphic reason to assume a break in occupation of the site during this interval, this issue would likely be resolved by increasing the number of samples from both periods in the model.

**Table 5.11 Results of the Calibrated and Constrained 14C Sequence at Tureng Tepe**

<table>
<thead>
<tr>
<th>Phase</th>
<th>68% Probability</th>
<th>95% Probability</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start</td>
<td>End</td>
<td>Start</td>
<td>End</td>
</tr>
<tr>
<td>IIIC2</td>
<td>1910</td>
<td>1685</td>
<td>2005</td>
<td>1530</td>
</tr>
<tr>
<td>IIIC1</td>
<td>2335-2040</td>
<td>2015-1815</td>
<td>2526-1955</td>
<td>2120-1715</td>
</tr>
<tr>
<td>IIIB</td>
<td>2940-2530</td>
<td>2625-2235</td>
<td>3120-2320</td>
<td>2825-2010</td>
</tr>
<tr>
<td>IIIA</td>
<td>no dates</td>
<td>no dates</td>
<td>no dates</td>
<td>no dates</td>
</tr>
<tr>
<td>IIB</td>
<td>3410-3065</td>
<td>3195-2895</td>
<td>3725-2925</td>
<td>3325-2780</td>
</tr>
<tr>
<td>IIA</td>
<td>no dates</td>
<td>no dates</td>
<td>no dates</td>
<td>no dates</td>
</tr>
</tbody>
</table>

To restate, the calibrated and constrained Bayesian model does not differ significantly from either Thornton (2009) or Gürsan-Salzmann (2016), it does shift around the timing of several transitions slightly. It should also be noted that Arne (1945: 308, Fig. 664) provides absolute dates for Shah III (ca. 3200-2800 BCE), IIb (ca. 2800-2300 BCE), and IIa (ca. 2300-1800 BCE). Relative to the Bayesian 14C model, this would equate Shah III to all of Tureng IIB and part of what should be IIIA, Shah IIb to part of what should be Tureng IIIA and all of IIIB, and Shah IIa to both phases of Tureng IIIC. In other words, this suggests that Shah III-IIb should date to ca. 3000-2700 BCE, or center of the Venn Diagram that is created by the overlap of Shah III with Tureng IIB/IIIA and Shah IIb with Tureng IIIA/IIIB (i.e., Tureng IIIA = both part of Shah III and IIb,
ergo the transitional period Shah III-IIb). This deduction fits well with the Bayesian model, in that it bridges both the relative and absolute gap between Tureng IIB and IIIB. Overall, Arne’s absolute chronology is surprisingly useful, proposed as it is based on entirely on parallels to artifacts cross-dated to textual sources in the typical pre-radiocarbon fashion. While it is likely that Shah III could date even earlier than 3200 BCE, the remainder of Arne’s model accords well with the modeled radiocarbon chronology.

Table 5.12 Absolute Dates for Gorgan Plain Culture-Historical Phases

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1700-1600</td>
<td>(IIIC2?)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1800-1700</td>
<td>IIIC2</td>
<td>IIIC2</td>
<td>IIIC2?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1900-1800</td>
<td>IIIC1</td>
<td>IIIC1</td>
<td></td>
<td>IIIC1</td>
<td></td>
<td>IIa</td>
</tr>
<tr>
<td>2000-1900</td>
<td>IIIC1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2100-2000</td>
<td>IIIC1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2200-2100</td>
<td>(IIIB/IIIC1?)</td>
<td>IIIB</td>
<td>IIIC1</td>
<td>IIIB</td>
<td></td>
<td>IIIA-IIIB</td>
</tr>
<tr>
<td>2300-2200</td>
<td>IIIB</td>
<td></td>
<td>IIIC1</td>
<td>IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2400-2300</td>
<td>IIIB</td>
<td></td>
<td>IIIC1</td>
<td>IIIB</td>
<td></td>
<td>IIIA-IIIB</td>
</tr>
<tr>
<td>2500-2400</td>
<td>IIIB</td>
<td></td>
<td></td>
<td>IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2600-2500</td>
<td>IIIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2700-2600</td>
<td>IIIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2800-2700</td>
<td>IIIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2900-2800</td>
<td>(IIA?)*</td>
<td>IIA</td>
<td></td>
<td></td>
<td></td>
<td>IIb</td>
</tr>
<tr>
<td>3000-2900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3100-3000</td>
<td>IIIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3200-3100</td>
<td>IIIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3300-3200</td>
<td>IIIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3400-3300</td>
<td>(IIA?)*</td>
<td>IIA</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3500-3400</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*No Dates
**Gap in the probability distribution

Lastly, there are 14C determinations available for Narges Tappeh (Abbasi 2011: 58-59, Figs. 10-11 [Samples 6-8]). While their stratigraphic contexts are reported explicitly in the text, for at least for two of the three relevant samples, it is not entirely clear to which cultural strata
these samples properly belong based on the published section: OxA-18134 clearly comes from Narges IV (3960-3800 cal. BCE 2σ), but my confidence that the Narges III samples OxA-18085 (3625-3370 cal. BCE 2σ) and OxA-18086 (3645-3385 cal. BCE 2σ) come from Narges IIIc is considerably less (Abbasi 2011: 60, 2016: 227). In any case, the early dates of these samples, along with the Tureng IIB modeled dates presented below, suggest that the contexts dated by these samples can be assigned to the portion of Narges IIIc that overlaps with Tureng IIA. Based on these dates, Narges IV dates to the first quarter of the 4th millennium and Narges IIIc dates to the middle of the 4th millennium, at least partially filling the slot we would expect to correspond to Tureng IIA.88

5.4 Resolving Discrepancies in the Era System Chronology for the Gorgan Plain

The outstanding questions to be answered are: (1) What strata properly belong to the Late Chalcolithic? That at least the early part of Shah III belongs to this period seems beyond doubt, but there is disagreement as to whether Tureng IC, IIA, or IIB is the Late Chalcolithic at Tureng, and whether the Late Chalcolithic at Narges is only Narges IV (Abbasi 2011) or whether it also encompasses part of Narges IIIc (2016); (2) What are the boundaries of the Early Bronze Age? At Tureng, the question is: does the Early Bronze Age correlate to Tureng IIA-IIB (Abbasi) or to Tureng IIIA-IIIB (Kohl)? At Narges, the Early Bronze Age seems clearly to encompass most if not all of Narges IIIc. What should be considered Early Bronze Age at Shah Tepe is perhaps the

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88 There is reason to doubt the validity of this dating, however, because I am charitably interpreting these dates from “Stratum 3” to be Narges IIIc based on how early their 14C determinations are. According to Abbasi, Stratum 3 is equivalent to the entirety of Narges III (Abbasi 2011: 53). In actuality, Sample 7 (OxA-18086) comes from “Feature” 2527b, about halfway up the stratigraphic column and Sample 6 (OxA-18085) comes from “Feature” 2521 near the interface with Stratum 2 (i.e., Narges II). So, unless Narges IIIb,1 and Narges IIIa are extremely compressed layers or more properly belong to Stratum 2 rather than Stratum 3, the published section seems to present confusing information (i.e., Abbasi 2011: 58, Fig. 10). Working directly from the section, it would be reasonable to assume based on stratigraphic position that Sample 6 should belong to the absolute latest phase of Narges III (i.e., IIIa) as it is very close to a stratigraphic break, the stratum above which is dated by 14C to the 2nd century BCE.
most variable, due to the III-IIb transitional period: is the Early Bronze Age at Shah Tepe only Shah III, partly III and partly III-IIb, only III-IIb, or partly III-IIb and partly IIb? Only by correctly correlating these layers at Shah Tepe to Tureng Tepe will we have an answer to this important question; (3) Is the Middle Bronze Age represented by Tureng IIIA-IIIB (Abbasi) or by Tureng IIIC1 (Kohl); and (4) Which phases of Tureng IIIC and Shah IIa correspond to the Late Bronze Age?

Table 5.13 Absolute Dates Correlated to Three-Age System

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1500-1400</td>
<td>Bronze Age</td>
<td></td>
<td>(Final) LBA</td>
<td>LBA-EIA Transition</td>
<td></td>
</tr>
<tr>
<td>1600-1500</td>
<td>Bronze Age</td>
<td></td>
<td>(Initial) LBA</td>
<td>LBA</td>
<td>LBA</td>
</tr>
<tr>
<td>1700-1600</td>
<td>Bronze Age</td>
<td></td>
<td>MBA Transition</td>
<td>MBA</td>
<td>MBA</td>
</tr>
<tr>
<td>1800-1700</td>
<td>Bronze Age</td>
<td></td>
<td>MBA</td>
<td>MBA</td>
<td>MBA</td>
</tr>
<tr>
<td>1900-1800</td>
<td>Bronze Age</td>
<td></td>
<td>MBA</td>
<td>MBA</td>
<td>MBA</td>
</tr>
<tr>
<td>2000-1900</td>
<td></td>
<td></td>
<td></td>
<td>LBA</td>
<td>LBA</td>
</tr>
<tr>
<td>2100-2000</td>
<td></td>
<td></td>
<td></td>
<td>MBA</td>
<td>MBA</td>
</tr>
<tr>
<td>2200-2100</td>
<td></td>
<td></td>
<td></td>
<td>MBA</td>
<td>MBA</td>
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<tr>
<td>2300-2200</td>
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<td>MBA</td>
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<td>2400-2300</td>
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<td>2500-2400</td>
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<tr>
<td>2600-2500</td>
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<td>MBA</td>
<td>MBA</td>
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<tr>
<td>2700-2600</td>
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<td></td>
<td>EBA</td>
<td>EBA</td>
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<td>2800-2700</td>
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<td></td>
<td></td>
<td>EBA</td>
<td>EBA</td>
</tr>
<tr>
<td>2900-2800</td>
<td></td>
<td></td>
<td></td>
<td>Early Elamite</td>
<td>LCA</td>
</tr>
<tr>
<td>3000-2900</td>
<td></td>
<td></td>
<td></td>
<td>Early Elamite</td>
<td>LCA</td>
</tr>
<tr>
<td>3100-3000</td>
<td></td>
<td></td>
<td></td>
<td>Early Elamite</td>
<td>LCA</td>
</tr>
<tr>
<td>3200-3100</td>
<td></td>
<td></td>
<td></td>
<td>Early Elamite</td>
<td>LCA</td>
</tr>
</tbody>
</table>

The place to begin this analysis is with the five published chronograms that provide information that directly links “eras” to absolute dates (Table 5.12). Two of these chronograms are of little use due to their use of just a generic “Bronze Age” and lack of a radiocarbon anchor, though Crawford does propose that the Late Chalcolithic as observed at Yarim Tepe dates to 3100-2900 BCE (Crawford 1963; Dyson 1968a). Three of these chronograms provide more useful information that link specific strata at the three sites to both absolute dates and eras (Table
5.13). Kohl (1984) only provides a sequence of Late Chalcolithic through what he calls the “Middle Bronze Age Transition”; in his chronogram, the Late Chalcolithic dates from 3500-3000 BCE, the Early Bronze Age from 3000-2500 BCE, the Middle Bronze Age from 2500-2200 BCE, and the Middle Bronze Age Transition dates to 2200-2100 BCE. No absolute dates are given for the Late Bronze Age for the Gorgan Plain.

Table 5.14 Correlating Absolute Dates to Cultural Strata (Comparing Abbasi 2011/2016)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Period</td>
<td>Narges</td>
<td>Period</td>
<td>Narges</td>
<td>Tureng</td>
<td>Shah</td>
<td>Shah</td>
</tr>
<tr>
<td>1700-1600</td>
<td>LBA</td>
<td>IIIa</td>
<td>LBA</td>
<td>IIIa</td>
<td>IIIC1/IIIC2</td>
<td>IIa2/IIa1</td>
<td></td>
</tr>
<tr>
<td>1800-1700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IIa</td>
<td></td>
</tr>
<tr>
<td>1900-1800</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>IIa</td>
<td></td>
</tr>
<tr>
<td>2000-1900</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>IIa</td>
<td></td>
</tr>
<tr>
<td>2100-2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IIa</td>
<td></td>
</tr>
<tr>
<td>2200-2100</td>
<td>MBA</td>
<td>IIIb</td>
<td>MBA</td>
<td>IIIb</td>
<td>IIIA/IIIB</td>
<td>IIb</td>
<td></td>
</tr>
<tr>
<td>2300-2200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IIb</td>
<td></td>
</tr>
<tr>
<td>2400-2300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IIb</td>
<td></td>
</tr>
<tr>
<td>2500-2400</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>IIb</td>
<td></td>
</tr>
<tr>
<td>2600-2500</td>
<td>MBA</td>
<td>IIIb</td>
<td>MBA</td>
<td>IIIc</td>
<td>IIA/IIB</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>2700-2600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>2800-2700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>2900-2800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>3000-2900</td>
<td>EBA</td>
<td>IIIc</td>
<td>EBA</td>
<td>IIIc</td>
<td>IIA/IIB</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>3100-3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>3200-3100</td>
<td>Proto-Elamite</td>
<td>IIIc</td>
<td>LCA</td>
<td>IV</td>
<td>IC</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>3300-3200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>III</td>
<td></td>
</tr>
</tbody>
</table>

Abbasi (2011: 250) provides a full prehistoric sequence from approximately 5200-550 BCE, but the naming conventions presented in his chronogram lead to some confusion. For example: is “Early Elamite” meant to refer to “Proto-Elamite”? Terms such as “Late Plateau,” “Middle Plateau (Late),” and “Middle Plateau (Early)” are tied to the diagnostic ceramic type
named “Sialk,” but the particular phase at Sialk is not specified. In any case, if it is true that “Early Elamite” refers to the Late Chalcolithic, for Abbasi this dates from 3400-3100 BCE, with the Early Bronze Age dating to 3100-2900 BCE, the Middle Bronze Age dating to 2900-2500 BCE, and the Late Bronze Age dating from 2500-1700 BCE, followed by a Late Bronze Age to Early Iron Age transition period extending from 1700-1400 BCE. On the face of it, Abbasi’s designation of the Late Chalcolithic absolute dates, as well as the LBA-EIA transition dates appear most likely to be accurate, but the length and positioning of the EBA, MBA and LBA seem rather suspect. Abbasi (1394) proposes that the Late Chalcolithic dates to 3500-3000 BCE, the Early Bronze Age from 3000-2500 BCE, the Middle Bronze Age from 2500-2000 BCE, and the Late Bronze Age from 2000-1500 BCE, evidently following Kohl’s framework (2016: 15).

5.4.1 Late Chalcolithic

In terms of the Late Chalcolithic, both Kohl and Abbasi agree that this period should be dated from 3500-3000 BCE, but Abbasi designates this period as Tureng IC and Kohl designates it as Tureng IIB. The Bayesian model does not have any dates for Tureng IC-IIA, but the Tureng IIB dates range from 3300-3050 cal. BCE 2σ. We should also note that although Arne does not explicitly designate Shah III as Late Chalcolithic, his dates for Shah III fall within this range (ca. 3200-2800). Table 5.9 shows that Tureng IC-IIB overlap with Shah III, but that Tureng IC only corresponds to Narges IV. With respect to Narges IIIc, the radiocarbon determinations date to ca. 3625-3375 cal. BCE 2σ, pointing to a slot which would overlap with Tureng IIA if there were dates for this period. The Bayesian model cannot therefore unambiguously resolve this

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89 According to Shahmirzadi, “Middle Plateau” refers to Sialk III, and “Late Plateau” refers to Proto-Elamite (2004: 539).
discrepancy, but the evidence from the absolute dates does point toward Tureng IIB as the more likely candidate to correspond to the Late Chalcolithic.

Table 5.15 Key for Interpretation of the Late Chalcolithic

<table>
<thead>
<tr>
<th>Absolute Dates</th>
<th>Tureng</th>
<th>Shah</th>
<th>Narges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbasi 2011</td>
<td>3500-3000 BCE</td>
<td>IC</td>
<td>III</td>
</tr>
<tr>
<td>Corrected</td>
<td>3175-3000 cal. BCE 2σ</td>
<td>IC-IIB</td>
<td>III-III/IIB</td>
</tr>
</tbody>
</table>

5.4.2 Early Bronze Age

Similarly, Abbasi and Kohl both agree on the absolute dates for the Early Bronze Age (i.e., 3000-2500 BCE) but differ on whether this corresponds culturally to Tureng IIA-IIB or to Tureng IIIA-IIB respectively. In the Bayesian model, there are no dates for Tureng IIA or IIIA, but Tureng IIB dates to 3200-3000 BCE and IIB dates to 2750-2425. The Bayesian model suggests that Kohl’s designation of at least Tureng IIB as belonging to the Early Bronze Age is likely the more correct assessment. The status of Tureng IIIA is still unclear at this juncture.

Table 5.16 Key for Interpretation of the Early Bronze Age

<table>
<thead>
<tr>
<th>Absolute Dates</th>
<th>Tureng</th>
<th>Shah</th>
<th>Narges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbasi 2011</td>
<td>3000-2500 BCE</td>
<td>IIA-IIB</td>
<td>III</td>
</tr>
<tr>
<td>Corrected</td>
<td>2725-2450 cal. BCE 2σ</td>
<td>IIIA-IIB</td>
<td>III/IIb-IIIb</td>
</tr>
</tbody>
</table>

5.4.3 Middle Bronze Age

Abbasi and Kohl agree on the timing of the beginning of the Middle Bronze Age, but not its end. Furthermore, they disagree over which cultural stratum at Tureng the Middle Bronze Age corresponds to (either IIIA-IIB versus IIIc1). Abbasi 2016 designates the MBA as Tureng IIIA-IIB, which he dates to 2500-2000 BCE. Kohl designates the MBA as Tureng IIIc1, which he dates to 2500-2200 BCE. In the Bayesian model, Tureng IIIA-IIB dates to 3000-2225 BCE; Tureng IIIc1 dates to 2225-1900 BCE. The case for Tureng IIIc1 (2200-1900) belonging to the Middle Bronze
Age seems more secure on the basis of the radiocarbon dates and interregional parallels (Thornton personal communication 2016).  

**Table 5.17 Key for Interpretation of the Middle Bronze Age**

<table>
<thead>
<tr>
<th>Absolute Dates</th>
<th>Tureng</th>
<th>Shah</th>
<th>Narges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbasi 2011</td>
<td>2500-2000 BCE</td>
<td>IIIA-IIIB</td>
<td>IIb</td>
</tr>
<tr>
<td>Corrected</td>
<td>2225-1950 cal. BCE</td>
<td>IIIC$_1$</td>
<td>IIa$^{2-17}$</td>
</tr>
</tbody>
</table>

**5.4.4 Late Bronze Age**

Based on the foregoing, the Late Bronze Age at Tureng Tepe minimally encompasses Tureng IIIC$_2$ and may or may not also include Tureng IIIC$_1$. This distinction is important with respect to the timing of the Middle Bronze Age to Late Bronze Age transition, and whether it occurs during the last few centuries of the 3rd millennium or the first few centuries of the 2nd millennium. Abbasi designates the LBA as Tureng IIIC, which he dates to 2000-1500 BCE. Kohl does not specify which stratum at Tureng Tepe corresponds to the LBA (2016).

**Table 5.18 Key for Interpretation of the Late Bronze Age**

<table>
<thead>
<tr>
<th>Absolute Dates</th>
<th>Tureng</th>
<th>Shah</th>
<th>Narges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbasi 2011</td>
<td>2000-1500 BCE</td>
<td>IIIC$_{1,2}$</td>
<td>IIa$_{2-1}$</td>
</tr>
<tr>
<td>Corrected</td>
<td>2025-1550 cal. BCE</td>
<td>IIIC$_2$</td>
<td>(IIa$_{3}?$)</td>
</tr>
</tbody>
</table>

**5.5 A New Chronological Framework for the Bronze Age Gorgan Plain**

All of the foregoing represents an advancement of our understanding of the third millennium regional chronology of the Gorgan Plain. These efforts have been complicated by the inconsistencies both within and between the sources of chronological information. Some of these problems will only be resolvable with recourse to new systematic and stratigraphically

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$^{90}$ “Late Chalcolithic = ca. 3500-3000; EBA = ca. 3000-23/2200; MBA = ca. 23/2300-18/1700; LBA = ca. 18/1700-13/1200; There’s no break in the sequence in NE Iran. MBA = Hissar IIIB-C; LBA = late Tureng IIIC; EIA = Yaz 1, etc.” (Christopher Thornton, pers. comm. Sept 7, 2016).

$^{91}$ As discussed above (see also Table 5.9), Narges Illb$_1$ overlaps with Tureng IIIC$_1$ but not Shah IIa$_3$. 

314
controlled excavations. Nevertheless, for the purposes of the present investigation, the primary outcome of this chapter has been to clarify the chronology of Abbasi’s site gazetteer by identifying what his era-based chronological terms correspond to in terms of cultural strata, and whether these correspondences are correct or not.

For example, if Abbasi designated a site as Early Bronze Age, in his gazetteer framework this corresponds to Tureng IIA-IIB/Shah III/Narges IIIc (2011). This means that, based on the above discussion, in all likelihood this site designated Early Bronze Age by Abbasi would properly correspond to the Late Chalcolithic in any survey which recognizes Tureng IIA-IIB as the cultural strata comprising this era. The remaining sticking point is that Abbasi’s absolute chronology of the different eras more or less accords with the other sources, so the only way to resolve this question is through recourse to the diagnostic material culture of the strata in question, as in the foregoing discussions. This problem plays out again for the Middle and Late Bronze Ages as well, which are consistently earlier in Abbasi’s reading than what the analysis presented here posits. These issues may not be fully resolvable on the basis of the available information, as only the source of the site locations is cited in the site gazetteer, all of which are either the same sources used in this dissertation or else are unpublished reports in the archives of the Iranian Cultural Heritage, Handicrafts, and Tourism Organization (Abbasi 2011: 199-200).

The analysis presented in this chapter has accomplished several objectives. First and foremost, the relative chronology of the region has been clarified, both in terms of what has been reported in the literature and in terms of resolving inconsistencies between these reported chronologies. In this analysis, I first compared the reported linkages between sites, then related the definitions of key culture-historical periods to cultural strata at the main excavated sites, and finally, evaluated these linkages and definitions with respect to contextually
secure ceramic parallels between Tureng Tepe, Narges Tepe, and Shah Tepe. The fundamental result of this analysis was the production of Table 5.10 (see above). In brief, my examination showed that there were several problem areas: (1) the relationship between Shah III, Narges IV-IIIc and Tureng IIA-B; (2) the relationship between Shah III-Ilb, Narges IIIc-b, and Tureng IIB-IIIB; (3) the relationship between Tureng IIIIC1-2 and Shah Ila2-1.

The most important conclusions here relate to the position of Shah III-Ilb on the one hand, and to the positioning of the final phases of each of the three sites on the other. Shah III-Ilb clearly correlates to both Narges IIIc and IIIb2 as well as to Tureng IIB, IIIB, and an early part of IIIB on the basis of ceramic parallels (see Tables 5.5-5.7). Regarding the end of the sequence, the main question to be resolved is the extent to which Shah Ila4 overlaps with Tureng IIIIC3, or whether it only co-occurs with Tureng IIIC2. It had appeared as though Narges IIIb1 might resolve this issue, but it seems to overlap with both Tureng IIIIC1 and IIIC2. In any case, Narges IIIa only overlaps with Tureng IIIIC2, but may or may not correspond to Shah Ila4. This exercise, while useful in pinning down the exact material bases for the harmonization of the phases between individual sites, does not resolve questions related to the validity of the divisions of particular strata at Shah Tepe and Narges Tappeh (i.e., III-Ilb and Narges IIIb2-1). For example, we can say confidently that Narges IIIb is both earlier (IIIb2) and later (IIIb1) than Abbasi proposes, but we are still left with Shah III-Ilb as a Chalcolithic-Early Bronze transition stratum that spans two (Narges IIIc-IIIb2) or three (Tureng IIB-IIIA-IIIB) phases at the other sites.

Table 5.19 Revised Era-Date-Strata Table

<table>
<thead>
<tr>
<th>Period</th>
<th>cal. BCE 2σ</th>
<th>Gaps Filled</th>
<th>Tureng</th>
<th>Shah</th>
<th>Narges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Bronze Age</td>
<td>2025-1550</td>
<td>2000-1550</td>
<td>IIIC2</td>
<td>(Ila2)</td>
<td>(IIIb1)-IIIA</td>
</tr>
<tr>
<td>Middle Bronze Age</td>
<td>2225-1950</td>
<td>2350-2000</td>
<td>IIIC1</td>
<td>IIa2(12)</td>
<td>IIIb1</td>
</tr>
<tr>
<td>Early Bronze Age</td>
<td>2725-2450</td>
<td>2875-2350</td>
<td>IIIA-IIB</td>
<td>III/IIB-Ilb</td>
<td>--</td>
</tr>
<tr>
<td>Late Chalcolithic</td>
<td>3175-3000</td>
<td>3175-2875</td>
<td>IC-IIB</td>
<td>III-III/Iib</td>
<td>IIIc-IIIb2</td>
</tr>
</tbody>
</table>
Thus, the regional chronology, while still exhibiting some as yet unresolvable ambiguities, has been clarified to the extent possible on the basis of synthesis of chronograms and cross-referencing of ceramic parallels. Tables 5.15-5.18 have important implications for how we understand the chronology of Abbasi’s gazetteer and how we assign new dates to the surface ceramics from Arne’s survey (see Table 6.12). Every attempt has been made in this chapter to maintain the links between these two sources and to explicate precisely how they converge with and diverge from the other primary sources of chronological information in the region. With respect to our ability to date surface ceramics, this should now theoretically be entirely possible for much of the third millennium based on Tables 5.5-5.7, provided that the sample of surface ceramics is comprised of suitably diagnostic specimens.

The chronology of Abbasi’s site gazetteer is still quite problematic, however, due to the major discrepancies between how he and others define the Early and Middle Bronze Age in particular. Thus, in the following chapter, when the terms Late Chalcolithic, Early Bronze Age, and so on are used, these designations are doing double-duty. On the one hand, these terms refer to the Abbasi’s gazetteer chronology, preserving his designations (e.g., Table 5.1a, Tables 5.15-5.18). On the other hand, however, within the analytical framework of this dissertation, these terms should be understood to correlate to the chronology presented in Table 5.19. Only recourse to the actual surface ceramics will be able to resolve the issue of to what Abbasi is actually referring to with all of these designations. It may be the case that Abbasi’s assignment of surface pottery to culture-historical phases is correct, but that his assignment of these phases to eras is incorrect. That is, a large number of sites may have been correctly dated to Tureng IIA-IIIB, but misidentified as belonging to the Early Bronze Age, when in fact they should be dated to the Late Chalcolithic. Obviously, this would have major ramifications for every aspect of the
historical and spatial analysis of regional settlement patterns, but this particular problem cannot be solved with the presently available data. Therefore, Abbasi’s chronology must be treated “as-if-it-were-correct” for the time being, with the knowledge that both his and my frameworks will need to be revisited in the future to verify the degree to which they converge and diverge from each other with reference to a fuller data set of surface ceramics is available (e.g., from the Gorgan Plain Wall Survey and/or the Hiroshima University Survey).

As a final note, it is my hope that this clarified regional chronology may help resolve some issues with respect to the relationship between the phases at Tureng Tepe and Tepe Hissar, and thus to the wider world of the Iranian Plateau and beyond – Tables 5.5-5.7 could certainly have another column added for Hissar, or even for Parkhai (Khlopin 1977, 1986, 2002) Ak Depe, Kara Depe in Turkmenistan (Sarianidi 1971, 1976), or to sites in Iranian Khorasan, such as Tappeh Qal’eh Khan, Tappeh Pahlavan and Tappeh Chalow, all of which are known to date to various points within the interval between ca. 3200-1600 BCE (Garazhian and Askarpour 2011; Vahdati 2010; Vahdati et al. 2019).
CHAPTER 6. SETTLEMENT PATTERNS IN THE GORGAN PLAIN (CA. 3200-1600 BCE)

The archaeological landscape of the Gorgan Plain has been surveyed on multiple occasions (Abbasi 2011; Arne 1945; Kayani 1974; Mortezaei and Farhani 2008; Sauer et al. 2013; Shiomi 1976, 1978). These surveys were conducted over disparate decades, by scholars with radically different disciplinary and national backgrounds. Despite these differences, however, the data collected in the field and presented in the available reports are structured in surprisingly similar ways, affording relatively easy comparison between their results. In this chapter, I discuss the procedures by which I evaluated the characteristics and comparability of the various sources of survey data through data characterization and source criticism, two staples of comparative survey analysis (6.1).

I also present the results of the Gorgan Plain Survey Restudy protocol that I conducted to not only integrate these varying sources of information but also to verify site locations and measurements, as well as the quality and reliability of the survey data according to the three Lawrence Indices of Archaeological Significance, Boundary Certainty, and Geographic Precision (6.2). This procedure led to two primary results: first, the spatial data in the legacy surveys is high-quality overall, despite variations in coordinate systems and methods of recording site morphology, and second, the identification of a large sample of previously unidentified likely prehistoric mounded settlements.

Furthermore, I discuss the procedure by which I extracted chronological information from the source surveys (6.3). Chronological designations for individual sites vary considerably both between and within the sources in terms of the distinct temporal frameworks used, as well as in the quantity and quality of independently verifiable diagnostic ceramic material that can be used to cross-reference the assignments of sites to particular periods. In some cases, it was
necessary to treat all of the information “as-if-it-were-correct,” because there was no way of verifying the designation (e.g., Abbasi 2011). In other cases, plates of potsherds collected or excavated from particular sites were available for inspection (e.g., Abbasi 2016; Ohtsu et al. 2012). In other cases, textual descriptions of diagnostic surface ceramics were available to consult (e.g., Arne 1945; Sauer et al. 2013). Finally, I discuss the results of my own re-examination of the surface ceramics from Arne’s collection, presently stored in Tumba, Sweden.

Lastly, I undertake an analysis of the settlement patterns of the Gorgan Plain from the Chalcolithic to the Bronze Age (6.4). My objective in this section is three-fold: 1) to understand these settlement patterns in light of their environmental context with reference to hydrology and broad landform classes; 2) to chart the change over time in settlement distributions across the four culture-historical eras under examination, focusing on variation in site location, numbers of sites, and site-size; and 3) to examine the particular settlement patterns of the Gorgan Plain in relation to Tosi’s predictions for the entire macro-region. I show that while Tosi’s model does account for some aspects of the settlement patterns under consideration here, there are some considerable differences as well. The Gorgan Plain should therefore be regarded as a distinct region, characterized by a different trajectory of transformations in its settlement geography in comparison to the neighboring areas with which it has often been grouped in discussions of political geography of Iranian Plateau and Central Asia in prehistory.

6.1 Surveys and Source Criticism

One of the main aims of this dissertation is to integrate, synthesize, and extend the results of regional surveys of the Gorgan Plain conducted between 1931 and 2009. Such work faces challenges on many fronts, resulting from the heterogeneity of source-data collected during disparate decades, under diverse disciplinary paradigms, and using differing recording
methods (Alcock and Cherry 2004; Allison 2008; Witcher 2008). These obstacles are, however, not insurmountable. Over the past thirty years, archaeologists have developed a number of ways to harmonize the morphological, chronological, and locational information contained within legacy sources (Lawrence 2012). These methods – grouped under the heading of “source criticism” – involve the description of the available evidence and the recuperation of metadata to clarify the basis of comparison between the sources (Alcock 1993). In this section, I discuss the procedures and results of source criticism conducted on the surveys of the Gorgan Plain, beginning with a thorough characterization of the data followed by comparison of the sources based on survey design, geographic representation, and site description.

6.1.1 Description of the Sources

The historical landscape of the Gorgan Plain has long fascinated European travelers, with reports on and accounts of the location and characteristics of archaeological, geological, and hydrological features of the region appearing as early as the mid-19th century (e.g., Arne 1935; De Bode 1844; De Morgan 1890; Hedin 1918; Rabino 1928; Thompson 1938). While these early reports identified dozens of archaeological sites, systematic archaeological site prospection was not initiated until 1933 when T.J. Arne and W. Schweitzer created the first cartographic archaeological map of the region (Arne 1945: 12-22). Archaeological survey of the Gorgan Plain has continued intermittently ever since, conducted by both foreign and Iranian researchers. The published and unpublished records from four of these surveys and one site gazetteer constitute the primary sources of legacy survey data used in this dissertation (Abbasi 2011; Arne 1945; Mortezaei and Farhani 2008; Sauer et al. 2013; Shiomi 1976, 1978).

These sources offer comprehensive coverage of the most densely occupied parts of Golestans province – i.e., south of the Gorgan Plain river and north of the Alborz mountains.
My attention in this section focuses on each survey’s key features and attributes, as well as their data structures, particularly in terms of survey design, geographic representation, and site description.

Table 6.1 Aggregate Site Data (All Sources)

<table>
<thead>
<tr>
<th>Count Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique Sites in Database</td>
<td>1213</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth</td>
<td>850</td>
</tr>
<tr>
<td>Unique Sites Not Checked in Google Earth</td>
<td>363</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth with Positive Identification</td>
<td>663</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth without Positive Identification</td>
<td>187</td>
</tr>
<tr>
<td>Unique Sites Reported in Multiple Surveys</td>
<td>133</td>
</tr>
<tr>
<td>Unique Sites Reported in Multiple Surveys with Positive Identification</td>
<td>129</td>
</tr>
<tr>
<td>Unique Sites Reported to date to Study Period</td>
<td>241</td>
</tr>
<tr>
<td>Unique Sites Reported to date to Study Period with Positive Identification</td>
<td>184</td>
</tr>
</tbody>
</table>

Figure 6.1 Map of the Spatial Extent of the Survey Sources

Legend
- Caspian Sea
- Provincial Border
- Lake & Reservoir
- Swamp & Marsh
- Rivers

Survey Boundaries (Hopper 2018)
- Arue (1945)
- GWS - Remote Sensing
- Abasz (2011)
- Mortzaei and Farhani (2008)
- Shioni (1976-78)

92 Survey boundary polygons created and generously shared by Dr. Kristen Hopper (pers. comm. 2018).
Altogether, I was able to extract over 1200 unique sites from the five sources, many of which were not “visited,” as they were reported to only have chronological components post-dating the period of focus here, i.e., the Chalcolithic through Late Bronze Age. I recorded information on 851 of these unique sites, resulting in the positive identification of a sample of 663 unique sites (Table 6.1).

**Figure 6.2 All Reported Site Locations by Source**

![Map of site locations](image)

**6.1.1.1 Abbasi’s Site Gazetteer**

This gazetteer compiles the results of many previous surveys into a comprehensive site register covering all of the major culture-historical periods from the Neolithic through the Islamic era, with the exception of Iron I-II (2011: 199-238). Unfortunately, the sources used to compile this gazetteer are discussed only in aggregate, rendering it difficult to connect specific
data domains to their points of origin; furthermore, most of the sources are unpublished inaccessible reports produced by officials of the Iranian Cultural Heritage, Handicrafts, and Tourism Organization (ICHHTO). The site data presented in the 2011 report comprise point distribution maps of site location for the Gorgan Plain and lists of site names, grouped by culture-historical period. The maps and the lists are connected together through the use of numerical map labels, which correspond to rows in the period-specific site name lists. This method of data presentation afforded a reasonably successful reverse-engineering of the information such that sites could be identified in Google Earth and CORONA imagery. For certain time-periods, especially Iron III-IV, Parthian, and Islamic, the density of sites in certain areas (especially in the area immediately to the south and southwest of Gonbad-e Kavus) meant that no label was discernable; these sites have not been included in the master site database.

Table 6.2 Counts of Sites as reported by Abbasi (2011)

<table>
<thead>
<tr>
<th>Count Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites Reported in Monograph</td>
<td>1554</td>
</tr>
<tr>
<td>Unique Sites in the Database</td>
<td>594</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth</td>
<td>303</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth with Positive Identification</td>
<td>240</td>
</tr>
<tr>
<td>Abbasi Sites Reported in Other Surveys</td>
<td>78</td>
</tr>
<tr>
<td>Abbasi Sites Reported in Other Surveys with Positive Identification</td>
<td>75</td>
</tr>
</tbody>
</table>

Another problem with this source is that multi-period sites are overrepresented in raw counts, as they are listed once for each chronological component, rendering the total count of sites in the tables considerably inflated (compare the first two rows of Table 6.2). No additional information, such as surface ceramics or other site attributes are provided in this report. The sites reported in the Abbasi gazetteer comprise a large percentage of the overall sites in the master database for this dissertation (594 unique reported sites out of a total of 1213, or 49%).
6.1.1.2 Arne’s “Archaeological Map of the Turkoman Steppe”

The survey by T.J. Arne and W. Schweitzer was the first of its kind in the region, using a cartographic approach to map the Swedish concession, stretching between Bandar-e Torkaman in the west and Gonbad-e Kavus in the east and from the Alborz in the south to the Kizil Alan in the north (Arne 1945: 14).

By Arne’s estimation, the survey area extended 110 km east to west and between 10-15/35-40 km north to south, covering an area no larger than 2,500 km². The explicitly stated aim of the mapping program was to mark the location of ancient remains still visible on the ground; for financial reasons the planned extensive topographic survey and plotting of river-courses, roads, irrigation-canals, modern villages, and tent settlements was not conducted. The archaeological map is drawn at a scale of 1:100000 but lacks geographic coordinates or a grid system, rendering it difficult but not impossible to georeference. In the end, the map is remarkably accurate given the rudimentary field and drafting methods by which it was produced, which will be discussed in more detail below.

Table 6.3 Counts of Sites as reported by Arne (1945)

<table>
<thead>
<tr>
<th>Count Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites Reported in Monograph Text</td>
<td>303</td>
</tr>
<tr>
<td>Sites Reported in Site Table</td>
<td>233</td>
</tr>
<tr>
<td>Sites Reported in Site Map</td>
<td>334</td>
</tr>
<tr>
<td>Unique Sites in the Database</td>
<td>334</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth</td>
<td>322</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth with Positive Identification</td>
<td>226</td>
</tr>
<tr>
<td>Arne Sites Reported in Other Surveys</td>
<td>98</td>
</tr>
<tr>
<td>Arne Sites Reported in Other Surveys with Positive Identification</td>
<td>94</td>
</tr>
</tbody>
</table>

In total, Arne reports that there are 303 sites in his survey (1945: 15), but the site table only presents 233 (1945: 23-30), whereas the map presents 334 plotted sites (1945: Fig. 3).

Additional data available from this report includes a large plate showing plan and section
sketches of 160 sites, as well as a spreadsheet that presents the names of sites, their height (in “meters above the surrounding plain”), physical dimensions (whether in length by width or diameter), overall morphology, surface finds, and miscellaneous observations. Ceramics and other surface finds were collected from 90 sites (Arne 1945: 21-22). The information relating to these finds is exceedingly general, referring most often to a rough count and ware classification (painted, Islamic, or surface color). Arne did not attempt to provide a precise dating for any of the sites, instead referencing them in relation to their diagnostic pottery types. Arne’s report contains a lengthy discussion about the size and morphology of different categories of sites, but as this is primarily a descriptive account and merely summarizes the data in the tables, it is of little analytical utility.

6.1.1.3 Mortezaei and Farhani’s Map of Gonbad-e Kavus County

The survey conducted in 2004 by M. Mortezaei and A. Farhani covers the smallest areal extent of the five sources, comprising only the western hinterland of the city of Gonbad-e Kavus. According to the authors, the survey was based on a review of older topographic maps and involved targeted site visits in which artifacts were collected from plots using random sampling and topographic features were recorded including height and base area dimensions as well as elevation contours (Mortezaei and Farhani 2008: 176). This survey identified 64 archaeological sites, 21 belonging to the prehistoric periods (Neolithic, Chalcolithic, Bronze, and Iron Ages), 55 related to the historic periods (Achaemenid, Parthian, Sasanian), and 35 with Islamic occupations. The sites identified are primarily occupation mounds, but the register also includes “flat” sites, bridges, and religious monuments.
Table 6.4 Counts of Sites as reported by Mortezaei and Farhani (2008)

<table>
<thead>
<tr>
<th>Count Type</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites Reported in Article</td>
<td>63</td>
</tr>
<tr>
<td>Unique Sites in the Database</td>
<td>63</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth</td>
<td>61</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth with Positive Identification</td>
<td>49</td>
</tr>
<tr>
<td>Mortezaei and Farhani Sites Reported in Other Surveys</td>
<td>25</td>
</tr>
</tbody>
</table>

The data included in the preliminary report comprises a site identification number, site name, longitude and latitude (in Degrees Decimal Minutes), length, width, and height, as well as presence/absence of surface finds categories (e.g., ceramics, brick, glass, lithics, etc.) and presence/absence of prehistoric, historic, or Islamic surface pottery. Tables of ceramic descriptions for selected sites are also provided, but the attributes presented in these tables are generally non-diagnostic.

6.1.1.4 Sauer and Colleagues’ Borderland Projects of Sasanian Empire

The Gorgan Plain Wall Survey report is by far the most detailed of the five sources, but as it is primarily focused on the Sasanian period, it is of limited utility to the present study. It does, however, permit the identification of likely and possible Bronze Age components at sites with considerable later overburden and furthermore provides dates for several sites identified during virtual site prospection. The Gorgan Plain Wall Survey is a question-driven project with a clear and explicitly presented research design, oriented toward clarifying the chronology of the construction, use, and abandonment of the Gorgan Plain Wall, its associated fortifications, production facilities, and settlements, as well as understanding the overall social, economic, and military organization of the Sasanian frontier.

The types of data contained in this report are numerous and varied, including detailed examination of travelers’ accounts, satellite imagery analysis, field survey, ceramic analysis, test
excavations, geophysical prospection, and others. The site data used consist of GPS points presented via UTM coordinates, as well as toponymy, detailed descriptions of site visits and fieldwalking conducted in the vicinity, and a chart indicating presence/absence of different chronological components in the surface ceramic assemblages collected from each site.

Table 6.5 Counts of Sites as reported by Sauer et al. (2013)

<table>
<thead>
<tr>
<th>Count Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites Reported in Monograph</td>
<td>60</td>
</tr>
<tr>
<td>Unique Sites in the Database</td>
<td>56</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth</td>
<td>29</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth with Positive Identification</td>
<td>26</td>
</tr>
<tr>
<td>GWS Sites Reported in Other Surveys</td>
<td>22</td>
</tr>
<tr>
<td>GWS Sites Reported in Other Surveys with Positive Identification</td>
<td>21</td>
</tr>
</tbody>
</table>

One of the significant contributions of this survey is that the GPS points it presents are the most accurate and precise of all the sources; at almost all sites, multiple GPS points were recorded, including centroids and perimeters, all of which have associated metadata clarifying what the GPS point corresponds to on the ground. Additionally, the textual descriptions of the site visits often contain detailed information about the ceramics that can be used to further clarify their chronology, even when the surveyors themselves were unable to do so.

6.1.1.5 Shiomi’s “Archaeological Map of the Gorgan Plain, Iran”

This survey, conducted in 1974-1976 by the Hiroshima University Scientific Expedition under the direction of Hiroshi Shiomi, was originally planned to cover the entirety of Arne’s survey area (Hiroshima University Scientific Expedition 1973). Due to the Iranian Revolution of 1978-79, however, the survey was truncated, leaving the eastern- and northern-most areas of the planned survey zone undocumented. The Hiroshima Expedition plotted site locations on a detailed topographic map that is anchored to a Lat/Long coordinate system, facilitating both accurate and precise georeferencing. The perimeters and base areas of the sites are clearly

328
indicated on the maps. The associated data table includes site name, form, height, base area, surface remains, ground conditions, and miscellaneous observations. Unfortunately, despite the relatively high quality of the information presented in the two published archaeological maps, beyond these two sources and their associated tables, the only published reported related to this survey is a narrative account of the preliminary travel to Iran by the University of Hiroshima Expedition in 1971 (Hiroshima University Scientific Expedition 1973). Consequently, the collection of photographs and surface remains are mostly unavailable, and the results of the test excavations at Tappeh Anjirab, Golbagh Tappeh and Tappeh Hosseinabad are only partially published (but see Ohtsu and Arimatsu 2012). Nevertheless, Shiomi reports 224 archaeological sites, approximately half of which can be dated to the 3rd millennium on the basis of reported surface ceramics.

**Table 6.6 Counts of Sites as reported by Shiomi (1976, 1978)**

<table>
<thead>
<tr>
<th>Count Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites Reported in Gazetteer</td>
<td>224</td>
</tr>
<tr>
<td>Unique Sites in the Database</td>
<td>224</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth</td>
<td>220</td>
</tr>
<tr>
<td>Unique Sites Checked in Google Earth with Positive Identification</td>
<td>200</td>
</tr>
<tr>
<td>Shiomi Sites Reported in Other Surveys</td>
<td>80</td>
</tr>
<tr>
<td>Shiomi Sites Reported in Other Surveys with Positive Identification</td>
<td>79</td>
</tr>
</tbody>
</table>

**6.1.2 Summary Characterization of the Sources**

While each of the sources has its particularities, in aggregate, they share broad continuities. Clearly, data collected from contemporary surveys using systematic field-walking transects and GPS-based recording technology produces a substantially different record from an opportunistic vehicle survey focused on locating tell-sites using analog recording techniques. This sample of surveys, nevertheless, shares more than it differs, with just one exception. The
similarities between the surveys made the process of data integration much smoother than originally expected.

### 6.1.2.1 Survey Design

All but one of the sources (the Gorgan Plain Wall Survey) can be characterized as a site gazetteer, i.e., a map with associated lists of sites and attributes. The sample includes: an archival compilation of site locations, names and dates derived from study of unpublished cultural heritage reports (Abbasi 2011); an opportunistic and systematic tell-spotting survey (Arne 1945; Shiomi 1976, 1978); and two systematic targeted sampling studies (Mortezaei and Farhani 2008; Sauer et al. 2013). The surveys diverge considerably in areal coverage, however, ranging from ca. 470 km² (Mortezaei and Farhani 2008) to ca. 13125 km² (Sauer et al. 2013). The most extensive on-the-ground surveys are those of Shiomi and Arne, who report covering ca. 4000 and 2500 km² respectively; in reality, the former covered slightly less than claimed, ca. 1880 km², and the latter covered slightly more, ca. 2955 km² (Hopper 2017).

#### Table 6.7 Comparison between the source surveys in terms of Survey Design

<table>
<thead>
<tr>
<th>Survey</th>
<th>Research Design</th>
<th>Period-Specific Objectives</th>
<th>Seasons</th>
<th>Total Area (km²)*</th>
<th>Intensity (area/seasons)</th>
<th>Identified Sites (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbasi 2011</td>
<td>Secondary Compilation</td>
<td>No</td>
<td>NoData</td>
<td>20145</td>
<td>n/a</td>
<td>ca. 600-1500**</td>
</tr>
<tr>
<td>Arne 1945</td>
<td>Opportunistic Tell-Spotting</td>
<td>No</td>
<td>1</td>
<td>2955</td>
<td>2955</td>
<td>303</td>
</tr>
<tr>
<td>Mortezaei and Farhani 2008</td>
<td>Systematic Targeted Sampling</td>
<td>No</td>
<td>1</td>
<td>470</td>
<td>470</td>
<td>64</td>
</tr>
<tr>
<td>Sauer et al. 2013</td>
<td>Systematic Targeted Sampling</td>
<td>Yes</td>
<td>5</td>
<td>13125***</td>
<td>2625</td>
<td>56</td>
</tr>
<tr>
<td>Shiomi 1974-6</td>
<td>Systematic Tell-Spotting</td>
<td>No</td>
<td>2</td>
<td>1880</td>
<td>940</td>
<td>224</td>
</tr>
<tr>
<td>Gorgan Survey Restudy 2016-2018</td>
<td>Systematic Tell-Spotting</td>
<td>No</td>
<td>n/a</td>
<td>11400</td>
<td>n/a</td>
<td>184</td>
</tr>
</tbody>
</table>

*Calculated from shapefiles generated by Kristen Hopper
**Difficult to accurately count due to duplicate counting of multi-component sites and complications with correlating maps to tables
***Reported in text that total survey area for satellite work measured approx. 200x50km², actual ground coverage likely much less

Despite the range of survey designs, none of these surveys can be characterized as full-coverage. One uniting factor is that all are site-based, rather than landscape- or artifact-based. The number of sites identified by each survey correlates both with its intensity and whether it was more opportunistic or systematic, further suggesting that the recovery rates of these surveys are broadly comparable to each other. Similar recovery rates (i.e. proportions of
reported sites positively identified) and common data structures also support the comparability of the surveys. The sources mainly differ in the frequency with which they report particular categories of information as well as the quality/reliability of this information when present. Typically, the survey records consist of a list of sites with (mostly) unique identifiers, names (when and where available), descriptions of site morphology, some chronological and artifactual information, either a distribution map or a list of coordinates, and occasional comments on the field conditions encountered by the surveyors on-site.

6.1.2.2 Geographic Representation

The sources represent site locations in one of three ways: point-distribution maps (Abbasi 2011; Arne 1945), topographic maps (Shiomi 1976, 1978), or tables of GPS coordinates (Mortezaei and Farhani 2008; Sauer et al. 2013). Only one of the surveys (GWS) made use of satellite imagery. The accuracy and precision of site locations varied according to the method used, but both dimensions were remarkably high given the wide range of field methods and conditions. A subsequent section of this chapter quantifies and compares inter-survey accuracy and precision.

Table 6.8 Comparison between the source surveys in terms of Geographic Representation

<table>
<thead>
<tr>
<th>Survey</th>
<th>Dot-Distribution Map</th>
<th>Topographic Distribution Map</th>
<th>GPS Coordinates</th>
<th>Use of Aerial Imagery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbasi 2011</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Arne 1945</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Mortezaei and Farhani 2008</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sauer et al. 2013</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Shiomi 1974–6</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Three primary challenges were encountered with the geographic information the five sources, relating principally to the use and reporting of coordinate systems and scales, or the lack thereof. First, Arne’s distribution map contained no coordinates; consequently, the map had to be georeferenced based on the location of known sites such as the cities of Gorgan Plain,
Gonbad-e Kavvus, Bibi Shirvan, and archaeological sites such as Tureng Tepe. This method of
georeferencing, while ultimately successful overall, also resulted in some considerable distortion
of the site locations, but this distortion was consistent (i.e., approximately 500-1000m, offset at
120-150°) enabling confident identifications in many cases. Second, Mortezaei and Farhani
report GPS coordinates in Degrees Decimal Minutes, which must be converted to Decimal
Degrees or UTM for ease of storage and inter-software convertibility. Unfortunately, there are
several mistakes in the reporting of these coordinates (e.g., there cannot be more than 60 arc-
minutes in a coordinate), which affected the DDM-DD conversion and subsequently the ability
to locate the sites. Otherwise, the reported site locations in Mortezaei and Farhani’s survey are
quite accurate overall. Third, Abbasi’s distribution maps are presented at such a scale that
makes it impossible to distinguish what map numbers are connected with which dots during the
Late Iron, Parthian, and Islamic periods. This issue therefore severed the connection between
the map and the table containing the corresponding site names and chronological information.
This was also a minor issue in certain areas for the Early Bronze Age, but all discrepancies
related to this period were resolved through cross-reference with the other surveys and modern
toponymy.

6.1.2.3 Site Description

The major subcategories of site description are morphological and cultural. The
morphological categories include measurements of base area and mound height, graphic
representations, textual descriptions, and ground-conditions. The base area measurements are
often given in length x width for sites with oblong and quadrangular plans, or in diameter for
sites that appear circular or round in plan. In the case of Shiomi’s survey and the Gorgan Plain
Wall Survey, base-area can be more or less directly calculated. Shiomi’s maps and the GWS
coordinates table clearly indicate the boundaries of the sites, which can be converted into polygons and measured in most GIS platforms. Height measurements are given in meters, but none of the surveys that report this information give any indication of how these measurements were obtained.

Graphic representations of site morphology are divided into three categories: sketches (Arne, GWS), topographic maps (Shiomi, GWS), and satellite imagery (GWS). In terms of narrative description of site morphology, two sources (Abbasi and Mortezaei/Farhani) provide no information, one survey (Arne) provides brief descriptions (e.g., “oval” or “four-cornered”) for about half of the sites, and two surveys (Shiomi and GWS) give descriptions of every single reported site. Shiomi’s descriptions are not much more detailed than Arne’s, whereas GWS’s site-morphology descriptions are considerably more detailed. Assessment of ground conditions varies widely, with Arne and Shiomi providing degrees of commentary on observations such as “wheat cultivation” or “Islamic cemetery,” which could be interesting to evaluate diachronically where these observations overlap to get a sense of changing land-use regimes between the 1930s and 1970s (see also McLachlan 1988). The Gorgan Plain Wall Survey provides the richest information regarding ground-conditions and surface visibility.
The cultural categories include chronological assessments and/or descriptions of surface remains, which is usually just an indication of the presence or absence of different ceramic types. The surveys vary in how these attributes are recorded and presented, but only the Gorgan Plain Wall Survey has explicit and useful metadata. In other words, four out of the five surveys do not describe data collection/analysis procedures or the interpretive schema that were used to make chronological assessments. Two surveys (Arne and Shiomi) report only pottery ware-types as chronological indices (e.g., Painted Ware, Dark Grey Burnished Ware, Glazed Ware, etc.), one survey (Mortezaei/Farhani) provide only broad eras (e.g., Prehistoric, Historic, Islamic, etc.), and two (Abbasi and GWS) provide period-specific assessments (e.g., Neolithic, Chalcolithic, Early Bronze Age, etc.). In all cases except for Abbasi (no information) and GWS (detailed information), broad categories of surface remains are reported on a presence/absence basis (e.g., pottery, brick, flint, glass, etc.). Unfortunately, only one of the
sources (GWS) provides illustration of the surface finds and ceramics, which primarily relate to periods post-dating the 3rd millennium.

6.1.3 Summary of Survey Source Criticism

According to the three categories of criteria – survey design, geographic representation, and site description – the surveys exhibit less data-structure diversity than might otherwise be expected, given the eighty years separating the earliest and most recent surveys, as well as the range of disciplinary and national backgrounds of the researchers involved. Part of this may be explained by the nature of the record, for two related reasons: 1) the Gorgan Plain is a landscape of tells and 2) low-intensity large-scale approaches to mapping landscapes of tells tend to record similar categories of information. The basic variables are location, toponymy, morphology, and surface finds; additional variables may or may not include taphonomy, textual descriptions, and graphic representations.

Due to the use of broadly similar research designs and the same empirical categories, the data collected by these surveys can be more or less easily integrated. Given the particularities of the ways the data are reported, however, it is necessary to record degrees of confidence in the accuracy, precision, and reliability of the survey information. Additional caveats to consider in relation to these records include: 1) the patchiness of records of surface remains decreases our overall confidence in the reported chronological assessments in light of the often-tenuous relationship between surface and subsurface remains (e.g., Alcock 1996; Ammerman 1985; David and Thomas 2016; Orton 2000; Stafford 1995; Wilkinson, T.J. 1982), and 2) evidence of sub-site spatiotemporal differentiation is completely absent from all of the sources, preventing us from tracking the growth and contraction of multi-component sites, occupied during two or more culture-historical periods.
It would appear at first glance, then, that the depth and sophistication of the questions that may be answered by these data are somewhat restricted. Closer examination undermines this pessimism. While the temporal and locational variation in the regional settlement patterns of the Gorgan Plain is not accompanied by the kind of rich cultural information required for complex interactional and network modeling (e.g., Mills et al. 2015; Knappett 2013), the record is still robust enough to contribute to the development of regional locational analysis more broadly.

6.2 Gorgan Plain Survey Restudy

More recently, scholars have begun to extend the domain of comparative survey by augmenting existing records through systematic remote site prospection (e.g., Franklin and Hammer 2018; Green and Petrie 2018; Hammer et al. 2018; Hammer and Lauricella 2017; Thomas and Kidd 2017). Thus, in addition to the descriptive source criticism detailed in the previous section, this dissertation conducted a virtual remote survey (Gorgan Plain Survey Restudy, hereafter GSR) in order to: 1) prospect for “new” tell-settlements in the region using Google Earth; 2) re-locate and record previously reported site locations; and 3) empirically characterize the results of the previous surveys using Lawrence’s indices (Geographical Precision, Boundary Certainty and Archaeological Significance) through the protocol described in 4.3.2.2. In this section, the results related to each of these three aims will be presented.

6.2.1 Site Prospection

The GSR protocol, in addition to systematically inspecting all reported site locations, also conducted a facsimile of a tell-spotting survey through intensive visual inspection of Google Earth imagery of 10x10 km² grid squares super-imposed over the Gorgan Plain (Figures 6.3a-
6.3b). Some of these sites had been previously identified by the author prior to the systematic GSR survey (Figure 6.4a-6.4c). These overlaps between unsystematic remote tell-spotting and reported site-locations, when cross-checked and validated against graphic representations (e.g., Arne/Shiomi) or textual description (e.g., GWS), suggest that this method is a viable prospection strategy for the identification of tell-settlements (Figure 6.4b). This suggestion is further reinforced by the tight spatial correlation between 38 of the virtually identified sites and later-period Abbasi sites which were added to the geospatial database subsequent to the completion of the GSR protocol (Figure 6.4c).

Figure 6.3a Failure to Locate Unique Reported Sites by Source
In total, 114 new sites were identified through the systematic virtual prospection routine that had not been previously reported by the main sources (Figure 6.4a). These new identifications are spread fairly evenly throughout the Alborz Piedmont and the forest-steppe zone between the foothills and the Gorgan Plain River. As with the overall site-database, few of these sites were identified north of the Gorgan Plain river, and surprisingly few tell-settlements were identified in the upland valleys of the Alborz surrounding the plain. The apparent dearth of tells in these zones likely results from the fact that settlements in the uplands are by necessity built on or into hillsides and therefore erode at a more rapid rate than in the lowlands. Consequently, in the Alborz valleys, sites signature that would be readily apparent on the ground are undetectable through visual inspection of satellite photography. Similarly, we should expect that distinct erosional processes north of the Gorgan Plain river are also occluding site-
signatures in this area from simple visual inspection of satellite imagery. In any case, future analysis should probe the “new” site identifications in all areas to detect if there are any variables or characteristics of these sites that made them differentially more detectable in the satellite imagery but less so on the ground.

The question remains, given the density of these site locations in areas that were previously surveyed (in some cases repeatedly), why were they not reported in the on-the-ground surveys? Is it a factor of the translation of the reported survey information into digital format and inaccuracies and imprecisions in this process that threw off reported locations? Consequently, should there actually be a higher correlation between the GSR-identified sites and previous surveys, or is it the case that these surveys simply missed particular categories of sites? If not, what other factors might account for the density of “new” site identifications in repeatedly-surveyed areas? In any case, these “new” site identifications are of great value, as they should be the first stops on future surveys in order to study their surface remains and attempt to assess first and foremost whether they are sites at all, and if they are, to evaluate their chronology and suitability for further investigation.

**Figure 6.4a Counts of "New" GSR Sites Already Reported**

![Graph showing counts of "New" GSR Sites Already Reported]
Figure 6.4b Geographic Distribution of “New” Sites Prospected in Google Earth

Figure 6.4c Sites identified in Gorgan Plain Survey Restudy Overlap with Reported Sites
If we ask whether GSR-identified sites are related to previously reported sites, it should be mentioned that the Google Earth protocol failed to locate 22% of all reported site locations that were checked (i.e., 188 out of 851). Of course, there would be some double-counting in this figure, as these numbers represent the aggregate sum of each source compared to the results of GSR (Figure 6.3a). In the end, double-counting has only a small effect on the rate of No Positive Identification, however, as GSR failed to locate only 4 out of 133 unique sites reported in two or more sources. Breaking down the results to compare between the sources we see that the best rate of correlation between reported (source) and recorded (GSR) site identifications was with Shiomi (91%, i.e., 200 positive identifications out of 220 checked unique reported locations). The other three sources had lower, but still quite good, rates of positive site identification; Mortezaei and Farhani’s reported site locations correlated to GSR positive identifications 80% of the time (i.e., 49 out of 62), Abbasi’s reported site locations correlated with positive GSR identification 79% of instances (i.e., 240 out of 303), and Arne’s reported sites corresponding to positive GSR identifications in 70% of cases (i.e., 226 out of 322).

The high success rate (i.e., approximately three out of four or better) in re-locating mounded sites reported in the legacy sources using Google Earth is significant. This result, along with the 114 “newly identified” sites further demonstrates the utility of virtual site prospection. In terms of comparison between the legacy sources, the survey with the lowest rate of Positive Identification is the oldest and least geographically precise (Arne), and the source with the highest success rate is the one with a topographic map and accurate coordinate readings (Shiomi). Crucially, as discussed in Chapter 4, the GSR protocol did not only seek to locate sites, but to describe them according to standardized categories and to evaluate the information provided by the sources. The subsequent two sections further examine the differences between
the surveys in terms of their quality (evaluating the reported information) and reliability (evaluating the reported information in comparison to the recorded information).

6.2.2 Characterization of Source Quality

In this section the Gorgan Plain Wall Survey is not included, as it was only selectively used in this analysis to attempt to date “new” sites identified in the GSR. Generally speaking, however, the GWS scores highly on all of the Lawrence Indices. To make sense of the Lawrence Indices, it is most helpful to examine the “reported” information and the “recorded” information separately. In the case of the former, this is an extension of data characterization, giving us a sense of the quality of the data that has been reported by the legacy surveys and sources. In the case of the latter, the side-by-side comparison of the reported survey data to the results of GSR gives us a sense of the reliability of these data.

Figure 6.5a Source Characterization
Beginning with the reported Geographic Precision, the legacy surveys are well-sorted into two quality groups: high (Mortezaei/Farhani and Shiomi) and low (Abbasi and Arne) (Figure 6.5a). This distinction primarily relates to two variables: 1) whether coordinates are reported in tabular form or otherwise; and/or 2) how accurately the maps can be georeferenced. For example, Shiomi does not report site coordinates, but the topographic map is highly accurate and is anchored to a Longitude-Latitude grid; consequently, the geographic precision of Shiomi’s reported site locations is uniformly high (Figure 6.6a), with the exception of the map tiles where sites are reported merely as dots (e.g., tiles C6, D6, and F4, see Figure 6.6b). As an opposite
example, Arne does not report coordinates, either for individual sites or for the map as a whole, resulting in a uniform low rating for geographic precision of the reported site locations.

**Figure 6.6 Examples of Boundary Certainty in Shiomi’s Map Tiles**

![Figures 6.6a and 6.6b](image)

In terms of Boundary Certainty, the legacy surveys vary more in their quality (Figure 6.5b). Two of the sources do not report any information related to site boundaries (Abbasi and Mortezaei/Farhani). In both of these cases, only site location is reported, whether this is represented as a dot-on-a-map or as an (x,y) coordinate pair. One of the sources (Arne) has an approximately even split between sites with low boundary certainty and those with negligible boundary certainty. The sites with low boundary certainty are represented by plan/profile sketches that are purportedly to-scale; based on the results of GSR, Arne’s plan sketches turned out to not always be to-scale but were nevertheless quite useful in some cases for site identification and in other cases may provide interesting clues as to the sorts of taphonomic and erosional processes that these sites have experienced over the past 80 years. The final source (Shiomi) has a consistently high Boundary Certainty rating, because the published topographic map is highly accurate, and the site extents are indicated not only by contour lines, but also by red ink (e.g., Figure 6.6a). In a few cases, sites were only indicated with dots on certain extensions of the map (e.g., Figure 6.6b), but in almost all cases the GSR was not able to re-
locate these sites. Therefore, it was not possible to evaluate the Boundary Certainty of these
reported site locations.

Archaeological significance has the least amount of variation between the legacy
sources, with all but one (Arne) exhibiting the same pattern. Part of this pattern may be an
artifact of how “Archaeological Significance” was defined with relation to the reported
information, which was a very simple measure of how many distinct archaeological components
or categories of artifacts were reported (see Chapter 4.3.2.1). In sum, Abbasi,
Mortezaei/Farhani, and Shiomi exhibit an approximate 3:2:1 ratio between high, medium, and
low; that is to say, for the plurality of sites, the legacy sources report at least one chronological
assessment or category of artifacts, and most often there are multiple components and surface
remains associated with each reported site location. Arne, on the other hand, had the highest
incidence of sites which had no chronological or surface remains reported, with approximately
two-thirds of the reported sites lacking any form of culturally diagnostic assessment.

6.2.3 Characterization of Source Reliability

In this analysis, the reported information from each source for each site is compared
against the information recorded during the GSR protocol. An important caveat to note in the
interpretation of the numbers presented below is that in some cases, there are mismatches
between the number of reported sites and the number of recorded sites. This is especially
noticeable in the case of Abbasi, where 292 of the reported sites in the database were not
checked due to their lack of reported pre-Iron Age components. In other cases, this is due to
issues with georeferencing (Shiomi, Arne), or due to the exclusion of obviously non-mounded
sites (Mortezaei and Farhani include several notable historic bridges in the vicinity of Gonbad-e
Kavus in their table).
6.2.3.1 Geographic Precision

In comparison with the uniform Low rating for reported geographic information in Abbasi’s gazetteer, 170 (56%) of the recorded sites were found within 100 meters of the reported location, 51 (17%) were found within 1 kilometer of the reported location, and 19 (6%) sites were found within 2 kilometers of the reported location. 63 sites (21%) were not located.

Arne’s reported survey information displays similar degrees of geographical precision to Abbasi’s gazetteer, with 106 (32%) of positively identified sites within 100 meters of the reported location, 74 (22%) within 1 kilometer, and 46 (14%) within 2 kilometers of the reported location. 96 sites (29%) were not located.

Figure 6.7 Reported Versus Reported Geographic Precision Ratings

Despite having a high degree of geographical precision according to the reported information, the reliability of Mortezaei and Farhani’s geographic data exhibits the same
distribution as with Abbasi and Arne, with 32 (53%) sites identified within 100 meters of the reported location, 10 sites (16%) within 1 kilometer of the reported location, and 7 (12%) within 2 kilometers of the reported location. 13 sites (20%) were not located. In some cases, these failures to locate sites were apparently due to development activities, but in several cases, this was due to misreporting errors in the DDM coordinate system, which rendered it impossible to get an accurate Lat/Long reading resulting in No Positive Identification for these sites.

Shiomi’s survey, like Mortezaei and Farhani’s, has a high degree of geographical precision in the reported site locations but differs in the proportion of these measurements that are highly reliable. 180 (82%) of the reported site locations were within 100 meters of the actual site location, 12 (6%) sites were within 1 kilometer, and 8 (4%) were within 2 kilometers. Shiomi’s survey had the lowest proportion of failures to identify sites based on reported locations, i.e., 20 (9%). Almost all of these points were found in just one sector of the survey, where the locations were only plotted with dots and lacked any topographic information to guide their relocation.

6.2.3.2 Boundary Certainty

Abbasi’s gazetteer, as previously mentioned, presented sites only as points on a dot-distribution map. Of the 303 site locations that were checked during the GSR protocol, 118 (39%) were rated as having high boundary certainty, 65 (21%) with medium boundary certainty and 57 (19%) with low boundary certainty. 63 sites (21%) were not located, and thus received a boundary certainty rating of negligible.

Arne’s survey, as one of the two that report site-boundaries in some form or another, suggested that there might be a greater proportion of sites with high ratings in this set. The distribution of ratings for this index, however, are quite similar to the sources for which there is
no reported boundary information. Of the 322 site locations that were checked, 123 (38%) were rated as having high boundary certainty, 66 (20%) with medium boundary certainty and 37 (11%) with low boundary certainty. 96 sites (30%) were not located, and thus received a boundary certainty rating of negligible.

Figure 6.8 Reported Versus Reported Boundary Certainty Ratings

Mortezaei and Farhani’s survey, like Abbasi’s, did not report any boundary information, only site locations. Interestingly, this source presents a different distribution of boundary certainty ratings, with 20 (33%) sites receiving a high rating, 19 (31%) sites receiving a medium rating, and 9 (15%) sites receiving a low rating. 13 (20%) sites were not located. This is the only source for which there were more sites receiving a medium or low rating than a high rating. This can possibly be attributed to the nature of the specific area covered by this survey, or equally as likely, to the fact that many of the sites reported in this survey dating to the Islamic period are
not tell-settlements. Additionally, a number of sites were reported that correspond to the medieval cities of Bibi Shirvan and Jorjan, which have exceedingly complex urban morphologies and unclear boundaries.

Shiomi’s survey had the highest reported boundary certainty, with almost all of the sites in the report having their extents indicated directly on the map (though approximately 21 sites were represented only as dots – few of these sites were actually located in GSR). In contrast to the reported information, the GSR protocol rated 92 (42%) sites as having high boundary certainty, 49 (22%) sites as having medium boundary certainty, and 53 (24%) sites as having low boundary certainty. 26 (12%) sites had negligible boundary certainty (including 19 sites that were not located). This distribution can be attributed to the fact that Shiomi’s survey covered an area that is today heavily cultivated and where the rate of site attrition due to mechanical plowing and other forms of land amelioration have considerably eroded many sites.

6.2.3.3 Archaeological Significance

Figure 6.9 Reported Versus Archaeological Significance Certainty Ratings
With Abbasi, the distribution of reported and recorded ratings for this index largely mirror each other. Of the 303 checked sites, 155 (51%) received a high rating, 74 (24%) received a medium rating, and 11 (4%) received a low rating. 63 (21%) sites were not located and therefore received a negligible rating.

Arne’s survey is perhaps the most interesting from the perspective of archaeological significance. In the reported information, the preponderance of sites received a low rating, due to the underreporting of cultural materials in the original report. On the recorded side, however, the distribution is quite similar to the other surveys, with a large number of high assessments (126, i.e., 39%). 71 (22%) sites received a medium rating, and 30 (9%) received a low rating. 95 (30%) sites received a negligible rating, as they were either not located, or else, were unlikely to be an archaeological site. The divergence in the distribution of ratings for this index between reported and recorded assessments is likely due to the contribution of sites for which the reported information either did not contain a site-sketch or any cultural information (or both), but which were clearly mounded settlement sites based on the GSR recording protocol.

Much like with Abbasi, the distribution of reported and recorded ratings for archaeological significance are quite similar in Mortezaei and Farhani’s survey. Of the 62 checked sites, 32 (53%) received a high rating, 11 (18%) received a medium rating, and 5 (8%)
received a low rating. 14 (20%) sites were not located and therefore received a negligible rating, and one site was determined not to be archaeological. This is a somewhat unexpected result, when compared to the boundary certainty index for the same site and remains to be explained.

Finally, the distribution of archaeological significance ratings for Shiomi’s survey is perhaps the one case where the reported and recorded assessments match each other most closely. Of the 220 checked sites, 115 (52%) received a high rating, 63 (29%) received a medium rating, and 23 (11%) received a low rating. 19 (9%) sites were not located and therefore received a negligible rating. The main difference between the two distributions is the slightly lower number of recorded sites receiving high ratings and the slightly higher number of recorded sites receiving low ratings as compared to the reported information. The remainder between these two difference gaps comprise the category of unlocated sites.

6.2.3.4 Discussion

In the preceding subsections, the recorded Lawrence Index ratings have been presented first with the sources aggregated by index type and then with the index types aggregated by source. This affords visualization of the differences in source quality between the surveys (Figure 6.5), as well the differences between the sources relative to the Gorgan Plain Survey Restudy (Figures 6.7-6.9). Arriving at an estimation of source reliability on the basis of the distribution of recorded Lawrence Index ratings is less straightforward, however, as it is necessary to be absolutely clear about the basis of the comparison.

To illustrate my point about the basis of comparison, consider the potential for where we might be led astray by confounding or linked variables. Looking at the distribution of Boundary Certainty ratings in aggregate, for example, there are about twice as many high recorded ratings as low recorded ratings, and an equal amount of medium and negligible
ratings. It is important to remember that the vast majority, but not all, negligible ratings are due to failure to positively identify a site. It is tempting to compare the high/medium/low ratings between sources, but this is actually a fallacious comparison, because there is no reason to believe that the effective independent variable generating these different ratios is the source (not to mention overlap in reporting between the sources). Rather, a more interesting analysis would be to examine the co-variation between the distribution of these ratings and different geomorphological and erosional zones on the one hand, and chronology on the other.

Reference to Archaeological Significance illustrates the problem of linked variables nicely, because when a recorded rating was difficult to determine the reported rating was used as a tie-breaker. For example, if a site appeared as borderline between low and medium Archaeological Significance during the recording protocol, it would be bumped up to a medium recorded rating if it had a reported archaeological significance of medium. Future analyses would likely benefit from either unlinking these variables. However, this was only a minor problem during GSR as such borderline cases were few in number. Consequently, direct comparisons between the reported and recorded Lawrence Indices can be made where the reported data for a given index are not 100% negligible and where there is no reason to suspect the strong effect of linking or otherwise confounding variables.

In terms of Boundary Certainty, only in the case of Arne and Shiomi can we draw a direct comparison between the reported and recorded ratings. With Arne, the recorded Boundary Certainty ratings are much higher than the reported ratings, and with Shiomi, on average the ratings are much lower. This is unsurprising, given the different modes of geographic representation and site description in these two surveys. Consequently, I consider both surveys as relatively unreliable in terms of Boundary Certainty, but acknowledge that
regardless of their reporting, between half and two-thirds of the sites they reported still have high or medium Boundary Certainty as determined from Google Earth.

With respect to Geographic Precision, direct comparison between the distributions of reported and recorded Lawrence Index ratings is neither possible nor necessary, because the variables captured by the ratings are measured on different types of scales, with the reported information rated qualitatively according to criteria, and the recorded information registering how accurate the reported site locations are in comparison to the recorded site locations. What I derive from this observation is that despite their differences, Abbasi, Arne, and Mortezaei and Farhani are roughly as reliable as each other, with recorded site locations within 1 km of reported locations in approximately two out of every three instances. Shiomi’s survey is the most reliable in terms of Geographic Precision, with 91% of all recorded site locations within 100 meters of the reported site location.

As mentioned above, the distribution of ratings for Archaeological Significance is most likely to be confounded by linked variables, as the rating relied in some cases on the reported rating to make a final determination. The important point about this distribution is that again, the negligible ratings are almost entirely comprised of sites which were failures to positively identify. The shape of the distribution across the different sources and in aggregate is basically the same, suggesting that as it was defined in this study, this index either isn’t a terribly sensitive indicator of differences between sources or that the surveys were roughly equally competent at identifying likely archaeological sites with few false positives. In the particular environment of the Gorgan Plain the latter interpretation seems more likely, although it is always possible that spatiotemporal factors are affecting this distribution.
6.3 Chronology

In terms of data integration, the temporal dimension of these surveys is perhaps the most challenging. The chronological information presented in the sources is patchy, coarse, and varies considerably in usefulness. At best, the reported information can be checked and verified with reference to collections of surface ceramics and compared to the record of excavated materials. At worst, we have to take the temporal designations at face-value. In this section, I both examine the chronological dimension of each of the surveys (and show how this information was incorporated into the GSR database) and present the results of my analysis of what surface pottery is available in both published sources and museum collections.

6.3.1 Reported Chronological Information

The chronological information reported from the legacy sources takes one of three forms. In the first, the site data is organized and presented according to chronological criteria (Abbasi), where the site lists and their distribution maps are tied to broad culture-historical periods (e.g., “Chalcolithic” or “Early Bronze Age”). In the second, chronological assessments are appended to site attribute tables (Mortezaei and Farhani, Shiomi), where the assignments may be either culture-historical (e.g., “Bronze Age”) or era-based (e.g., “Prehistoric” or “Historic”). The third form is a combination of a matrix that displays the presence/absence and confidence level of different diagnostic ceramic types, accompanied by a narrative description of the surface ceramics (Gorgan Plain Wall Survey). Finally, the Arne survey did not make culture-historical chronological assessments of surveyed sites but did report some general information about potentially diagnostic surface ceramics. It should be noted that the surveys by Arne, Shiomi and the Gorgan Plain Wall Survey have extensive surface ceramic collections that are the subject of on-going research; in the case of Arne, restudy of the survey ceramics are part of this
dissertation and in the case of the latter two, study of these collections is either in press or in progress.

6.3.1.1 Counts of Chronological Components

The chronological assessments were first based entirely on the reported information at face-value, with the caveat that these reported assessments were limited to only those where the sources made an explicit and unambiguous assignment of a particular period to a given site.

It should be noted that many sites belong to multiple periods, and that Figure 6.10 depicts the total number of reported assessments per chronological component in aggregate, not the number of sites. When comparing the distribution of reported chronological assessments to the numbers of sites for which the GSR resulted in a positive site identification, we see that the recovery rate across time periods ranges between 75-90% for each. This is similar enough to the overall average (ca. 80%) to suggest that positive identification of sites is not biased against sites dating to any particular period during this interval.

Figure 6.10 Counts of Sites by Chronological Categories and Positive Identification
Table 6.10 Counts of Sites with Date-Assignments by Source and Positive Identification

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</tr>
<tr>
<td>early bronze age</td>
<td>51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>middle bronze age</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>late bronze age</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>bronze age, unspecified</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Totals</td>
<td>462</td>
<td>21</td>
<td>14</td>
<td>29</td>
<td>34</td>
<td>560</td>
</tr>
</tbody>
</table>

Another important dimension of the chronological assessments is their distribution across the legacy sources. As we can see from Table 6.10, with only a few exceptions, most (462/501 or 92%) of the chronological assessments of the Chalcolithic through Late Bronze Age are reported from just one source (Abbasi). A small number of sites can be considered to be “reported” to date to the Chalcolithic on the basis of textual description of diagnostic ceramic types, particularly Caspian Black on Red Ware, in the sources (Arne, Mortezaei and Farhani, and Shiomi). The remainder of the sources either report general assessments of sites as belonging to the Bronze Age, or else are designated as merely Prehistoric. The operational definitions of what these periods correspond to is presented below.

6.3.1.2 Chronological Reporting (Abbasi)

As mentioned, the Abbasi gazetteer reports the sites by period, with each period represented by a dot-distribution map and a table containing the names of sites linked to their number on the map. These periods are defined in the original report straightforwardly as
corresponding to four periods at Narges Tappeh: Narges IV (Late Chalcolithic, n=75), Narges IIIc (Early Bronze Age, n=210), Narges IIIb (Middle Bronze Age, n=105), and Narges IIIa (Late Bronze Age, n=74) (Abbasi 2011: 239-240). These assessments anchor the survey sequence, but are not unproblematic, as discussed in Chapter 5.4.2. The principle issues with taking this dating system at face value are related to Abbasi’s inconsistent linkages of both these phases at Narges to securely dated materials at other sites, but also the problems with the radiocarbon chronology of Narges Tepe. To restate the argument from Chapter 5, the most notable issues with Abbasi’s chronology are that: 1) Narges IIIc and IIIb2 properly belong to the Late Chalcolithic rather than either the Early or Middle Bronze Age; 2) the Early Bronze Age does not appear to be represented at Narges Tepe; and 3) that the Middle and Late Bronze Ages at Narges Tappeh are not so clearly separated from each other, though the distribution of parallels suggests that Narges IIIb1 is more likely to be Middle Bronze Age and Narges IIIa Late Bronze Age. The concern is, can we trust the gazetteer’s chronology at all? Given the foregoing, there is a strong argument to say no, we cannot. But I am inclined toward generosity on two counts: as discussed in Chapter 5, 1) Abbasi gets the Middle and Late Bronze Age more or less correct; and 2) Abbasi doesn’t actually explicitly link the survey chronology to the excavation layers at Narges Tappeh, so there are grounds to treat the reported information for now as if it were correct, and to await further refinement of the chronology based on future work.

6.3.1.3 Chronological Reporting (Arne)

The chronological information that can be gleaned from Arne’s report comes from two sources: first, the written description of surface finds at the end of the narrative report on the survey, and second, entries in the site table. The description of surface finds includes four references to ceramic types that likely date to the chronological span of this dissertation.
1) Arne reports a total of 80 sites with fragments of prehistoric black or grey pottery (1945: 21), including twelve sites ornamented with knobs, ridges, or grooves (i.e., Shah III/Tureng II) and ten sites with burnished ornamentation (i.e., Shah IIb-IIa/Tureng III).

2) Arne also reports a red burnished ware, rare at Shah Tepe, but which he asserts dates to the Late Chalcolithic, from 50 sites, 40 of which also had black or grey sherds. There are two caveats to this point: first, a similar burnished red ware dates to the Islamic period and is therefore difficult to distinguish based only on body sherds, and second, it is not clear whether the 40 out of 50 sites in this count that also had black or grey prehistoric sherds should be counted in addition to the 80 sites mentioned previously, or whether these are a separate and additional category of sites (Arne 1945: 21).

3) Arne reports finding “undoubtedly prehistoric” unornamented coarse ware at 46 sites, 32 of which co-occur with black, grey, or red pottery (Arne 1945: 22). Again, it is not clear whether these 32 sites are counted in the 80 sites mentioned above or whether they are additional.

4) Lastly, Arne reports the presence of prehistoric pottery with red slip and black geometric ornamentation at 24 sites, otherwise known as Caspian Black on Red Ware, dating to Shah III (Arne 1945: 22) and Tureng IIA (Martinez 1990: Pl. 47-48). This is the only ware for which he provides a list of the individual sites, which include: Shah Tepe, Gumusteppe, Tureng Tepe and Hadji Kara Agha, as well as sites 4, 8, 35, 39, 41, 52, 62, 65, 66, 80, 83, 86, 88, 93, 94, 97, 125, DK, I, and KD.

In the site table, pottery is reported by ware type, and appended with either a numerical or descriptive quantification. Painted ware (presumably the Caspian Black on Red Ware) is reported at twenty-four sites; prehistoric ware is reported at one site, grey ware at four sites, and knobbed ware at one site. The remainder of the sites for which surface ceramics are reported in the site table are either labeled as Islamic or their type is unspecified. As will be discussed below, the collection of surface pottery from this survey in Sweden only contains materials from 103 of the total 303 reported sites.

**6.3.1.4 Chronological Reporting (Mortezaei and Farhani)**

In their field report, Mortezaei and Farhani cursorily discuss the approximately 120 sherds of decorated ceramics they gathered from the surfaces of the surveyed mounds. In their

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93 Of these, DK, I, and Gumusteppe could not be confidently related between the table, the map, and the database, and therefore do not appear in Figure 6.10 or Table 6.10.
account, ca. 100 of the potsherds are described as belonging to the Late Chalcolithic, which the authors refer to as “Felaat-e Qadim,” i.e., “Early Plateau”, found at Kol Tappeh, Tappeh-ye Payeh-Yekkom, and Habibli and based on the chronology established by Shahmirzadi (2004). They equate this period to an unspecified stratum at Tureng Tepe and Shah Tepe III (Mortezaei and Farhani 2008: 177). A narrower assessment of this “Early Plateau” period would assign it to Aq Tappeh I-II, Esmailabad, and the Cheshmeh ‘Ali horizon (Shahmirzadi and Nokandeh 2001: 169). While specialists in this time period seem to agree that these strata are contemporary to each other, they differ on whether Aq I-II and Cheshmeh ‘Ali belong to the Late Neolithic (Shahmirzadi 2004: 539) or the Transitional/Early Chalcolithic (Fazeli et al. 2004; Thornton 2009: xviii). The remaining ceramics in Mortezaei and Farhani’s report are described as belonging to the Early and Middle Chalcolithic, related to Shahmirzadi’s Zagheh horizon, i.e., “Felaat-e ‘Atiq” or “Ancient Plateau” style. This ceramic type is known locally as Aq Tappeh III, which is assigned by its excavators to the Neolithic (Shahmirzadi and Nokandeh 2001: 169). These wares are reported to have been found at Tappeh-ye Payeh-Yekkom, Yarim Tappeh, Moujak Tappeh, and Agari Tappeh.

Twenty-one sherds identifiable as dating to the Chalcolithic period are described in the catalog to the article but are not illustrated. The characteristics of these sherds (i.e., body sherds with fine sand temper, well-fired, hand-made, red/buff with thick red slip on interior/exterior surfaces, and black geometric painted decoration) are sufficiently diagnostic to distinguish them as Caspian Black-on-Red Ware (i.e., Tureng IIA). In the ceramic table, seventeen sherds are detailed that date to the Chalcolithic from two sites (Aqcheh and Habibli), eleven of which are black on red painted ware with geometric decorations, three sherds of which are plain red ware and three plain grey wares. In terms of Bronze Age sherds referenced in this table, only one site,
Gugcheh 1, has ceramics with sufficient detail to be diagnostic: with five grey ware sherds, two of which are burnished and one of which is knobbed, we can assign it to the Early Bronze Age and recognize a likely earlier component as well.

**6.3.1.5 Chronological Reporting (Shiomi)**

The reported chronological information from the Shiomi survey comes in the form of presence/absence of different classes of materials and broad ware categories in the data tables (Shiomi 1976, 1978). Some of the classes of materials are non-diagnostic, such as brick, flint, and glass; some of the categories of ceramics are also too broad to be diagnostic, such as Red Brown Burnished Ware (n = 124) and Red Ware (n = 45), both of which could belong to the Chalcolithic, Iron Age or Historical periods. More chronologically indicative ware types are still general enough to render their association with specific periods difficult, for example, Dark Grey Polished Ware (n = 48) and Grey Polished Ware (n = 52), which are in fact the same thing, just reported differently between the two publications (n = 100). This information narrows down the window of possibility to Tureng IIB-IIIC2 but is only further specifiable with reference to the images published in the preliminary restudy reports (e.g., Ohtsu et al. 2010; Ohtsu et al. 2012). Another category of more specific but still indeterminate category of reported ceramics is Painted Ware (n = 55), which could either refer to Neolithic or Chalcolithic ware types, but which seems likely to be primarily comprised of Caspian Black on Red Ware and Aq Tappeh types (i.e. Djeitun Ware, Cheshmeh ‘Ali Ware, etc.). The former category (Ohtsu et a. 2010: 136; Ohtsu et al. 2012: 74, Pl. I: 4, Pl. II: 2-4, Pl. III: 8, Pl. IV: 7, Fig. 2.1, 3.1-3), i.e., Caspian Black on Red Ware, is equivalent to Tureng IIA (Deshayes 1966: Pl. II, Fig. 7) and Shah III (Arne 1945: 167-180, Pl. XLI). The last category of reported surface ceramics is Islamic (n = 64).

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94 There is also grey ware pottery present in Tureng IIA, but no examples I have seen thus far are unambiguously burnished or polished.
The preliminary report of the Japanese-Iranian Restudy project reports ca. 2600 sherds were collected during the Shiomi survey and excavations at Tappeh Hosseinabad. Of these, 2,335 sherds are surface samples from a total of 108 sites. Approximately 1,000 of these sherds were assigned to the Bronze Age (Ohtsu et al. 2012: 73), from approximately 71 sites. According to their report, the most characteristic ware type for the Bronze Age is Burnished Grey Ware (Ohtsu et al. 2012: Fig. 2.2-13, Fig. 3.4-10, Fig. 5.12-15; also Pl. I: 5-9, Pl. II: 1-6, Pl. III: 4-5, Pl. IV: 8). Of the presented examples of Painted Wares, all are clearly Caspian Black on Red Ware of the Shah III type. The Burnished Grey Ware examples, however, appear to present the full range of types, including the knobbed, incised, and ribbed types of Shah III/Tureng II and the pattern burnished types of Shah II/Tureng III. Unfortunately, only in a few cases are specific sites tied to specific ceramics in these preliminary reports, which will be discussed in more detail below.

6.3.1.6 Chronological Reporting (GWS)

The chronological information reported in the Gorgan Plain Wall Survey takes one of two forms: a matrix presenting presence/absence of chronological components at each site with a confidence rating of the accuracy of the assessment and narrative descriptions (Sauer et al. 2013: 102-103). The relevant chronological period reported in this matrix is a generic unspecified “Bronze Age”. The confidence ratings include “field assessment of uncertain quality,” “field assessment probable date,” “ceramics assessed in lab with confident assessment,” and “excavated site with 14C dates.” For the sites with Bronze Age components, six sites received field assessments of uncertain quality (Nurjan Tappeh [6], Hevaz Yalanchi [8], Unnamed [12], Qelich Oliya [24], Qareh Tappeh [34], and Dasht Qal’eh [54]); four Bronze Age sites received a field assessment probable date (Chuni 1 [14], Tappeh-ye Karamin [17], Qal’eh-ye Bibi Shirvan [31], and Unnamed [36]); and three sites were assessed in the field and received a
It is important to note that the greatest level of specificity that can be provided on the basis of the textual descriptions of the diagnostic pottery for many of these sites is “Bronze Age, Unspecified.” There is at least one case (GWS-36) where the textual description of the ceramic
surface finds from the site is sufficient to tie the site to one specific period (Tureng IIA, i.e., Chalcolithic), but the site is described as “Bronze Age.” Another point worth noting is that several sites appear to span the Late Bronze Age to Early Iron Age “gap” (i.e., GWS-17, GWS-31, GWS-34, and GWS-54), which should be of high interest in future research aimed at better understanding the Late Bronze to Early Iron transition in this region.

6.3.1.7 Summary

The reported chronological information presented above can be further refined with reference to the surface ceramics collected by these surveys, which are all incompletely published (e.g., Arne 1935, 1945: 21-22; Bylin-Althyn 1937; Ohtsu et al. 2010, 2012; Sauer et al. 2013: 102-125). Further analysis should focus on tracking down whatever records underpin Abbasi’s chronology, any photographs and field documentation of surface ceramics collected by the Gorgan Plain Wall Survey project, and to contact the keepers of the Shiomi surface ceramics collections, which are split between Tehran and Hiroshima. Until then, what little information is presently available is described below.

6.3.2 Recorded Chronological Information

Both the published and unpublished surface ceramics are few in number. On the published side, there are only three publications that present images of diagnostic surface pottery explicitly linked to a single site (Abbasi 2016; Ohtsu et al. 2010, 2012). On the unpublished side there are several collections, but only one (i.e., Arne) was available for the purposes of this dissertation. For both published and unpublished collections, the diagnostic material often amounts to a single sherd, diminishing the confidence we may put in these chronological determinations, but as is often the case with legacy data, you must start with what you have. In other cases, there is much more material, but it is not always particularly
diagnostic of a single period, for as discussed in Chapter 5, particular common forms of pottery were in use for long periods of time.

6.3.2.1 Abbasi

In this source, the photographs of surface pottery are presented on a single plate (2016: 139, Fig. 102) with individual sherds labeled with the name of the site from which they were collected; of the 34 unique sites represented on this plate, only 27 are also present in the 2011 site gazetteer. The sherds presented on this plate can all be classified as Black on Red Painted Ware with geometric motifs and are labelled in the plate caption as Aq Tappeh II. This plate concisely demonstrates a particular problem for any reported instance of “black on red painted ware with geometric motifs” not accompanied by an illustration. As it turns out, despite the fact that Abbasi assigns all of the sherds in this plate to the period Aq II, ten of the sherds on this plate (corresponding to ten sites) are clearly Caspian Black on Red Ware, chronologically diagnostic of Tureng IIA. Aq II is referred to as belonging to the Early Plateau horizon (Shahmirzadi and Nokandeh 2001: 169), i.e., Cheshmeh ‘Ali, which correlates to the Early Chalcolithic and the late-6th millennium BCE (Dyson and Thornton 2009: Table 1). Tureng IIA is correlated with Hissar IC-IIA, Anau IB, and Sialk III4-5, placing it in the early-to-mid-4th millennium. The conflation of Aq II and Caspian Black on Red painted wares is a persistent problem in the literature, and a major concern, given that these two types are separated in time by as much as a millennium.  

95 Moreover, there are some issues with Caspian Black on Red Ware’s chronology. My assignment of it to Tureng IIA (ca. 3500-3200 BCE) is based on Martinez (1990) and Deshayes (1967), both of whom are very clear on the type strictly belonging to that and only that period. Moreover, at Tepe Hissar, Caspian Black on Red Ware appears in a temporally restricted range of contexts, radiocarbon dated to ca. 3300. The problem arises due to the fact that these contexts at Tepe Hissar are cross-dated by material parallels to Tureng IIB, rather than Tureng IIA (Thornton pers. comm. 2019). Based on the restudy of the Arne collections from the excavations at Shah Tepe and a holistic review of the excavation reports of the other
There are also three sites in Abbasi’s 2016 volume that have been excavated in recent years, which have components dating to the Chalcolithic/Bronze Age (Pookerdovall, Del-Gosha, and Darzi-Kheil), which are not in the 2011 site gazetteer and whose locations are given only in a small and imprecise map (Abbasi 2016: 310, Fig. 1). For the purposes of this dissertation, all of the sites which appear in Abbasi (2016) and are also present in the database (i.e., derived from the 2011 Gazetteer) have been marked simply as “Chalcolithic,” because the distinction between Early Chalcolithic and Middle Chalcolithic is not present in any of the other sources. In reality, differences between the Early, Middle, and Late Chalcolithic are likely to be significant. While resolution of this particular issue is beyond the scope of this dissertation, this is an important area for further investigation.

6.3.2.2 Arne

In section 6.3.1.3, I discussed the narrative description that Arne provides of the survey chronology. Another important source of information is the data table, in which Arne reports only one category of diagnostic pottery – “Black on Red Painted Ware” – which he found at 26 sites. As discussed above, this is an imprecise type-designator, because the label corresponds to several chronologically distinct types. Therefore, I conducted a re-study of Arne’s survey pottery stored in Sweden to check, refine, and extend the chronological information available from this source. This effort returned less than ideal results. Arne’s survey pottery collection stored at the Svensk Museitjänst Riksarkivet in Tumba, Sweden, primarily consists of non-diagnostic body sites at which it is found, it appears that this ware type may also be found in Early Bronze Age deposits (e.g., Ohtsu et al. 2010: 135-137). It also remains an open question as to whether there is any stylistic or formal change within this type over time. If it can be found that there is a chronologically dependent change in decoration style within this ware type, it may turn out to be a useful indicator and would allow us to date sites to the particular phases of the Chalcolithic or even to the Early Bronze Age.
sherds, a large quantity of Partho-Sasanian, glazed Islamic and other later pottery types, as well as shards of glass and pieces of metal not germane to the present analysis.

Only nineteen of the sites in this collection had chronologically diagnostic material from this dissertation’s temporal horizon. Interestingly, this sample contained no examples of Aq II ceramics, i.e., all black on red painted ceramics were Caspian Black on Red Wares. These wares co-occurred in many cases with horizontally ribbed grey ware bowl fragments, another type-indicator of Tureng IIA (Martinez 1990: Pl. 39, 43, 45-46)96. In all, twelve of the nineteen sites which could be dated on the basis of Arne’s survey pottery collection were assigned to the Chalcolithic (though it should be noted for future studies that many of these sites likely belong to the Middle-Late Chalcolithic). Seven sites in the sample could be dated to Tureng IIIA-IIIB, or the Early Bronze Age, primarily on the basis of diagnostic rim forms of Burnished Grey Ware sherds.

6.3.2.3 Shiomi

In the case of the reports by Ohtsu and colleagues, the collected surface ceramics from a smaller number of sites are presented with both drawings and photographs. Out of a total of 15 unique sites presented in these reports, only 3 satisfied the condition of having both a one-to-one correspondence with an identifiable entity in the database and Chalcolithic/Bronze Age diagnostic sherds. These were Tappeh Anjirab, Hosseinabad, and Golbagh Tappeh. Anjirab has a clear Early and Middle Bronze Age component, and all three have Caspian Black on Red Ware present in the samples (Ohtsu et al. 2012: Pl. II: 1, Pl. II: 2-7, and Pl. III: 8).

6.3.2.4 Summary

96 Horizontally ribbed Burnished Grey Ware examples are present in Tureng IIB as well, but in much smaller quantities (Martinez 1990: Pl. 71, Fig. 4), and often in combination with other decorative elements not typical of Tureng IIA (Martinez 1990: Pl. 77 Figs. 1, 4).
This analysis of published and unpublished surface ceramics resulted in the recording of a chronological determination for 52 sites (Table 6.12). Given the discrepancies surrounding the identification of particular ceramic types described above and the major disjunctures in understandings of the relationships between strata at key sites and the 3-age system for the region (see Chapter 5), it is reasonable to ask whether these recorded designations can be used alongside the reported chronologies in any straightforward fashion.

**Table 6.12 Recorded Chronological Determinations by Source and Period**

<table>
<thead>
<tr>
<th>Source</th>
<th>Chalcolithic</th>
<th>Early Bronze Age</th>
<th>Middle Bronze Age</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbasi 2016: 138, Fig. 102</td>
<td>27</td>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Arne Collections</td>
<td>13</td>
<td>7</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Ohtsu et al. 2012: Plates I-III</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>43</strong></td>
<td><strong>8</strong></td>
<td><strong>1</strong></td>
<td><strong>52</strong></td>
</tr>
</tbody>
</table>

The major remaining chronological concern is the status of the sites designated “Early Bronze Age” in Abbasi’s gazetteer, which he considers as correlating to Narges IIIc and Tureng IIA-IIB (2011: 240-241; 2016: 6). This is an incorrect correlation between site-strata and culture-historical eras, as discussed at length in Chapter 5. Curiously, however, when surface ceramics are presented, they are generally assigned to the correct era (e.g., Abbasi 2016: 139, Fig. 102). Yet, there is no evidence to suggest that the site chronology presented in Abbasi’s gazetteer is based on a detailed or systematic examination of the surface finds from the sites listed and thus seems more likely to comprise a re-presentation of information contained in other reports. The

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97 Based on the ceramic parallels discussed in Chapter 5, Narges IIIc clearly belongs to the Chalcolithic and Abbasi dates this to the second quarter of the 4th millennium (Abbasi 2011: 241). Moreover, Abbasi’s description of the ceramics of Narges IIIc are clearly those of Tureng IIA-IIB, including short and squat slightly carinated jars, as well grey-black sherds with appliqué ridges, knobs, incised grooves, and combinations of the three along with Black on Red Painted Ware, which is described as burnished, which I am comfortable calling Caspian Black on Red rather than Aq II. He also claims that many of the Narges IIIc finds have great similarities to Shah III-IIb, whose “proposed chronology is the second half of the 4th millennium” (Abbasi 2011: 241). Thus, Abbasi has clearly conflated the Early Bronze Age and the Chalcolithic, which is plain to see from his chronograms, where he consistently and incorrectly designates Tureng IIA-IIB as Early Bronze Age (2016: 6).
conflation of the Early Bronze Age and Chalcolithic strata and pottery types in the text of the
gazetteer seems therefore unlikely to have been propagated. The best course of action,
therefore, is to treat the reported information as if it is correct, with the full knowledge that this
cannot be verified without reference to the source reports and collections.

Other concerns with the recorded chronological framework include: the flattening of
the Chalcolithic period into one phase98 and the generally non-diagnostic character of much of
the published survey pottery from the Shiomi survey and the Arne collection. The confidence
threshold required for these materials to be included in the sample under analysis is therefore
quite strict, and thus greatly reduces the size of the sample for analysis compared to what is
available. The sample can only be increased with reference to a larger and more diagnostic
sample of surface pottery, to say nothing of the benefits that a larger sample of stratigraphically
controlled excavated material would provide. In summary, the reported and recorded
chronological information may be provisionally treated as analytically compatible, with the full
knowledge that both the frameworks themselves and the correlation between them are
provisional and likely subject to substantial future revisions.

6.4 Chalcolithic and Bronze Age Settlement Patterns of the Gorgan Plain

With all the preceding information about the nature and quality of the spatial and
chronological data from both the reported survey data and my restudy protocol, we can
examine the basic organization of the settlement distribution of the Gorgan Plain and how it
changes over the course of the third millennium. This discussion provides the baseline for the

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98 The distinction between Aq II and Caspian Black on Red Ware is an important one temporally, but which
has escaped all previous authors as a salient categorical difference, much less as a chronologically
diagnostic marker. Therefore, while this distinction can be maintained in materials to which I have access,
it is not present in any of the other sources and thus not operationalizable for analysis at present.
territorial and rank-size analyses to be presented in Chapter 7 by first situating these settlement distributions in their environmental context with reference to precipitation patterns and broad pedological and lithological zones. I begin the analysis of the settlement patterns by specifying the quantitative parameters of the sample to be analyzed (i.e., only those sites for which a positive identification was made during the Gorgan Plain Survey Restudy), and then examining the spatial distribution of site counts over time. I next examine the intersection of chronology and site size (i.e., base area in hectares), before re-introducing location to the analysis.

This chapter thus represents a move toward expanding the evidence base to be used in discussions concerning the emergence and nature of socio-political complexity in the so-called “Lands East of Sumer” (T. Potts 1994). As I have mentioned previously, there is in fact a wealth of evidence available for many of these regions, but with only few exceptions, these data have either been under-analyzed, theoretically overdetermined, or both. The primary theory that has been used to explain trajectories of settlement in this vast zone, which all subsequent scholars respond to in one manner or another, is Tosi’s “Turanian” model of the emergence of proto-state structures (1979, 1986). While new evidence – especially related to the Bactria-Margiana Archaeological Complex – has led to modification and critique of particular components of Tosi’s model, the basic contours of the trajectory are widely accepted (e.g., Hiebert 1994a; Kohl 2007; Salvatori 2008b).

Yet, even as Tosi’s model purports to account broadly for this entire region, its arguments are principally grounded in evidence from the lower Helmand basin and the Kopet Dagh Piedmont, especially in the case of settlement patterns. Tosi argued that the processes observed in these two regions also occurred across the entirety of “Turan,” comprising a similar trajectory of changes in regional settlement organization, even as the specific morphology
varied according to local ecological circumstances. The key point here is that the Gorgan Plain has often been included in the laundry-list of regions purportedly belonging to this shared trajectory. It is now clear that each of the regions of what Tosi called “Turan” have distinct histories of settlement and the Gorgan Plain is no exception. It does appear, however, that the other regions of the “lands east of Sumer” have more in common with each other than they do with the Gorgan Plain, and it is to illustration of this point that this section is dedicated.

6.4.1 Physical Geography and Environmental Backdrop

Recalling the discussion from Section 3.3.1, the Gorgan Plain is an unusual environment within the physical-cultural geographic zones of the Iranian Plateau and Central Asia. Two characteristics stand out: the Gorgan Plain is more humid than any other region, for Mazandaran and Gilan immediately to the west and it features an extensive belt of Brown Soils.

Figure 6.11 Location of Sites in Relation to Rivers and Precipitation Gradient
The prehistoric settlement patterns of the region strongly reflect both of these attributes. Indeed, ancient settlements are preferentially located in areas of above 300mm annual cumulative precipitation and in close proximity to rivers (Figure 6.11). Taking the sample of settlements under analysis (i.e., all those reported sites whose location and chronology were verified according to the procedures above in 6.2 and 6.3), we can see that the plurality of sites located in the 300-400mm/year range (Table 6.13). Moreover, nearly half of the sites are located within 2 km of a permanently flowing river (Table 6.14). Inclusion of seasonal watercourses and streams in this analysis would likely show that sites are located even closer to water sources on average.

Table 6.13 Summary Statistics of Annual Cumulative Precipitation for All Site Locations (mm)

<table>
<thead>
<tr>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Standard Deviation</th>
<th>% Sites 300-400mm</th>
<th>% Sites 400mm+</th>
</tr>
</thead>
<tbody>
<tr>
<td>385.4</td>
<td>489.0</td>
<td>293.0</td>
<td>40.5</td>
<td>64.3</td>
<td>34.9%</td>
</tr>
</tbody>
</table>

Table 6.14 Summary Statistics of Proximity of All Sites to Rivers (distance in meters)

<table>
<thead>
<tr>
<th>Mean</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Standard Deviation</th>
<th>% Sites &lt;1km</th>
<th>% Sites 1-2km</th>
</tr>
</thead>
<tbody>
<tr>
<td>2852.6</td>
<td>23195.7</td>
<td>19.5</td>
<td>2978.0</td>
<td>28.5</td>
<td>20%</td>
</tr>
</tbody>
</table>

Table 6.15 Quantification of Site Distribution by Soil Zone

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Number of Sites</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prime Agricultural Soils</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown Soils</td>
<td>137</td>
<td>58.3</td>
</tr>
<tr>
<td>Brown Forest Soils</td>
<td>23</td>
<td>9.8</td>
</tr>
<tr>
<td>Brown Forest Lithosols</td>
<td>9</td>
<td>3.8</td>
</tr>
<tr>
<td>Fine Textured Alluvial Soils</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>Red and Brown Mediterranean Soils</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>176</td>
<td>74.9</td>
</tr>
<tr>
<td><strong>Subprime Agricultural Soils</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt Marsh Soils</td>
<td>41</td>
<td>17.5</td>
</tr>
<tr>
<td>Solonchak and Solonet</td>
<td>17</td>
<td>7.2</td>
</tr>
<tr>
<td>Coastal</td>
<td>1</td>
<td>0.004</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>59</td>
<td>25.1</td>
</tr>
</tbody>
</table>
The plurality of sites is located in pedological areas of prime agricultural potential, with Brown Soils constituting the most ideal for cropland (Figures 6.12-6.13 and Table 6.15). Brown Soils are highly valued for agricultural land for two reasons, namely because they are typically well-drained and permeable, and due to their typical silty-loam topsoil composition, they are easily workable. Moreover, Brown Soils support the growth of both extensive grasslands and a wide range of forest trees. It should also be mentioned that the vast majority of these soils are either alluvial or lithic in origin, that is, the result of deposition of riverine sediments, in situ soil formation, or both.
Figure 6.13 MODIS Landcover classification of the Study Area

Figure 6.14 Distribution of Loess Soils in the Gorgan Plain (After Asadi et al. 2013: Figure 1)
Areas of windborne loess accumulation are also distributed throughout the region but are concentrated in the far southwest of the province along the Alborz skirt and in the hills behind Gonbad-e Kavus to the far northeast of the province (Figure 6.14). While loess is generally considered among the world’s most fertile soils, in neither case is archaeological settlement concentrated in these areas of the Gorgan Plain, likely due to the fact that the loess accumulations are located along the slopes of mountains (to the southwest) and rugged hills (to the northeast).

**Figure 6.15 Geographic Zones of Settlement in the Gorgan Plain**

One interesting spatial difference that can be observed through comparison of Figures 6.12-13 and Figure 6.15 is the relative proportions of sites located in different soil zones across the three geographic zones of settlement. The Gorgan Plain can be divided into three broad areas of settlement – what will be referred to as the western, central, and eastern zones (Figure
These zones correspond to the lower, middle, and upper reaches of the Gorgan Plain River watershed. The western zone correlates with the Qara Su watershed, the central zone with the Mohammadabad-Ramiyan interfluve, and the eastern zone with the Gorgan Plain’s upper tributaries, including the Tilabad, Nalivan, Turkoglu, and Cheshmeh rivers (Figure 6.11).

With respect to how these geographic divisions of the plain correspond to soil zones, in the western zone, the majority of sites are located in Salt Marsh soils, with a smaller number in Fine Alluvial Soils and a smaller still number in the Brown Forest Lithosol zone. In the central zone, the vast majority of sites are located within the Brown Soil zone, with a smaller number in the Brown Forest Lithosol zone and a handful of sites located in the Salt Marshes just to the south of the main channel of the Gorgan Plain. In the eastern zone, almost all of the sites are located in the Brown Soil Zone. Thus, despite the lack of direct paleobotanical and artifactual evidence from excavations that might attest to the forms of agricultural practiced by the ancient inhabitants of this region, it is reasonable to infer based on the distribution of site locations with respect to precipitation and soil type that the regime of primary production ca. 3200-1600 BCE was characterized by rainfed agriculture.

6.4.2 Site Counts over Time and Space

Restricting the sample of sites to include only those sites with chronological designations between the Chalcolithic and Late Bronze Age considerably reduces the sample of

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99 One aspect of the settlement geography of the Gorgan that became apparent from the k-means cluster analysis that was used in early versions of the territorial model developed more fully in Chapter 7 is that there is a consistent spatial structure to settlement in the region that holds over time. That is, in each period, the k-means analysis identified the optimum clustering solution as k=3, and there was little variation over time in the spatial distribution of these groupings. Because the k-means clustering method produces groupings that are at best tenuously related to human behavior, in the end, the k-means analysis was not used to identify “polities” as such (cf. Palmisano 2017). Nevertheless, these results do have some analytical utility insofar as the k-means routine consistently divided the plain into three broad geographic zones.
overall sites from the database (n = 341). The sample can be further restricted to only those sites for which GSR resulted in a positive identification (Figure 6.16). Take note that the sums in this graph total higher than the number of unique sites. The differences in these numbers show that many sites in the sample were occupied during multiple periods; indeed, 40-90% of the sites dated to any given period are also occupied during another period, hence the smaller count of unique sites relative to the counts presented in Figure 6.16. The count of unique sites in the sample of sites with Chalcolithic through Late Bronze Age components totals 341, out which 235 of these were positively identified.

**Figure 6.16 Counts of Sites Per Period Grouped by Positive Identification**

![Figure 6.16 Counts of Sites Per Period Grouped by Positive Identification](image)

The following maps (Figures 6.17-6.20) plot the location of recorded positive site identifications (dark blue) against reported site locations (light blue) and depict the distribution of reported sites for which positive identifications could not be made (yellow).
Figure 6.17 Distribution of Positive & No Positive Identifications (Chalcolithic)

Figure 6.18 Distribution of Positive & No Positive Identifications (Early Bronze Age)
Figure 6.19 Distribution of Positive & No Positive Identifications (Middle Bronze Age)

Figure 6.20 Distribution of Positive and No Positive Identifications (Late Bronze Age)
The distribution of positive identifications versus non-positive identifications does not appear to be biased toward any one part of the region, though identification rates do seem to be slightly better in the southwestern part of the plain near the Caspian and slightly worse in the northeastern part of the plain between Gonbad-e Kavus and the Alborz flanks. The percentage of sites reported to have Early Bronze Age components for which no positive identification could be made is between double and triple the proportion of the other periods. Moreover, 33 out of the 52 Early Bronze Age sites (i.e., 64%) for which there was no positive identification were single-component, suggesting there has been some degree of recovery, reporting, or taphonomic bias affecting counts of sites occupied only during the Early Bronze Age. It may be the case that this observation is the result of the fact that a large number of Early Bronze Age sites were reported within the boundaries of what is today the spatially expansive and still-growing city of Gonbad-e Kavus, and which are clearly either destroyed or built over completely.

6.4.3 Site Size Distributions Over Time

While site size is reported in a number of formats across the sources, the one constant measurement present in all surveys is base area. Moreover, base area can be measured in Google Earth by drawing a polygon around the boundary of the site and measuring that polygon. This is likely not the most accurate method of measurement, but I see no reason to believe that field measurements derived from the use of analog theodolites between forty to eighty years ago would be any more or less reliable. The following charts represent five different ways of visualizing key basic descriptive parameters of the distribution of site sizes over time without considering location.
Figure 6.21 Box-and-Whisker Plot of Site Size Distribution Grouped by Period (Scaled log10)

Figure 6.22 Histogram of Site Size Distribution Grouped by Period
Figure 6.21 shows that the overall distribution of base area measurements does not change dramatically in its overall shape between the four time periods. First, and most simply, the minimum and maximum base area measurements hold constant over these four periods. This can be explained with reference to two observations: 1) in each period there is at least one site sized 0.1 ha or less, and 2) the base-area estimate for Tureng Tepe cannot be chronologically subdivided on the basis of presently available information. It seems unlikely that Tureng Tepe covered 34 ha for the entirety of its prehistoric occupation, and indeed may be smaller or in fact even larger at different intervals. Moving away from their extremities, the most notable feature of these distributions is their strong skew toward the lower end of the size spectrum, with the plurality of sites in each period smaller than 3 ha in all periods. The distribution of larger sites (outlier points on the plot) does change between the periods, with a significant increase in the number of sites larger than 5 ha during the Early Bronze Age, and a decline in the numbers of sites larger than 5 ha from the Early Bronze Age to the Middle Bronze Age and from the Middle Bronze Age to the Late Bronze Age.

The distributions are visualized in the form of a histogram in Figure 6.22, which goes some way toward disaggregating the summary presented in Figure 6.21. What it most clearly shows is both the numerical dominance and the changing proportion of sites whose base area measures between 1.0 and 2.0 over time. Additionally, it provides an alternative way of viewing the distribution of the medium- and large-sized sites. Particularly noticeable from this chart is the small number of sites in all periods the larger than 10 ha; there are 4 in the Late Chalcolithic, 5 in the Early Bronze Age, 4 in the Middle Bronze Age, and only 3 in the Late Bronze Age.

Figure 6.23 re-aggregates the size distributions, for the purpose of examining the median, mean and sum of site sizes over time. While it is clear from Figures 6.21 and 6.22 above
that the overall distribution of site sizes is skewed strongly toward the lower end of the spectrum, subtler trends can be observed in median and average site base area over the four periods. Principally, we observe an increase in the median site base area from 1.15 ha in the Chalcolithic to 1.24 ha in the Early Bronze Age, followed by another increase to 1.45 ha in the Middle Bronze Age, which holds constant to the Late Bronze Age. The trendline of the mean site base area is similarly shaped, rising from 2.49 ha in the Chalcolithic to 3.04 ha in the Late Bronze Age, a percent increase (22.1%) roughly comparable to that over the same interval in the median size (26.9%). The trajectory of mean site-size differs, however, in that the mean site base area drops from the Chalcolithic to the Early Bronze Age, likely due to the doubling of the number of sites between 1-2 ha in size between these two periods, before rising more sharply between the Early Bronze Age and Middle Bronze Age.

**Figure 6.23 Descriptive Statistics (Mean, Median, and Aggregate Occupied hectares by Period)**
In terms of aggregate site base area over time, there is a noticeable increase from the Chalcolithic to the Early Bronze Age (i.e., from 224 to 372 ha, an increase of 166%), followed by a 35% decrease to 242 ha in the Middle Bronze Age and a further 28% decrease to 176 ha in the Late Bronze Age. The aggregate base area figures are partly a factor of the raw counts of numbers of sites, which show the same distribution (i.e., Figure 6.16), but are also affected by the aforementioned trend toward slightly larger median and average site sizes over time. Thus, the main trend over time appears to be overall growth from the Chalcolithic to the Early Bronze Age, both in terms of aggregate occupied hectarage and number of sites, followed by two successive periods in which the total number of sites and aggregate occupied hectarage declines.

Figure 6.24 Population Distribution between Large and Small Settlements Over Time

Figure 6.24 presents another way of breaking down the changes in settlement demography by computing the proportions that different size classes of sites contribute to the overall count (left) and aggregate occupied area over time (right).
With regard to small villages (i.e., sites between 0.1-3 ha, shown in purple), these contribute the overwhelming plurality of site counts in all periods (consistently between 78-84%), but their proportional contribution to the total occupied area exhibits more variation from period-to-period. To wit, after increasing from the Late Chalcolithic to the Early Bronze Age, the proportion of the aggregate settled hectarage contributed by small villages decreases from the Early to Middle Bronze Age and again from the Middle Bronze Age to the Late Bronze Age. It is a significant result that during the Early Bronze Age 84% of the sites were small villages and that these sites contributed 43% of the total occupied area in the region but that by the Late Bronze Age these figures had declined to 78% of the total sites being small villages but only contributing 33% of the total occupied area.

As regards large villages (i.e., sites between 3-8 ha, shown in green in Figure 6.24), the proportion that these sites contribute to the total of both site counts and aggregate occupied area increases period-to-period over the entire span. The numerical proportion of large villages relative to the overall sample increases from 11% in the Chalcolithic to 17% in the Late Bronze Age. In terms of the contribution that large villages make to the overall occupied area, this proportion increases from the Chalcolithic to Early Bronze Age (22% to 27%), remains basically the same from the Early to Middle Bronze Age, before increasing again to 29% in the Late Bronze Age. Thus, over time, large villages become more prevalent and constitute a larger proportion of the population of the region.

Small towns (i.e., sites between 8-15 ha, shown in blue) contribute a low percentage of the count and aggregate area in all periods. Their greatest proportional prevalence is in the Late Chalcolithic and in the Late Bronze Age, but at no point is this figure greater than 3% of the total number of sites. Most interestingly, during the Chalcolithic, small towns contribute 15% of the...
aggregate occupied hectarage of the region, but never more than half of that figure in any of the subsequent periods. Nevertheless, the numerical proportion and proportion of aggregate occupied area increase from the Middle Bronze Age to the Late Bronze Age, though in both of these periods, small towns are the least frequent size-class and constitute the smallest proportion of the total occupied area.

The large towns (i.e., sites between 15-40 ha, shown in red) are a bit trickier to interpret, given what we know and don’t know about the change in size of Tureng Tepe over time, but given this caveat, the notable trends are that they contribute a small proportion of the total site count in all periods (in no period are there more than four such sites), but their proportion of the overall aggregate area is consistently between one-quarter and one-third of the total. Between the Chalcolithic and Early Bronze Age, the proportion of aggregate area holds at 25%, and increases through the Middle Bronze Age to 32% in the Late Bronze Age.

Now, of course taking base area measurements as corresponding to occupied hectarage is not an unproblematic assumption, nor is taking occupied hectarage as a proxy for population/demographic trends (Drennan et al. 2015). Nevertheless, in the absence of better sources of population proxies, we have to make do with what information is available. In this discussion, I have shown that several trends can be observed in some simple population distribution proxies. Most notable among these are: 1) a large increase in overall settled area from the Chalcolithic to the Early Bronze Age, which appears to be due to an increase in the total number of sites, but especially from growth in the number sites sized between 1-2 ha and 5-10 ha; and 2) a restructuring of the “demographic profile” from the Early to Middle Bronze Age, where the average and median site sizes increase, but the overall count of sites and occupied hectarage decreases, a trend which continues into the Late Bronze Age. This change
appears to be due to the increase over time in both the numerical and areal proportion of large villages relative to the aggregate (Figure 6.24). Another significant trend to observe is the convergence in areal proportion contributed to the total by large towns, large villages, and small villages in the Late Bronze Age, where they are almost the same, despite their numerical-proportional differences. This suggests that during this time, the population concentrated especially in a greater number of large villages as compared to before. Whether this represents stability and growth in sites established in the Middle Bronze Age or an entirely different pattern of agglomeration will remain the subject of future inquiries. Either way, it appears that in all periods, the greatest proportion of the population of the Gorgan Plain lived in small villages, but that period-over-period across this interval, the proportion of the population living in large villages, small towns, and large towns steadily increased, until the Late Bronze Age, where the aggregate occupied hectarage was nearly equally comprised of small villages, large villages and large towns.

6.4.4 Geographic Distribution of Site Size over Time

The change in site-size distributions over time discussed in section 6.4.2 are interesting in their own right but become all the more compelling when the third key variable (location) is re-introduced. Because these distributions will be subject to spatial modeling Chapter 7, for now, the distributions will be presented in terms of their basic parameters through visual inspection and description only. In the future, spatial-statistical analysis should be conducted, but, as I will argue in Chapter 7, if contemporaneity cannot be established, any such patterns identified in the settlement distributions of long culture-historical periods represent palimpsests of occupation rather than synchronic snapshots and render moot any conclusions that rest of the assumption of simultaneous settlement.
One point to note immediately about these distribution maps is that in all four periods there appears to be a gap between the central and eastern portions of the plain where there are no reported or recorded site locations. This “gap” is misleading, however, as I documented at least nine mounded sites in this area during the process of reviewing the reported site locations in Google Earth and there are likely more yet to be found; moreover, a large number of later sites are reported in this location by Abbasi. The curious aspect of this pattern is that only one of the sources of survey data reports any sites in this locale, a small EBA-MBA site reported by Abbasi, that I was not able to confidently identify. The reasons for this consistent gap in documentation remain obscure, but it is possible that access to this area has been restricted, as it is not covered by any of the intensive on-the-ground surveys (see Figure 6.1). In the satellite imagery, it does not appear unusual in any way such to suggest modern climate or topographic conditions occluded archaeological visibility, and it is bounded on all sides by inter-city roads and the province’s main arterial highway.
With respect to the size-location distribution of sites dated to the Chalcolithic, the focus of occupation seems to be concentrated at opposite ends of the plain. The number of sites appears to be about equivalent between the western and eastern halves of the plain, but the size distribution differs. During this period, the western half of the plain appears to be more split between large and small sites. Both of the 15+ ha sites are in the western plain, but with only one 8-15 ha sized site and four 3-8 ha sized sites and the remaining under 3 ha. In the eastern half of the plain there are no 15+ ha sites, but more 8-15 ha sized sites and the same number of 3-8 ha sites. Settlement also appears to be more spatially concentrated in the eastern half of the plain as compared to the west, where there is more average distance between the sites. In both cases, and as will be seen throughout the following examples, settlement tends to cluster quite closely to permanently watered rivers and streams.
In the Early Bronze Age, the division between the western and eastern halves of the plain is less clear-cut, especially as there is more settlement along the Kara Su River in the far west of the plain, compared to in the Chalcolithic. The notable change in the settlement distribution (in addition to the notable increase in numbers and sizes of sites overall) is that settlement considerably expands in the central part of the plain (near the intersection of 37.00° Lat, 55.00° Long), with a large number of new small sites, but also several larger sites of different size classes as well, including two new sites >20ha. The site distribution in the eastern plain changes as well, with the core area from the Chalcolithic still densely populated with sites, but with some expansion in the number of sites, particularly to the south of the modern reservoir. A new intermediate-sized site appears just north of the Gorgan Plain River during this
period, and one of the older intermediate-sized sites from the Chalcolithic appears to grow considerably in size.

**Figure 6.27 Geographic Distribution of Site Size Classes (Middle Bronze Age)**

In the Middle Bronze Age, the most notable change is in the marked decrease in the number of sites overall. Most of the intermediate- and large-sized sites are still occupied, but the number of small settlements surrounding them is noticeably less. In particular, the number of sites in the central and especially the eastern parts of the plain appear to be considerably reduced compared to the preceding period. The western-most part of the plain, by contrast, appears relatively stable though some small sites from the previous period do not continue to be occupied. There is also one fewer site in the largest site-size class in the Middle Bronze Age (n=3) as compared to the Early Bronze Age (n=4), but the three that remain were continuous occupations from the EBA, rather than new settlements.
During the Late Bronze Age, the trend toward the reduction in site numbers continues, however some interesting spatial trends emerge. In the westernmost part of the plain, there are no sites larger than 8 ha, but this area has more 3-8 ha sized sites than the other two zones. The central zone continuing to be home to the largest centers, as in the preceding period, with the two 15+ ha sized sites located here; in contrast to previously, however, there are no 8-15 ha sized sites in this zone during this period. In the eastern plain, there is one site sized 8-15 ha and three sites sized 3-8 ha. Settlement appears densest in the central plain and concentrated along a single river channel. Settlement is least dense in the eastern zone of the plain, which is a new development compared to previous periods.
6.4.4 Evaluating Tosi’s model

The overall spatial distribution of site sizes and locations suggests that not only are there geographic divisions in the location of settlement over time, but that the structure of settlement within these different areas changes over time as well. Moreover, it appears that trends in the relationship between site size and location, if subdivided by area of the plain, can diverge considerably from each other. That is to say, the geographic organization of human settlement does not appear to be uniform across different parts of the plain at any one time. These trends can and should be the subject of further analysis to identify more fine-grained patterns, especially those relating to questions of agricultural potential and the environmental variables introduced in Section 6.4.1. For now, however, I would like to return to Tosi’s model of the formation of “Turanian” proto-state structures to examine how his claims about changing settlement patterns do or do not align with the Gorgan Plain settlement data.

During the Late Chalcolithic (i.e., the Pre-Urban Phase, ca. late-fourth to early-third millennia BCE), Tosi argued that the landscapes of settlement across this region comprised primarily of small settlements located close together, with nascent centers, and where “units of cultural integration” measure no larger than 50 km² (Tosi 1979: 162). For example, in southern Turkmenistan, one such territory was based in the central Kopet Dagh Piedmont around Kara Tepe (ca. 15 hectares, see Masson 1960: 355-362) and another was based in the Tejen delta, centered around Geoksjur (ca. 12 hectares, see Biscione 1973: 108). As far as we accept the distinction between so-called “elite” and “non-elite” architecture at face-value, these sites appear to exhibit some degree of social stratification during this period, especially at Anau North, Kara Depe and Ilgynly Depe (Hiebert 2003: 171). But, on the whole, the settlement regime of this period is characterized by undifferentiated habitation sites, more or less similar in
size (ca. ≤2ha), with simple burials, and an overall material inventory typical of village-level agriculturalists (Hiebert 1994a: 167-168). By the end of Namazga III, the trend of micro-regional units of cultural integration with small villages and nascent centers was distributed quite widely across the different ecological zones of EIASCA. The central settlements of these micro-regional units included Tepe Hissar, Tureng Tepe, Shahdad, Shahr-i Sokhta, Kara Depe, Geoksjur, Namazga Depe, Alryn Depe, each of which had grown to a size of between 12 and 18 hectares on average (Tosi 1984: 30). Each of these sites was either the largest (e.g. Tureng Tepe and Shahr-i Sokhta) or the only (e.g. Shahdad) settlement in its micro-region (Tosi 1984: 30), leading to the conclusion that the settlement system of this period indicated a simpler form of social organization during this period, especially with respect to what was to follow (Hiebert 1994a: 168).

During the Early Bronze Age (i.e., the Proto-Urban Phase, ca. early-to-middle third millennium BCE), in Tosi’s model, settlement geographies were characterized by growth in the number of sites and occupied area overall and the emergence of settlement hierarchies, with large central sites, and where “units of cultural integration” extended over territories between 50-100 km² (Tosi 1979: 162-163). Trends established in the preceding phase continued, with settlements continuing to cluster in areas of naturally abundant water flow as in the preceding periods (Berking et al. 2017). Centers continued to grow while villages remained small (Tosi 1977: 56), though the total number of sites continued to increase (Kohl 1984: 115). Survey records indicate that the central settlements quadrupled in size over the course of this period, with the notable exception of Tepe Hissar, which shrank in size from 12 to 8 hectares and saw all its outlying settlements abandoned (Tosi 1986: 163; Trinkaus 1989). For example, Shahr-i Sokhta begins the “Proto-Urban II” phase at 35 hectares, and by the “Urban I” phase, has grown to over
150 (Tosi 1976: Fig. 5) and Mundigak grew from a size of 6-8 hectares to ca. 55-60 hectares over the same interval (Tosi 1986: 158). The settlements surrounding Shahr-i Sokhta at this time are spread widely across the relict deltas of the Helmand and none exceed 1.5 hectares (Meder 1977 as in Tosi 1984: 30). In the upper Helmand, the villages contemporary to this period at Mundigak also appear quite small, though precise figures are not available (Dupree 1963: Fig 1; Tosi 1986: 163). In Turkmenistan, Altyn Depe and Namazga Depe both grew from ca. 10 hectares at the outset of this period to ca. 25 and 50 ha respectively by its end (Kohl 1984: 105), with outlying settlements remaining under 2 hectares (Tosi 1977: 52).

Tosi argues that for many of the regions of EIASCA during this period the pattern of landscape occupation continues to differentiate into two size-classes of ever larger centers and smaller rural settlements (Tosi 1986: 158). He considers this pattern as reflective of a process of demographic concentration or centralization, which also accounts for the seemingly anomalous situation of Damghan, where over this interval Tepe Hissar does not grow in areal extent, but purportedly absorbs the population of its outlying settlements (Tosi 1986: 163). Kohl, differing from Tosi, argues for the emergence of a three-tier settlement system, at least in the Kopet Dagh, with the larges centers being Namazga Depe and Altyn Depe (25+ ha), and second order centers ca. 5-20 hectares (e.g. Khapuz Depe, Ulug Depe, Yarim Tepe of Darreh Gaz, Mansur Depe), and small villages of ca. 1 ha (Kohl 1984: 107). He also argues for the emergence of a similar pattern in Southwestern Turkmenistan, the Upper Atrek, and in the Gorgan Plain at the same time. Crucially, Kohl proposes that the known occupation area of settlement in aggregate peaked during this period (i.e., Late Namazga IV), not to again be surpassed until the Early Iron Age but cautions us against being overconfident in this assessment due to the relative lack of systematic surveys in the area. Nevertheless, he concludes that there must have been a striking
increase in settled area in these regions (Kohl 1984: 216-217). On the basis of the settlement record, Kohl makes an intriguing claim to the effect that insofar as one can “accurately speak of an urban revolution” in southern Turkmenistan, that this was more likely to have begun during the Early Bronze Age (i.e. Namazga IV) than during the subsequent and more fully documented Namazga V period (Kohl 1984: 105). Whether or not this can be substantiated by the evidence available is yet to be determined.

Regardless of the disagreement over settlement hierarchies, there is consensus between these two positions that the geographic extent of the regional sub-systems began to grow in the Early Bronze Age (Tosi 1979: 151). These areas of cultural integration expanded to a range between 50 and 250 square kilometers during this period, evinced by a purportedly wider distribution of materials produced by a given center and the other craft producing areas with which it was culturally integrated (Tosi 1984: 27). Tosi argued that this areal expansion of cultural integration was tied to increasing centralization of craft production. In other words, in Tosi’s view, the observed expansion of cultural integration was made possible by the nucleation of facilities and services needed to support the increasingly specialized craft industries with labor and raw materials. This concentration of skilled labor and resources made it possible to coordinate both production and distribution at greater scales than previously possible (Lamberg-Karlovsky 2014: 395; Tosi 1984: 31).

During the Middle Bronze Age (i.e., the Urban Phase, ca. middle-to-late third millennium BCE), Tosi argued for a phase of urbanization, which further differentiated the settlement hierarchy in these regions. He characterizes this phase as the one in which “proto-state structures” emerged, with the large fully urban centers anchoring “more compactly integrated territorial units, presumed embryos of state structures” comprising territories of 500-1000 km²
Yet, accounts of the Early Namazga V period in the Kopet Dagh conflict with each other.

In one version, the settlement distribution sorts into three sized-based categories: the large centers of 40+ hectares, medium-sized settlements of ca. 10 hectares, and small hamlets ca. 1-2 hectares (Biscione 1977; Tosi 1974b: 70; Tosi 1977: 52). Tosi interprets this as a dual system of two-tiered settlement hierarchies, in which urban centers (whether ca. 40+ ha or ca. 10 ha) controlled integrated territorial systems of subordinate intermediate centers with dependent villages scattered through the hinterland between. In this account, the urban centers either grew or maintained their size and the numbers of small “rural” settlements increased (Tosi 1984: 30). In some cases, medium-sized settlements came to stand as territorial centers in their own right, such as Ulug Depe and Khapuz Depe (Tosi 1977: 55). In the alternative account, the number of sites and the overall occupied area decreased from the Namazga IV period into the Early Namazga V period (Kohl 1984: 117). In this telling, settlements of different sizes were not functionally differentiated from each other in any marked capacity. That is, both villages and centers comprise dense settlement mounds with compact architectural complexes featuring multi-roomed houses, long alleys or corridors and courtyards (Hiebert 1994a: 172; Shchetenko 1970: 50). From this perspective, the “centers” are best characterized as large agglomerated villages, since there is no appreciable difference in the structure of the settlements between the large sites and the small sites (Hiebert 1994a: 172), and because there is apparently little difference in the quality or variety of material culture inventories found at the small sites and larger sites (Kohl 1984: 120).

This vision of the Early Namazga V settlement pattern is difficult to reconcile with the picture that emerges from the excavations at Altyn Depe, but in any case, in this reading, the
Early Namazga V pattern consists as much of small autonomous settlements as much as it does of centers surrounded by clusters of small villages (Ganyalin 1967: 208; Kohl 1984: 120-121). This account of the settlement pattern as characterized by relatively decentralized clusters of self-sufficient communities, if correct, would significantly undercut the urbanization thesis (Masson 1968). There is no particular \textit{a priori} reason why these two versions of the Early Namazga V settlement patterns might not both be correct in some ways and incorrect in others. It is entirely possible, for example, that Tosi’s interpretation accounts well for the Early Namazga V phase, and Kohl’s interpretation better characterizes the Late Namazga V phase. This is an empirical problem that could be the subject of a targeted study to clarify the nature of the overall pattern, both spatially and chronologically. It is also significant to note that both Tosi and Kohl specifically refer to the Gorgan Plain as a region with great potential for studying the settlement patterns of this period, due to their clear material-cultural connections to Southern Turkmenistan (Kohl 1984: 218; Tosi 1977: 54). At the time of their writing, however, the record was too underdeveloped to draw any conclusions.

Nevertheless, Tosi did argue for the emergence of larger-scale social groups at this time, what he called “units of cultural integration”, extending during this period to encompass territories measuring between 500-1000 km$^2$ (Tosi 1986: 167). He specifically highlights the strong cultural connections between Tepe Hissar and the Gorgan Plain, suggesting that the two areas may have formed a coherent “unit of cultural integration,” driven by the productive symbiosis that developed between the rich farmlands of the lowland alluvium with the mineral resources of the highlands (Tosi 1984: 34). Given the distance between Tepe Hissar and Tureng Tepe, the inference of some kind of political integration on this basis would be an overreach, despite the fact that the sites share similar material cultural inventories. Tosi also argues that
Sistan (i.e., Shahr-i Sokhta) and Arachosia (i.e., Mundigak) achieved a higher degree of cultural integration at this time, fusing into something he provisionally called the “Helmand Civilization” (Tosi 1986: 167). He also argues that such territorial units emerged around Altyn Depe (ibid); presumably, we may also find such a territorial unit in the Jaz Murian basin, and slightly later, in the Murghab Delta and the plains of Bactria (Salvatori 2008a: 93). There is neither time nor space to fully address the issue of the settlement geography of the Bactria Margiana Archaeological Complex here because it is not included in Tosi’s model due to having only been recently discovered at the time of his writing on the subject (ca. 1974-1986). Suffice it to say that the most recent study of its political geography argues for a period of territorial integration into an extensive, hierarchically-organized polity during this period, with its political capitol centered on the fortified compound of Gonur North (Salvatori 2008b).

In the Late Bronze Age (i.e., the Post-Urban Phase, ca. late-third to early-second millennia BCE), Tosi views settlement geographies across this zone as being restructured by the breakdown of the Urban Phase system, which lead to a dispersal of the population into smaller settlements, with fragmentation of the “units of cultural integration” into smaller sub-regional units whose territorial extent is not specified, but presumably less than in the preceding Urban Phase (Tosi 1979: 165). Interestingly, Tosi attempts to both have his cake and eat it too, insofar as he argues that despite the fact that the urban polities that formed during the preceding phase lost all their features of centrality, with most if not all of the cities declining in size of being or abandoned relatively quickly, the disappearance of the city does not necessarily imply the dissolution of the state organization; indeed, he concludes that urbanism is one but not the only outcome of a social order based on the state and this relativity appears to hold for Middle Asia (Tosi 1986: 172). The particulars underpinning this argument are provided by Biscione
(1977), who argues that during Namazga VI, the settlement system in Southern Turkmenistan shifted as a whole to one based on smaller but more numerous sites, which expanded into new territory and which was focused on an oasis-adapted pattern of primary production rather a piedmont-based system. Again, much of this theorizing was done prior to our now much more extensive knowledge of the settlement system of the Bactria Margiana Archaeological Complex (see Markofsky 2010; Rouse and Cerasetti 2015). Nevertheless, the basic model seems to hold, insofar as the Late Bronze Age is seen as a period of political-geographic fragmentation (e.g., Salvatori 2008b). This theory reflects Biscione and Tosi’s demographic fission hypothesis even if disagreeing or remaining agnostic about causes driving the transformation of the centralized hierarchical urban system into a decentralized less differentiated village system (Biscione 1977; Biscione and Tosi 1979).

To summarize, the case of the Gorgan Plain complicates Tosi’s claims about changes in site distributions over time about the macro-region as a whole. While he is correct that the landscape of settlement in all periods is numerically dominated by small settlements and does feature nascent centers during the Chalcolithic (sites ca. 12-18 ha), this is true of all of the periods, in which the overwhelming plurality of sites are smaller than 3 hectares. With regard to the Early Bronze Age, Tosi’s model correctly accounts for the growth in both numbers of sites and overall occupied area, though it should be noted again, that much of this growth is due to the great numerical expansion of small sites, as this period has the lowest mean site size, but the largest aggregate occupied hectarage of the four periods.

Tosi’s model argues for the emergence of urban centers during the Middle Bronze Age, but as we have seen, this period actually has fewer large centers than the preceding Early Bronze Age and represents a period of transition toward a different demographic profile of
settlement, which continues into the subsequent period. As concerns the Late Bronze Age, Tosi’s argument regarding the dispersal of population into smaller settlements must be qualified. While the claim about the breakdown of the settlement system of the preceding Middle Bronze Age may correlate to the decrease in the number of sites overall and the lowest recorded aggregate occupied hectarage of all four periods, at the same time, mean site size is at its highest and the median site size is at its joint highest. Rather than representing a population ‘dispersal’ as posited in the model, this may in fact represent a population concentration, or at the very least, indicates that the settlements that continue to be occupied from the preceding period either tended to grow or perhaps to have been the larger settlements to begin with.

Thus, settlement patterns represent another point of distinction that mark the Gorgan Plain as unique among the regions of Eastern Iran, southern Central Asia, Afghanistan, and the Indo-Iranian borderlands. The validity of lumping all these regions together must be questioned overall, but on the basis of the foregoing we can certainly conclude that the Gorgan Plain exhibits certain particularities that preclude its inclusion in a laundry-list of areas experiencing similar trajectories in their history of settlement. In particular, the Gorgan Plain exhibits its greatest number of sites, largest amount of occupied area, and highest number of “centers” during the Early Bronze Age, i.e., earlier than predicted by Tosi’s model, which would expect these figures to characterize the Middle Bronze Age. The Late Bronze Age of the Gorgan Plain also departs from prediction, in that while there does appear to be a decline in population (understood through the rough proxy of site counts and aggregate occupied area), but it is hardly the case that this is the result of the disappearance of centrality; indeed, settlement appears to concentrate to a greater degree than before in large villages and large towns.
Finally, it should also be noted that the sites tend to be located further south over time (Figure 6.24). The northern and southern limits of the settlement distribution are relatively stable over time, which is unsurprising given the ecological barriers (i.e. the Turkmen Desert to the north and the Alborz Mountains to the south). The mean, as well as the second and third quartiles, move steadily southward over time, however. This is an interesting observation, but one which is likely to be related to environmental factors beyond the scope of this dissertation.

Figure 6.29 Southward shift in Settlement Distribution over time

Nevertheless, investigation into the causes and impacts of this shift are certainly an area for further research, especially in light of the increasingly detailed paleoclimatic and geomorphological record available for the Caspian basin more generally, but the southern
littoral in particular (see Leroy et al. 2019; Shumilovskikh et al. 2016). This could perhaps be connected to Ali Mousavi’s hypothesis about changing patterns of resource use and the availability in particular of fuel for ceramic and metallurgical production (Mousavi 2008); could the shift of settlement southward over time be caused by the increased need for and decreasing supply of timber reserves? Could it also be related to the effects of the 4.2ka climate event (Weiss 2000, 2012; see also Kaniewski et al. 2008; Ran and Chen 2019)? Or some combination of all three, and potentially more, factors?

6.5 Results, Trends, and Future Directions

In this chapter, I have presented the third millennium settlement record for the Gorgan Plain. This complex landscape of tells has been surveyed multiple times over the course of the past eighty years. These survey records vary in their quality and reliability, but through source criticism I was able to determine that all were ultimately comparable and did not present any insurmountable challenges to integration into a coherent digitized information system. Digitization of paper records and the conversion of the flat tables of the source information into a relational geospatial database was augmented by the Gorgan Plain Survey Restudy protocol, whereby all reported site locations were examined in Google Earth and through which new sites were identified. Unfortunately, most of these new sites could not be assigned chronological information, and therefore did not factor into the settlement pattern analysis conducted in section 6.4.

My analysis of these settlement patterns represents the first systematic analytical study of this regional settlement distribution. While the methods deployed in this chapter are relatively rudimentary by today’s standards in archaeology, they are necessary first steps toward more computationally sophisticated investigations. Indeed, prior to this, hardly anything was
known about the settlement patterns of the Gorgan Plain aside from the recognition that there were between 200-300 sites dating to the third millennium distributed across the plain. Through the application of basic EDA techniques – including summary statistics of site-sizes through box-and-whisker plots and histograms, along with the computation of the changing proportions of counts and area contributed to the total by sites of different size classes and visual inspection of distribution maps, we now have a much better sense of the subtleties of historical and spatial trends of settlement in the Gorgan Plain during the Chalcolithic and Bronze Age.

I was also able to evaluate aspects of Tosi’s settlement model. In summary, his predictions about the Chalcolithic appear to have been more or less correct, but his model mischaracterizes the following three periods. My analysis shows that the peak period of settlement, in terms of number of sites, aggregate occupied area, and greatest number of “centers,” occurs during the Early Bronze Age, i.e., prior to when Tosi would have predicted. The Middle Bronze Age represents the beginning of a demographic shift away from the dense occupation of the Early Bronze Age, with a major reduction in the number of sites and the overall occupied area, but the beginning of a trend of a greater proportion of the population living in large villages (i.e., sites sized 3-8 ha). Moreover, the Late Bronze Age, far from being a period of collapse and dispersal appears to continue trends established in the Middle Bronze Age. Granted, as discussed above, there are some serious problems with both the precision and accuracy of this chronology, which will need to be re-examined in the future. Fortunately, the data structures that I have created to support this analysis will easily assimilate an updated chronology. Finally, a surprising result was the discovery that site locations steadily trend southward over time, which remains to be explained, but may perhaps be due to changing patterns of resource use or climate shifts (e.g., Mousavi 2008).
A last note should be made that the settlement patterns discussed in this chapter, and indeed, in this dissertation overall, are only partially representative of any coherent prehistoric settlement system in the region for three reasons. First, the Caspian Sea experienced a low-stand between ca. 7-3.5kya, with a minimum elevation above sea level approximately 5-6 meters below its current level at ca. 3.9kya, i.e., approximately 1900 BCE (Leroy et al. 2013, 2019; cf. Kakroodi et al. 2012: Figure 12). Consequently, it is highly likely that there are an unknown number of sites currently inundated below the Caspian Sea. Second, due to the high rate of alluviation and colluviation in the region, an unknowable number of small sites likely lay buried under riverine and wind-blown sediment, especially along the main channel of the Gorgan Plain and in the loess belt located to the north and east of Gonbad-e Kavus (Asadi et al. 2013; Karimi et al. 2011; see also Leroy et al. 2019). Third, the Gorgan Plain forms a contiguous geographic space with the plain of Mazandaran immediately to the west; indeed, twenty-four prehistoric sites have been documented just in the two easternmost counties of the province, bordering the Gorgan Plain (Mahfroozi 2003: Figure 1; Piller 2012). Future analysis must take all three factors into account.
In terms of change over time in the distribution of counts, sizes, and locations of sites, the basic parameters of the settlement history of the Gorgan Plain ca. 3200-1600 BCE are now clear. In Chapter 6, I showed that Tosi’s basic empirical model of settlement trends only partially accounts for the trajectory of change over the course of this chronological interval. Given that Tosi’s model was not based on a systematic investigation of the actual evidence from the Gorgan Plain, but rather, impressionistic comparisons to better-documented regions, this should hardly be considered a surprising result. In this chapter, I extend this analysis to evaluate Tosi’s model of proto-state formation in the so-called “Turanian Basin,” focusing his claims regarding shifts in the territorial and rank-size organization of the settlement patterns of these regions. I demonstrate that, at least within the specific modeling parameters used, the broad trajectory of territorial patterns that Tosi identifies across this time span is more or less accurate, if not terribly precise. Tosi’s assertions about the spatial structure of these territorial units are less than compelling, however. Indeed, the Gorgan Plain exhibits greater-than-expected variation over time and space in rank-size distributions, strengthening the argument that the political geography of the Gorgan Plain is distinctive among the regions of Eastern Iran, Central Asia, Afghanistan, and the Indo-Iranian Borderlands during the Bronze Age.

In this chapter, I make three primary interventions. The first concerns the use of strict contemporaneity as a sampling criterion for settlement pattern analysis (7.1.1-7.1.2). While this could be seen as an additional and unnecessary layer of abstraction, I argue that it is actually fundamental to the felicitous identification of regional-scale trends in settlement and occupation. The use of this chronological framework resulted in the identification of three
phases of simultaneous settlement: T₁ (the Chalcolithic to Early Bronze Age Transition, ca. 2800 BCE), T₂ (the Early to Middle Bronze Age Transition, ca. 2400 BCE), and T₃ (the Middle to Late Bronze Age Transition, ca. 2000 BCE). My analysis reveals several trends in the demographic profile of the Gorgan Plain as inferred from the settlement patterns. First of all, the plurality of sites in all periods are “small villages” (i.e., sites between 0.1-3 ha). The relative numerical prevalence of sites in this size-class category decreases slightly over time, however, as does their areal proportion of the overall aggregate occupied hectarage per period. Second, the proportion of “large villages” (i.e., sites between 3-8 ha) increases over time, both in terms of site-counts and in terms of the percentage of the aggregate occupied area contributed by this size-class. Notably, large villages constitute the largest share of aggregate occupied hectares in the final phase of the sequence (i.e., T₃). This trend is also reflected in measurements of mean and median site size over the three phases of the sequence, which both increase steadily over time. Third, while the second phase of the sequence (i.e., T₂), was the most demographically expansive phase in this sequence, with the greatest number of sites and largest occupied area overall, it is also the period that exhibits the greatest polarization in population distribution between large and small settlements. Together, these trends suggest a different longue durée settlement history than predicted, in which the most salient patterns concern changes in the patterning of small and medium sized sites rather than those of the so-called “proto-urban” centers.

The second intervention is to demonstrate how Tosi’s predictions about territory and rank-size dynamics do and do not fit the record of settlement in the Gorgan Plain over the chronological window of focus here (7.1.3). My analysis shows that not only does Tosi’s center-focused model of political geography produce a result in which the majority of settlement
clusters and groups exhibit a primate rank-size distribution, but also, that his parameters leave a plurality of sites out of the equation, resulting in a distorted picture of the overall dynamics. Two major issues with Tosi’s model are his undertheorized and arbitrary definitions of: (1) the size thresholds used to designate sites as “centers,” which may perhaps be too large and (2) the distance thresholds that Tosi uses to delineate these center-focused territories, which don’t seem to be based on any interrogatable behavioral correlates. Another concern regards translating Tosi’s narrative description of settlement distributions into the rank-size idiom. It is quite clear to what he is referring by his descriptions of the patterns predicted during the earliest (i.e., primate) and latest (i.e., convex) phases of the sequence, but as regards the Early-Middle Bronze Age Transition (i.e., T₂) there is still some ambiguity as to what his descriptions correspond to, though they seem to be primate-type variants.

In my third intervention, I present an alternative model of territoriality (7.2) and rank-size dynamics (7.3) that begins by defining settlement clusters and groups not based on the spatial proximity of sites to “centers,” but rather based on proximity between all sites to each other. In other words, where Tosi’s model is top-down, mine is bottom-up, seeking to identify settlement groups at scales that correspond to the limits of “community” on the one hand, and to “polity” on the other (see Chapter 2.2.1). The results of this analysis show that the number of the smallest-scale “communities” is fairly stable over time (i.e., all those settlements within 3 km of each other), despite their differing spatial configurations. This contrasts with the larger-scale definition of “community” as understood within the model (i.e., all those settlements within 6 km of each other), where the trend is also stable count-wise between the first two phases, and then increases dramatically into the final phase. With respect to the level of settlement grouping that I have defined as corresponding to “polities” (i.e., all those settlements
within 9 km of each other), the count of such units decreases from the first phase to the second phase, followed by a precipitous increase to the third phase. Comparing these trends to the average area of settlement clusters and groups further supports the conclusion that in territorial terms, the broadest trend is one of consolidation-integration between the first two phases and fragmentation between the last two phases. While this supports Tosi’s narrative on the whole, this observation should not be taken to mean that the final phase represents a “collapse” of some kind, but rather a period of diversity characterized by a greater number of differently-organized polities.

Taken together, the results of these three interventions support Kohl’s contention that the secondary states east of Sumer were less nucleated, less hierarchical, and less centralized than Tosi predicted, and much less so than contemporaneous polities in Mesopotamia. Key take-aways are the variation observed across the three phases of the chronological sequence under investigation, particularly with regard to the distinct territorial and rank-size trajectories identified in the three spatial zones of the Gorgan Plain. This result in particular should be the subject of further investigation, as should the change over time in the “life-cycle” of individual settlement clusters/groups. On a broader theoretical level, I argue that territoriality and rank-size models are best understood in a multi-scalar framework.

7.1 Evaluating Tosi’s Model

Tosi’s model of proto-state formation in Greater Khorasan makes several claims relating to territorial dynamics and settlement organization, namely that over the course of the third millennium, centralized, hierarchical and territorially-integrated polities formed, consolidated, and then collapsed. Recalling the discussion from Chapter 3, Tosi partially revised not only his interpretation of the archaeological record, but also the phasing and absolute chronology of key
developments (see Tosi 1974b, 1977, 1979, 1984, 1986). Consequently, I have chosen to use the final version of the model’s phasing and absolute dates (e.g., 1986), though certain empirical points relating to the specific morphology of regional political and social geographies during particular phases are derived from the earlier versions of the model, as they are either unchanged or not mentioned in the later versions.

7.1.1 Establishing Strict Contemporaneity

As difficult as stabilizing Tosi’s phasing proved to be, the most challenging task was to articulate Tosi’s chronology for the macro-region of the Greater Khorasan with the Gorgan Plain-specific chronology, which was poorly understood at the time of Tosi’s writing.

Table 7.1 Tosi’s 1986 Chronological Framework for Proto-Historic Greater Khorasan

<table>
<thead>
<tr>
<th>Phase</th>
<th>Period</th>
<th>Dates (BCE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Urban</td>
<td>Middle Chalcolithic</td>
<td>4000-3200</td>
</tr>
<tr>
<td>Proto-Urban</td>
<td>Late Chalcolithic-Early Bronze</td>
<td>3200-2600</td>
</tr>
<tr>
<td>Urban</td>
<td>Middle Bronze I</td>
<td>2600-2200</td>
</tr>
<tr>
<td>Post-Urban</td>
<td>Middle Bronze II</td>
<td>2200-1600</td>
</tr>
</tbody>
</table>

Table 7.2 Bayesian Radiocarbon Chronology for the Gorgan Plain (Late-4th to Early-2nd Millennia)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Period</th>
<th>cal. BCE 2σ</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tureng IIB</td>
<td>Late Chalcolithic</td>
<td>3175-3000</td>
<td>Late 4th Millennium</td>
</tr>
<tr>
<td>Tureng IIIB</td>
<td>Early Bronze Age</td>
<td>2725-2450</td>
<td>Early-Middle to Middle 3rd Millennium</td>
</tr>
<tr>
<td>Tureng IIIC1</td>
<td>Middle Bronze Age</td>
<td>2225-1950</td>
<td>Late 3rd Millennium</td>
</tr>
<tr>
<td>Tureng IIIC2</td>
<td>Late Bronze Age</td>
<td>2025-1550</td>
<td>Early-Middle 2nd Millennium</td>
</tr>
</tbody>
</table>

Contrast Table 7.1, which presents the phasing, culture-history, and absolute dates of Tosi’s model with Table 7.2, which is drawn from the phase-constrained Bayesian radiocarbon simulation discussed in Chapter 5. The date-ranges presented in Table 7.2 reflect the posterior probability distributions derived from an OxCal simulation of eleven radiocarbon samples using stratigraphic priors (e.g., Tureng IIB must come before IIIB, and IIIC2 must come after IIIC1, etc.).
There are a number of problems with this chronology, stemming from outliers which likely result from contaminated samples or the old-wood problem, several dates with wide error ranges (≥200 radiocarbon years), and a lack of dates for the periods Tureng IIA (early-4th mill) and IIIA (early-3rd mill). These issues notwithstanding, I regard this chronology as accurate, but not particularly precise; it is thus broadly comparable in accuracy to Tosi’s chronology, despite the low precision in his model resulting from an entirely different set of prior assumptions.

As is often true with inter-regional culture-historical comparison, the phases and periods of different cultural zones can be difficult to align, and indeed, there is no a priori reason to assume that they should perfectly align at all in the first place. In this case, however, the absolute dates provide us a “key” with which to compare these two sequences (Table 7.3). Two points require attention. The first is that Tosi’s model differentiates between (Early-Middle) Chalcolithic (i.e. 4000-3200 BCE) and Late Chalcolithic, but the latter period is lumped together with the Early Bronze Age (i.e., 3200-2600 BCE). The second is that Tosi’s model does not include the Late Bronze Age, but rather features a Middle Bronze I (i.e., 2600-2200 BCE) and a Middle Bronze II (i.e., 2200-1600 BCE). Nevertheless, we can assign the Gorgan Plain Late Chalcolithic and Early Bronze Age to Tosi’s Proto-Urban phase, the Gorgan Plain Early and Middle Bronze Age to Tosi’s Urban Phase, and the Gorgan Plain Middle and Late Bronze Age to Tosi’s Post-Urban phase.
Table 7.3 Correlation Between Gorgan Plain Culture-Historical Framework and Tosi’s model

<table>
<thead>
<tr>
<th>Tosi Phase</th>
<th>“Turan” Culture History</th>
<th>Dates (BCE)</th>
<th>Gorgan Plain Culture History</th>
<th>Dates (cal. BCE)</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Urban</td>
<td>Chalcolithic</td>
<td>4000-3200</td>
<td>Late Chalcolithic</td>
<td>3175-3000</td>
<td>Late 4th Mill.</td>
</tr>
<tr>
<td>Proto-Urban</td>
<td>Late Chalcolithic-EBA</td>
<td>3200-2600</td>
<td>Early Bronze Age</td>
<td>3000-2450</td>
<td>Mid 3rd Mill.</td>
</tr>
<tr>
<td>Urban</td>
<td>Middle Bronze I</td>
<td>2600-2200</td>
<td>Middle Bronze Age</td>
<td>2225-1950</td>
<td>Late 3rd Mill.</td>
</tr>
<tr>
<td>Post-Urban</td>
<td>Middle Bronze II</td>
<td>2200-1600</td>
<td>Late Bronze Age</td>
<td>2025-1550</td>
<td>Early 2nd Mill.</td>
</tr>
</tbody>
</table>

These observations would appear to complicate evaluation of Tosi’s model, if we were to work only with these broad culture-historical periods. As discussed in Chapter 6, the majority of the chronological determinations assigned to the survey data are derived from Abbasi’s 2011 site gazetteer, date assignments which are not without their own problems, as extensively discussed in Chapter 6. What the apparently disjuncture between Tosi’s phase-chronology and the Gorgan Plain chronology does align with, however, is the strict contemporaneity framework (Chapter 4.1.2).

Table 7.4 Correlation Between Gorgan Plain Culture-Historical Framework and Tosi’s model

<table>
<thead>
<tr>
<th>Tosi Phase</th>
<th>Tosi Dates</th>
<th>Gorgan Plain Culture History</th>
<th>Strict Contemp.</th>
<th>Gorgan Plain Dates cal. BCE (midpoint within the range)</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proto-Urban</td>
<td>3200-2600</td>
<td>LCA-Early EBA</td>
<td>$T_1$</td>
<td>ca. 3000-2725 (ca. 2850 or 2800 for ease)</td>
<td>Early 3rd Mill.</td>
</tr>
<tr>
<td>Urban</td>
<td>2600-2200</td>
<td>Late EBA-Early MBA</td>
<td>$T_2$</td>
<td>ca. 2450-2225 (ca. 2350 or 2400 for ease)</td>
<td>Mid-Late 3rd Mill.</td>
</tr>
<tr>
<td>Post-Urban</td>
<td>2200-1600</td>
<td>Late MBA-LBA</td>
<td>$T_3$</td>
<td>ca. 2025-1950 (ca. 2000)</td>
<td>Early 2nd Mill.</td>
</tr>
</tbody>
</table>

100 In one article (1979: 169-170), Tosi periodizes the sequence as having two proto-Urban phases, i.e. EBA I and EBA II corresponding to 3200-2800 (i.e. Namazga III) and 2800-2500 (Namazga IV) respectively, which lines up quite nicely with the LCA-EBA absolute dates for the Gorgan, as well as the culture-historical sequence insofar as Namazga III = Tureng IIIB and Namazga IV = Tureng IIIB.
Allowing for the imprecision but accuracy of both absolute chronologies, Tosi’s Proto-Urban, Urban, and Post-Urban phases match best respectively with T₁ (i.e., the LCA-EBA transition or the Late 4th-Early 3rd millennium), T₂ (i.e., the EBA-MBA transition or the Mid-Late 3rd millennium), and T₃ (i.e., the MBA-LBA transition or the Early 2nd millennium).

**Table 7.5 Tosi’s Settlement Organization Predictions**

<table>
<thead>
<tr>
<th>Strict Contemp. Phases</th>
<th>Settlement Organization</th>
<th>Scale</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₀</td>
<td>Emergence of difference between incipient centers (ca. 12-18 ha) and villages (ca. 0-2 ha)</td>
<td>Micro-regional</td>
<td>&lt;50km²</td>
</tr>
<tr>
<td>T₁</td>
<td>Increasing differentiation of centers (up to ca. 30 ha) and villages (ca. 0-2 ha)</td>
<td>Micro-regional w/ “Centers”</td>
<td>50-250km²</td>
</tr>
<tr>
<td>T₂</td>
<td>Emergence of “intermediate”-sized centers (ca. 10 ha) controlling similarly sized territories as the largest centers</td>
<td>Regional “Proto-States”</td>
<td>500-1000km²</td>
</tr>
<tr>
<td>T₃</td>
<td>Collapse of centrality, functional differentiation between fortified and unfortified sites of roughly similar size</td>
<td>Sub-regional fragmentation</td>
<td>Unspecified (250-500km²?)</td>
</tr>
</tbody>
</table>

Accordingly, Tosi’s model should be evaluated based on the temporal framework of strict contemporaneity. This is also an advantageous route from the standpoint of examining territorial and spatial-organizational dynamics, because both of these analyses require sets of simultaneously occupied sites, a condition not satisfied by the culture-historical framework (Table 7.5).¹⁰¹ The first step in this analysis is to re-examine the settlement patterns, using the same forms of analysis as conducted in Chapter 6, but in accordance with the Strict Contemporaneity framework in order to eliminate the problem of “map-overfilling” (see Ammerman 1981; Dewar 1991; Plog 1973; Wossink 2009).

¹⁰¹ Note that T₀ (corresponding to Tosi’s Pre-Urban Phase) will not be evaluated in this procedure, though its organizational, scalar and range definitions should be kept in mind.
7.1.2 Exploratory Data Analysis of Strictly Contemporaneous Settlement Distributions

As in Chapter 6, I examine the baseline settlement distributions using exploratory descriptive statistics and cartographic visual inspection. The sample of sites is necessarily more restricted than that presented in the Culture-Historical framework (Table 7.6). The distributions of settlement location and size over time are presented according to the schema used in Kouchoukos (1999), with the site-size categories of 0-3 ha (i.e., small villages), 3-8 ha (i.e., large villages), 8-15 ha (i.e., small towns), and 15-40 ha (i.e. large towns). In terms of the most basic description of the distributional patterns, the number of settlements increases by ca. 60% from T₁ to T₂ and decreases from T₂ to T₃ by ca. 40%. In no case do we observe drastic shifts in the geographic spread of sites, e.g., a complete depopulation of one zone in favor of another, but there are some subtle patterns to be drawn out with respect to the differences between the western, central, and eastern zones of the plain (recall Figure 6.15).

Table 7.6 Count of Strictly Contemporaneous Sites by Period

<table>
<thead>
<tr>
<th>Period</th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites N</td>
<td>48</td>
<td>76</td>
<td>46</td>
</tr>
</tbody>
</table>
What is immediately apparent from this distribution is that the overall number of sites is much lower than for both the Chalcolithic and the Early Bronze Age (Figure 6.16), which ought to be expected, given that the strict contemporaneity chronological framework is designed to combat “map-overfilling.” The densest concentrations of settlement are at opposite ends of the plain, with the eastern portion of the plain being considerably denser than the western zone. In any case, at T1, there are only three sites larger than 8 ha, Tureng Tepe in the west and two sites in the eastern zone of the plain. Interestingly, in the western zone of the plain, there are no intermediate sized sites of the 3-8 ha or 8-15 ha size-classes, only Tureng Tepe and ca. 10-15 small villages.
The distribution of sites at T2 shows most clearly the separation of the Gorgan Plain into western, central, and eastern foci of settlement. The primary differences in the dynamics of these three areas relate to the relative proportion of EBA sites of type b (founded before EBA and occupied at least during MBA) and c (founded during EBA and occupied at least during MBA), as well as the MBA type a sites (founded before and occupied during MBA). The EBA b and c sites are most common in the western and central zones, whereas the MBA a sites are most prevalent in the east, particularly in the areas north and east Gonbad-e Kavus. Here we have four sites that Tosi would classify as “centers,” and they are evenly distributed across the plain, though the easternmost of these is slightly smaller than the two in the central plain and the one in the western plain. Another point to note is the greater density of settlement in the western and central zones of the Plain as compared to the previous phase, particularly in the
central zone. The central zone of the plain appears to be the focus of new settlement at this time, though it should be noted that almost all of the 3-8 ha sites dating to this phase were not previously occupied in T1.

Figure 7.3 T3 Distribution (i.e., Middle Bronze Age-Late Bronze Age Transition, ca. 2000 BCE)

The T3 settlement distribution differs quite a bit from the T2 distribution, especially in the eastern part of the plain. At T3, the greatest density of occupation is located in the westernmost portion of the plain for the first time, with the number and density of simultaneous occupations dropping off increasingly as one moves eastward. This trend may be explained by the high proportion of type d sites in the easternmost zone during the Late Bronze Age, and by the high incidence of type b sites during the Middle Bronze Age, all but one of which are type a during the Late Bronze Age. Thus, here we have a distortion in the strict contemporaneity framework, as it is missing the LBA type d sites, of which there are many, and
they are concentrated in the eastern portion of the plain. In any case, what is perhaps most
notable spatially in this distribution map is how much further apart the sites tend to be than in
the previous two phases, which is especially notable in the eastern zone.

Figure 7.4 Box-and-Whisker Plot of Site Size Distribution Over Time

Removing location from the analysis for now, let us examine the basic trends in site-size
distribution over the course of these three time-slices. Figure 7.6 shows the overall shape of the
distributions quite clearly. In all periods, the middle quartiles range between 1 and 3 ha. T₁
exhibits the most restricted range of site sizes, and the lowest mean site size. By contrast, T₂
exhibits the widest range of site-sizes, and a slightly larger mean than at T₁. It should also be
noted that at T₂, the quartile below the mean has more members than the quartile above, which
is reversed in T₃. T₃ has a more restricted range overall than T₂, but also a larger site-size mean as well as middle quartiles. Taken together, there are two main trends to take note of. The first is the steadily increasing average site size over time, and the second is the change from T₁ to T₂ in terms of greater variance in site sizes, a degree of variance which appears to be maintained into T₃. These trends are also observed in Figure 7.5, which presents much the same information in alternative graphical format but result in the same observations. Figure 7.6 shows precisely how much the mean and median site-size measurements change over the course of these three phases.

**Figure 7.5 Histogram of Site Size Distribution Over Time**
Figure 7.6 Basic Descriptive Statistics (Mean, Median, and Aggregate Occupied Hectares)

Figure 7.7 Population Distribution between Different Size Classes Over Time

Figure 7.7 shows what are perhaps more indicative trends in terms of the distribution of site-size classes over time. As in Chapter 6, this type of chart shows the relative proportion of
total site counts for the different size classes on the left, and the relative proportion of total site area for the different size classes on the right. The shapes of the curves are similar for all four categories between count and area, but their magnitude and position relative to each other change. First of all, it should be noted that the left-hand chart is presented in log$^{10}$ scale and the right-hand chart is presented in linear scale, meaning that in actuality, there is a much greater separation between the small village category and the large village category on the left of the chart as compared to the right. This was done, as in Chapter 6, primarily such that the trend-lines of the large village, small town, and large town categories would be legible.

In any case, the trends are as follows. Beginning with small villages, At T1, in terms of counts, sites sized between 0-3 ha make up 86% of the sample, staying steady to T2, but dropping to 73% in T3. This is reflected in the areal proportions: at T1-T2, small villages comprise ca. 40% of the total area, but drop to 32% at T3. This can be contrasted to the large village category (3-8 ha), which exhibits the opposite trend, i.e., stasis between T1-T2, but experiencing a doubling of the proportion of both count (from 9% to 22%) and area (from 16% to 34%) from T2 to T3. This is perhaps the most notable of all the trends. With regard to the small towns (8-15 ha), at all points, they contribute less than 5% of the total number of sites, and a low proportion of the total area of sites, dropping from 16% in T1 to 6% in T2, and remaining under 10% at T3. With regard to the large towns (15-40 ha), these figures are distorted by the fact that we do not have any evidence about the change in size over time of Tureng Tepe, but in any case, as with the small towns, large towns contribute less than 5% of the count of overall sites in all time periods. The difference here is the change from T1 to T2 in the relative proportion of overall site area contributed by large towns (from 26% to 37%) and its decrease from T2 to 25% in T3.
Thus, to draw conclusions from these trends, the most notable patterns are: (1) the overall large proportion of site counts contributed by the smallest site-size category, i.e., small villages, (2) the notable growth in the relative proportion of count and area taken up by large villages over time, (3) the relatively small proportion of sites in the small town size-class, both by area and count in all periods, and (4) the growth from \( T_1 \) to \( T_2 \) and decline from \( T_2 \) to \( T_3 \) in count and areal proportion of large towns. Altogether, similarly to in the Culture-Historical framework, under the conditions of Strict Contemporaneity, we still see that small villages are numerically predominant and that the greatest change over time is in the numerical and areal proportion of large villages, especially between \( T_2 \) and \( T_3 \).

7.1.3 Tosi’s Territorial and Rank-Size Predictions Parameterized with Gorgan Plain Settlement Data

Now that the basic trajectory of change in demographic profile has been established in the Strict Contemporaneity framework, Tosi’s model can be evaluated. There are several points that bear mentioning before beginning: first, his approach to settlement distributions is descriptive rather than quantitative, second, his scope of analysis is typically regional, and third, he often discusses spatial scale and hierarchy in the same breath (e.g. Tosi 1977: 52, Tosi 1984: 70-71). It should also be noted that Tosi differs from both Biscione and Kohl, insofar as he is much less concerned with spatial hierarchies in regional-scale settlement distributions than with the development of hierarchical tendencies occurring within the centers, i.e., the spatial aggregation of productive forces in distinct quarters, wealth and status differentiation between spatially segregated residential and mortuary areas, monumental architecture, and so on (e.g., Tosi 1984, 1986; cf. Biscione 1977, 1981; Kohl 1984, 2007). Moreover, at the regional level, Tosi was working with an incomplete dataset, which consequently skewed his perspective on the...
Urban phase in particular. Tosi was certainly aware that the record was biased against recovery of small sites, and it should be noted that systematic research was just beginning in the Murgab and northern Bactria at the time of his writing, rendering his conclusions regarding this area provisional at best. Thus, in this section, I will first seek to translate Tosi’s narrative descriptions of regional dynamics into a modeling vocabulary, before moving on to examine his claims about regional distributions, and concluding with an analysis of individual settlement systems, defined according to Tosi’s parameters.

Tosi makes several telling claims about regional settlement distributions which are important to understanding the overall model, though his use of such evidence is inconsistent, and largely concerned with settlement distributions during the Urban Phase. For example, Tosi explicitly states that during Namazga IV-V, the “size seriation” of sites in Turkmenistan does not indicate the presence of a territorially integrated form of hierarchical administrative organization (Tosi 1977: 55; contra Biscione 1977: 117; cf. Wright and Johnson 1975). Tosi posits instead that the large sites in southern Turkmenistan, whether in the 10 ha or 30-40 ha size-range, controlled their own territories of approximately the same size (Tosi 1977: 55), i.e., an agricultural catchment with a radius of about 10-15 km, a catchment of ca. 315-705 km² (Tosi 1986: 163). Thus, the differential distribution of large and small sites reflects continuity of growth patterns established in the Chalcolithic, i.e., that settlement size is largely if not entirely conditioned by the uneven distribution of natural resources over a long period of stable growth.

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102 This is not an insignificant problem, insofar as “the picture of an overly urbanized [Namazga] V society surely is incorrect and reflects more the lack of systematic survey in the piedmont and, particularly, the Murghab and Tedjen lowlands than reality” (Kohl 1984: 134).
103 As noted for example by his student Raffaele Biscione (e.g. 1977, 1981).
104 It should be noted that this agricultural catchment is a lowball figure relative to Tosi’s prediction that during the Urban phase, the “regional” polities each controlled territories measuring 500-1000 km², but we will return to this in 7.1.1
settlement rather than being the landscape-scale manifestation of a political-administrative hierarchy (Tosi 1977: 52-54, 56).\textsuperscript{105}

In any case, Tosi sees at least four distinct polities in Southern Turkmenistan during the “Urban Phase”: one each centered around Altyn Depe (ca. 48 ha), Namazga Depe (ca. 30 ha), Ulug Depe (ca. 10 ha), and Khapuz Depe (ca. 10 ha). As we can see from Figure 7.8, at the regional scale of analysis, when including the four ca. 1 ha sites also mentioned in this passage, the region exhibits a convexo-primate rank-size distribution (Tosi 1977: 52-56). It should be noted that this is almost certainly an undercount of the total site distribution, but there have been few subsequent \textit{regional} studies of this area that could augment this account.

\textbf{Figure 7.8 Regional Rank-Plot of Southern Turkmenistan during Namazga V Period}

\begin{itemize}
\item library(tidyverse) \# call code library
\item \# store the sizes of South Turkmenistan sites as a vector
\item stkm <- c(48, 30, 10, 10, 1, 1, 1, 1)
\item \# generate the Zipf distribution line for this vector
\item stkm_zipf <- as.data.frame(max(sort(stkm,decreasing = TRUE))/(1:length(stkm)))
\item stkm_zipf$rank <- 1:length(stkm)
\item names(stkm_zipf)[1]<"size"
\item \# plot sampled (bold) versus Zipf (hashed) distributions
\item on a log-log scale
\item ggplot(stkm_zipf, aes(x=rank, y=size)) +
\item geom_line(lty=2, size = 1) +
\item geom_line(aes(x=1:length(stkm), y=sort(stkm,TRUE)), size = 2) +
\item scale_y_log10() +
\item scale_x_log10()
\end{itemize}

\textsuperscript{105} In other words, richer, more well-watered farmland with more ready access to a broad spectrum of resources afforded the growth and stability of larger settlements. Conversely, smaller settlements were concentrated in comparatively resource-poor areas.
Given Tosi’s focus on the Urban Phase in his written descriptions, to flesh out the full sequence of developments in regional-level rank-size morphology over time requires a bit more inference. Because the actual site size distributions are not specifically spelled out for each period, and because it is not always clear whether he is talking about a region as a whole or an individual territorial unit, we must estimate how these distributions would have manifested. Some of his narrative descriptions are helpful (see Table 7.7), but far from unambiguous. My translation of Tosi’s descriptions understands the settlement patterns of the first phase as manifesting primate or convexo-primate rank-size distributions at the regional level. This distinction depends on how many centers would be present in the distribution, and their size relative to each other. Such a distinction largely affects the top zone of the rank-size curve, however, with the rest of its morphology remaining unaffected, well below the power-law line (the “Zipf Rule,” i.e., the dashed line in Figure 7.8). I interpret Tosi’s description of the second phase as convexo-primate (i.e., having one or more “intermediate-sized” centers in between the largest and smallest sites, as depicted visually in Figure 7.8). Finally, given the description of the Post-Urban phase site-size distribution, I take this period as exhibiting a convex distribution at the regional level.
The reason why I have detailed Tosi’s understanding of Southern Turkmenistan here is because Tosi argued that a similar set of spatial-organizational trends in settlement distributions occurred across the “Turanian Basin” over the course of this sequence, i.e., demographic agglomeration in central sites during the Urban Phase, but which took different forms depending on the agricultural base of the sub-region in question. To illustrate using Tosi’s two main examples, even as both Southern Turkmenistan and Sistan experienced demographic agglomeration, this process manifested differently in the two zones. In the Kopet Dagh piedmont, centers such as Altyn Depe exercised hegemony via concentration of the population in the center by depopulating the “rural” areas. In the Hamun basin, by contrast, Shahr-i Sokhta controlled a population that was extensively distributed across a tight-knit network of very small settlements in areas suitable for productive agriculture within the deltaic wetlands (Tosi 1977: 56). Thus, Tosi argues that despite Sistan exhibiting a different spatial configuration than the one observed in the Kopet Dagh, the settlement trends in both areas converge insofar as they both reflect increasing economic centralization in and territorial control by the main center(s).

Crucially, Tosi argues that the Gorgan Plain underwent similar transformations in its regional
settlement organization, along with a laundry-list of other regions of Eastern Iran and Central Asia, such as Damghan, Kerman, and so on (Tosi 1979: 151, 1984: 34; 1986: 167).

Figure 7.9 All-Sites-Included Regional-Scale Rank-Size Distributions for the Gorgan Plain

More directly, we can compare Tosi's model of Southern Turkmenistan (i.e., Table 7.7 and Figure 7.8) to the Gorgan Plain settlement distributions at the regional level (i.e., Table 7.6 and Figure 7.9). As a caveat, it is important to note that in this chart, each of the distributions has a strongly primate tail-zone, indicating that the smallest sites are much smaller than the rest. This fact notwithstanding, at T1, there is a primo-zipfian distribution, at T2 a convex distribution, and at T3 a primo-convex distribution; thus, the settlement data for the Gorgan Plain in the Strict Contemporaneity framework exhibits a distinct morphology from Southern Turkmenistan. Nevertheless, there are some similarities, especially in the case of T1 and T2. At T1, there is one site much larger than the rest and two sites larger than 10 ha before a largely power-law-following tail region. At T2 there are five sites larger than 10 ha and five intermediate-sized sites, all approximately 8 ha, before the convex tail-region begins. With regard to T3, there are three large sites and six intermediate sized sites, producing a distribution that would appear even more convex if it were not for the largest site.

Thus, we can see that at the regional level, the Gorgan Plain is distinct from Southern Turkmenistan. The question remains, however, how many of these large sites were the center of
their own territorial units? With respect to evaluating Tosi’s center-oriented model of polity formation specifically through the Gorgan Plain settlement data, I took centers (i.e., those sites ≥ 10ha) as the defining anchor for a territorial unit. To create the territorial groups, I buffered the sample of centers for each period according to a radius that would produce the areal catchment thresholds specified by Tosi (e.g. a radius of ca. 3.98 km to derive a 50 km² catchment, ca. 8.92 km to for 250 km² and so on). Within the strict contemporaneity framework this resulted in the identification of two territorial units for T₁, four units for T₂, and two units for T₃, regardless of the catchment threshold (Figures 7.10-7.12 and Table 7.8).

Figure 7.10 Tosi Territory Predictions T₁
Table 7.8 Results of Rank-Size Analysis Using Tosi’s Territorial Predictions

<table>
<thead>
<tr>
<th>Period</th>
<th>Territory (km²)</th>
<th>Cluster ID</th>
<th>Center ID</th>
<th>Sites in Cluster</th>
<th>Largest Site in Cluster</th>
<th>RS Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>250</td>
<td>1</td>
<td>262</td>
<td>2</td>
<td>34</td>
<td>primate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>103</td>
<td>2</td>
<td>12.4</td>
<td>primate</td>
</tr>
<tr>
<td>T2</td>
<td>500</td>
<td>1</td>
<td>94</td>
<td>4</td>
<td>19.7</td>
<td>primate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>103</td>
<td>4</td>
<td>12.4</td>
<td>primate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>193</td>
<td>5</td>
<td>22.6</td>
<td>primate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>262</td>
<td>4</td>
<td>34</td>
<td>primate</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>1</td>
<td>94</td>
<td>10</td>
<td>19.7</td>
<td>primate*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>103</td>
<td>8</td>
<td>12.4</td>
<td>primate*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>193</td>
<td>10</td>
<td>22.6</td>
<td>primate*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>262</td>
<td>7</td>
<td>34</td>
<td>primate*</td>
</tr>
<tr>
<td>T3</td>
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<td></td>
<td>2</td>
<td>262</td>
<td>1</td>
<td>34</td>
<td>NA</td>
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<tr>
<td>500</td>
<td></td>
<td>1</td>
<td>103</td>
<td>2</td>
<td>12.4</td>
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<tr>
<td></td>
<td></td>
<td>2</td>
<td>262</td>
<td>3</td>
<td>34</td>
<td>primate</td>
</tr>
</tbody>
</table>

First and foremost, it should be noted that these territorial units do not include the plurality of sites (see Table 7.6). Thus, even in the most territorially inclusive modeled scenario (i.e., T2-1000 km²), less than half of the total number of sites are incorporated into one of these center-based territories. Another notable result is that the 250 km² territorial prediction produces territorial units that only include the center and one other site in both modeling scenarios (i.e., T1-250 km² and T3-250 km²), as well as one case in which there is only one site in the unit (i.e., T3-250 km²-Cluster 2). Regarding the predictions related to rank-size distributions, in all cases except for the aforementioned single-site cluster, the resulting rank-size distributions are primate. Now, in cases where there are only two sites in a cluster, this is hardly a revealing result, insofar as there is one large site and one small site in the group.

In the cases where there is an adequate sample of sites in the territorial groups (i.e., T2-500 km² and T2-1000 km²), however, the rank-size distributions are still primate. In the T2-1000 km² scenario in particular, the primate groups take an interesting shape, morphologically
resembling a primo-convex distribution, but situated entirely underneath the zipf-line. Thus, within the territorial units in this prediction-scenario, the largest sites (i.e., 12.4-34.0 ha) are typically much larger than the medium-sized sites (i.e., 2.0-6.0 ha). The medium-sized sites are smaller than the power-law would predict, however, and relatively more numerous than the smallest-sized sites (i.e., 0.1-2.0 ha).

Regarding Tosi’s rank-size predictions, we see that in the “Proto-Urban” Phase (i.e., T₁), Tosi’s prediction of primate distributions was on target, but a so-called “intermediate-sized” center was already present. Moreover, the low counts of sites within these predicted territorial units calls into question its suitability for capturing the territorial dynamics of this phase. In the “Urban” Phase (i.e., T₂), the 500 km² territorial cells also seem to be a lowball figure in terms of the number of sites per cluster, but they conform to the prediction of primateness. The 1000 km² territorial cells are much more interesting; as described above, they have a peculiar rank-size morphology, which can still be considered primate, but their uniformity in terms of the appearance of convexity in the middle-zone of the distribution while still being under the zipf-line suggests a considerably different pattern, in which centers are surrounded by relatively more medium-sized sites than small-sized sites. In any case, in terms of evaluating Tosi’s model, there is at least one “intermediate”-sized center during this period, and the dominance of primate-type distributions is as predicted. As will be discussed in section 7.4, however, the rank-size distribution of a unit of settlement is highly dependent upon the group’s areal extent and the size of its largest settlement. It should be no surprise then, that small territories with large centers would exhibit mostly primate distributions. Tosi’s model is least predictive of the “Post-Urban” Phase, i.e. T₃, whether in the 250 km² or 500 km² scenario. The territorial catchments around the centers are too small, as in T₁, and where there are rank-size distributions, they are
all markedly primate. Thus the “collapse of centrality” and rank-size morphology of many smaller-sized sites within these cells cannot be supported given these modelling parameters.

Altogether, when we take Tosi’s predictions of territorial units based on catchments of certain size-ranges organized around centers (ca. 10-30+ ha), the Gorgan Plain settlement data only partially fits the parameters for the individual site-groups. One key observation is the small number of sites of any size within any of the center-based catchments in any period. These results suggest several non-mutually exclusive conclusions: 1) the centers “ruralized” their immediate hinterlands, requiring few outlying settlements to sustain population at these settlements, 2) the distance-thresholds for the centers’ catchments are too small; or 3) the center-focused model of territory may be altogether unsuitable to capture the variation in the socio-political dynamics of the Gorgan Plain’s settlement geography over the course of this trajectory. It should also not be ignored that the site-size measurements are static, i.e., that it is highly unlikely that sites were the same size in all periods of occupation, but we have no way of distinguishing these differences on the basis of available evidence.

Thus, while Tosi’s model does account for some elements of the Gorgan Plain’s settlement geography, particularly regarding rank-size dynamics for individual site groups during T1-T2, there are more ways in which Tosi’s predictions do not fit the Gorgan Plain data. Most concerning is that half of all sites lie outside the territorial catchments of the “centers,” suggesting the need for an alternative understanding of territoriality. There are several possible remedies, one of which would be to re-parameterize this model to have a more inclusive definition of what counts as a “center,” i.e., with a lower size threshold. But this is not an ideal solution, as there is no natural break in the size distribution below ca. 10 ha, and no good a priori justification for making such a delimitation.
Another approach would do away with the center-focused model and work from a different principle of grouping, which works from more bottom-up assumptions about how community and polity territories should be estimated. The latter approach will be pursued in the following section to determine how many separate communities and/or polities could there have in the Gorgan Plain during each phase of the Strict Contemporaneity framework and to examine the geographic structure of these hypothetical social and political units.

7.2 Modeling Territoriality with Site Catchments and Hierarchical Clustering

In evaluating Tosi’s model, the objective is to identify territorial units to be counted, mapped, measured, and analyzed in terms of their rank-size distributions (following Kohl 2007: 212-214). One issue with Tosi’s model is that despite specifying general changes in the territorial extent of “units of cultural integration,” only in two cases does he specify the number of such units within any of the sub-regions of the “Turanian Basin” for any given period, i.e. four during the “Urban” Phase of Southern Turkmenistan, and one in Sistan during the same period. His objective in these papers was to synthesize many decades of research into a coherent framework, rather than to conduct fine-grained spatial analysis. Any model of social and political geography for this time and place should at least attempt to answer the question: at any given point, how many “compactly integrated territorial units” co-existed in a particular region?

In this analysis, I address these lacunae in Tosi’s model by extending his catchment analysis, but by working from the bottom-up rather than top-down. Similarly to in 7.1.3, my approach here models territory as concentric radii of distance/walk-time from a sample of points, whether distance/walk-time is understood by proxy (i.e., calculated as-the-crow-flies), or more directly, as an actual estimate of movement in anisotropic space (e.g., Casarotto et al. 2016; Kalayci 2016; Ullah 2011; Yanchar 2013). As highlighted in Chapter 2, this is not an
unproblematic understanding of territoriality. Indeed, ancient polity boundaries can confound our modern expectations for a variety of reasons, not least of which because premodern statecraft operated on different principles of property, but it can be difficult to discern such patterns without recourse to textual records (Casana 2013; Ristvet 2008, 2011).

7.2.1 Procedure and Aggregate Results

Recalling the discussion from Chapter 4, of the thresholds considered, the 18km radius turned out to be the least useful in the context of the Gorgan Plain, because it created hypothetical polities that encompassed the entire set of sites in the region in almost each case. Instead, the 3 km buffer, corresponding to the limits of daily interaction (i.e., the lower threshold of possible community size) was used as the first step in a hierarchical clustering routine: each site location was buffered out to 3km, and any sites whose 3 km buffers intersected with each other were grouped together via the dissolve tool into a new set of polygons, that I termed a “Settlement Cluster,” or in Tosi’s idiom, a micro-regional territorial unit. These polygons were then buffered an additional 3 km (to derive a radius of 6 km), representing a common maximum threshold for agrarian site-catchments as an alternative basis for identifying the upper limits of what might reasonably constitute an agrarian “community” (e.g. Coppolillo 2000; Ullah 2011). I refer to this second-order level of settlement clustering as Settlement Groups (6 km), which may be thought of as a sub-regional territorial unit. Finally, the 6 km settlement groups were buffered an additional 3 km to a radius of 9 km, i.e., Wilcox and colleagues’ threshold of a one-day round-trip, which were grouped according to the same intersection routine and referred to as Settlement Groups (9 km), or in Tosi’s idiom, a regional territorial unit. I take these buffered polygons to represent the conditions of possibility for multi-scalar models of community and polity territoriality, whose principle of grouping is based
on behaviorally meaningful spatial thresholds. For each of the time-slices of the Strict Contemporaneity framework, I performed the buffer-intersection routine to derive the three levels of grouping (Figures 7.13-7.15).  

Figure 7.13a T₁ Settlement Clusters Lower Threshold (3 km Buffer)
Figure 7.13b T1 Settlement Clusters Upper Threshold (6 km Buffer)

Figure 7.13c T1 Settlement Groups (9 km Buffer)
Figure 7.14a T2 Settlement Clusters Lower Threshold (3 km Buffer)

Figure 7.14b T2 Settlement Clusters Upper Threshold (6 km Buffer)
Figure 7.15b T3 Settlement Clusters Upper Threshold (6 km Buffer)

Figure 7.15c T3 Settlement Groups (9 km Buffer)
I use three simple descriptive statistical measures to examine the change over time in the distribution of these units. The first metric is the counts of groupings at each level of clustering (Table 7.9), the second statistic counts the number of sites within groupings (Table 7.10), and the third measures the areal extent of the groupings (Table 7.11).

### Table 7.9 Buffer Cluster/Group Counts by Period (N Clusters/Groups with only one site)

<table>
<thead>
<tr>
<th>Level</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 km</td>
<td>5  (2)</td>
<td>2  (3)</td>
<td>8  (4)</td>
<td>5.0 (8.0)</td>
</tr>
<tr>
<td>6 km</td>
<td>6  (3)</td>
<td>6  (3)</td>
<td>8  (7)</td>
<td>6.7 (11.0)</td>
</tr>
<tr>
<td>3 km</td>
<td>7  (16)</td>
<td>12 (10)</td>
<td>6  (16)</td>
<td>8.3 (22.3)</td>
</tr>
</tbody>
</table>

In terms of the counts of settlement clusters and groups over time, there are several trends to note. First, at the level of settlement clusters (3 km), if we include clusters that only contain one site, the count remains stable across the three snapshots, i.e., n=22-23. This is an interesting result, insofar as there are one-and-a-half times as many sites occupied at T2 compared to T1 and T3. This suggests that the settlement clusters are denser in terms of the number of sites belonging to each cluster during T2. It is important to clarify that these are not necessarily the same groups at each stage, indeed, their spatial configuration and site-composition is distinct at each of the three time slices. Nevertheless, while this consistency is an interesting result it should not be read as indicating a high degree of settlement continuity between periods. Also, worth noting is the fact that, when the single-site clusters are segregated from multi-site clusters, a different trend appears: the number of 3 km clusters increases 71% from T1 (7) to T2 (12) and then decreases by a factor of half from T2 to T3 (6).

At the level of the 6 km settlement groups, counts are stable between T1 and T2 (9 each) but increase by 67% from T2 to T3 (15). If single-site clusters are removed, a similar trajectory is observed, though the count only increases 33% from T2 to T3. Either way, this indicates a similar process of densification of number of settlements within groups from T1 to T2 as the one
observed at the 3km grouping level. In this case, however, T2 is followed by a major spatial reorganization from T2 to T3, insofar as there are half as many sites in T3 as T2, but twice as many groups. This suggests territorial fragmentation at the meso-scale, toward more groups with fewer members, which is confirmed by the figures in the corresponding rows of Table 7.10, i.e., excluding single-site clusters, there are 12.2 sites per cluster at T2 compared to 4.9 sites per cluster at T3.

At the 9 km group level, i.e., what I have been assuming correlates to the spatial scale of possible “polities” within these modeling parameters, the number of groups decreases slightly from T1 to T2, but more than doubles to T3. If we remove the single-site clusters from these figures, the trendline is the same, but more accentuated; the number of groups decreases by half from T1 to T2, and then quadruples from T2 to T3. Much as at the meso-scale (i.e., 6 km), we see a major episode of reconfiguration across this T2 to T3 interval, with a greater number of territorial units who have a considerably decreased group membership. This result tracks, at least in a gross sense, with the centralization-decentralization trajectory as predicted by Tosi from the Proto-Urban to Urban to Post-Urban phase.

<p>| Table 7.10 Average Number of Sites Per Cluster/Group (Single-Site Clusters Excluded) |</p>
<table>
<thead>
<tr>
<th>Level</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>Grand Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 km</td>
<td>6.9 (9.2)</td>
<td>15.2 (36.5)</td>
<td>3.8 (5.3)</td>
<td>8.6 (17.0)</td>
</tr>
<tr>
<td>6 km</td>
<td>5.3 (7.5)</td>
<td>8.6 (12.2)</td>
<td>3.1 (4.9)</td>
<td>5.7 (8.2)</td>
</tr>
<tr>
<td>3 km</td>
<td>2.1 (4.6)</td>
<td>3.5 (5.5)</td>
<td>2.1 (5)</td>
<td>2.6 (5.0)</td>
</tr>
</tbody>
</table>

The summary statistics presented in Tables 7.9 and 7.10 indicate a number of important points. Firstly, in each of the time-slices, the number of sites per grouping naturally increases as the level of territorial inclusiveness increases. The notable point is that this trend is most extreme at T2, insofar as the increase in average sites per grouping from the 6 km to 9 km levels is by far greater than at T1 or T3. This can be explained with reference to the fact that there are
fewer and much larger territorial units at the 9 km level of clustering at T2 than observed at any other time or scale. Moreover, comparing the figures within the grouping levels across time, the same trend is observed here as the one noted in the overall count of sites. That is, regardless of level, the average number of sites per cluster increases from T1 to T2 and decreases from T2 to T3, with the T3 averages either at parity with or lower than the T1 averages.

Table 7.11 Average Cluster/Group Polygon Area in km² (Single-Site Clusters Excluded)

<table>
<thead>
<tr>
<th>Level</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>Grand Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 km</td>
<td>709.3 (891.3)</td>
<td>1238.6 (2714.9)</td>
<td>478.9 (591.2)</td>
<td>808.9 (1399.1)</td>
</tr>
<tr>
<td>6 km</td>
<td>336.6 (448.4)</td>
<td>459.1 (632.1)</td>
<td>221.3 (316.0)</td>
<td>339.0 (465.5)</td>
</tr>
<tr>
<td>3 km</td>
<td>49.9 (99.5)</td>
<td>76.7 (117.1)</td>
<td>50.0 (108.0)</td>
<td>58.9 (108.2)</td>
</tr>
</tbody>
</table>

In terms of summarizing the hypothetical cluster and group territory area measurements, several observations should be noted. At all three levels of grouping, regardless of whether the single-site clusters are included or not, the average areal extent of clusters and groups follows the same trend, increasing from T1 to T2 and decreasing from T2-T3. At the T3 average grouping size is less than it was at T1, except for at the 3 km level, where the average size of groups at T3 is approximately the same average size as in T1. While not deviating from this pattern, another point worth noting is that the average group size of the 9 km groupings at T2 is much larger relative to the 6 km groupings than at either T1 or T3. This difference is related to observations made above regarding the number of groupings at this level (Table 7.9) and the average number of sites (Table 7.10) and further confirms the observations derived from visual inspection of the geographic distribution of these modeled territorial units, namely that at T2 the settlement distribution of the Gorgan Plain can support the inference of two territorially extensive groups or “polities.” In any case, the average areal extent of groupings is largest at T2 regardless of level.
To generalize from these trends, what seems to be changing primarily is the extent to which the settlement clusters (3 km) are clumped or dispersed over time, especially when we consider that the number of clusters (inclusive of single-site clusters) doesn’t change much between the three phases of the Strict Contemporaneity framework. Accordingly, it would appear that the 3 km clusters are first less dispersed from each other in T2 relative to T1, but then more dispersed in T3, relative to T1-2. This can be understood perhaps as stable sub- and micro-regional integration from T1 to T2, followed by fragmentation at these levels at T3. By the same token, at the regional level, there is increasing integration from T1 to T2, followed by precipitous territorial fragmentation from T2 to T3, represented by a much larger number of spatially less extensive and less densely occupied regional territorial units.

As regards the relationship between the areal predictions in Tosi’s model (i.e., Table 7.5) and change over time in the number of polities that were inferred on that basis (i.e., Table 7.8) and the results of the bottom-up approach to modeling territoriality (Table 7.12), we can derive the following conclusions. First, with regard to the number of polities, the major difference here is that the alternative model is quite different from Tosi’s. It should not be forgotten that Tosi does predict a breakdown in the central-site oriented system of territorial units for the final phase, which was not captured in the analysis presented in section 7.1.3, but the most important point here is that where Tosi’s parameters would predict the largest number of polities (i.e., at T2), the alternative model produces the fewest. Thus, while the differences between Tosi’s model and the alternative model at T3 may be chalked up to the need to re-parameterize Tosi’s model, there is a distinct difference between the two approaches at T1 and T2. With respect to the territorial extent of polities on average, Tosi’s model as parameterized here correctly predicts the trajectory of polity sizes but underestimates the scale at each phase.
and the magnitude of changes between them. In particular, the averages of areal extent for modeled polities at $T_1$ and $T_2$ are much larger than predicted, and especially so if we only consider those units which are not single-site clusters (i.e., the upper range of the polity extents presented in the right-most column of Table 7.12).

Table 7.12 Best Overlaps Between Tosi’s Territorial Predictions and Cluster Model Results

<table>
<thead>
<tr>
<th>Period</th>
<th>Number of Polities</th>
<th>Extent of Polities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tosi Model</td>
<td>Alternative Model</td>
</tr>
<tr>
<td>$T_1$</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>$T_2$</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>$T_3$</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

To bring it all together, on the whole, Tosi’s model of territorial integration-disintegration dynamics over the interval of inquiry can be cautiously confirmed, even if the matches between his predictions and my model are sometimes fuzzy. This fuzziness, in my view, largely results from the gulf in the relative sophistication of the cartographic and representational technology brought to bear in his model versus mine. Recalling the distinction drawn between community (i.e., as small as 3 km to as large as 6 km) and polity (i.e., a territory that could be traversed in a single day’s round-trip, or 9 km), what we see is a stable number of the smallest communities over time, whose average territory size remains relatively stable (i.e., between ca. 50-100 km$^2$). The smallest threshold for grouping produces settlement clusters comprised of two to five settlements on average in all periods.

The territorial dynamics at the next most inclusive grouping level, defined according to the outer threshold of common agricultural catchments (i.e., 6 km), fluctuate more. Notable trends at this level of settlement clustering are the marked increase in the number of clusters from $T_2$ to $T_3$, at the same time that the number of sites within these groupings and their average territories shrinking over the same interval. What this suggests is that, after a period of
growth in the spatial extent and site density of settlement groups at this spatial scale from T₁ to T₂, a major change occurred from T₂ to T₃, with more, smaller, and more spatially segregated settlement groupings becoming the norm.

The same trends are observed at the most inclusive grouping level (i.e., 9 km), but in more exaggerated form. The trendline here is one of decrease in the number of settlement groups from T₁ to T₂ correlated to a sizeable increase in average number of sites per cluster and areal extent, followed by the inverse pattern across the T₂ to T₃ interval, where the number of settlement groups increases precipitously at the same time as the average areal extent and average number of sites per group decrease significantly.

### 7.2.2 The relationships between modeled communities and polities in the Gorgan Plain

The preceding section considered the modeled community and polity territorial units at an aggregate level, focused directly on evaluating aspects of Tosi’s territorial model. This section takes a step toward analysis of the communities and territories themselves, a fuller explication of which will have to be the subject of future work. Nevertheless, some preliminary observations can be drawn about the relationships between clusters and groups within and between phases. The first point to note is that there does not appear to be anything distinct about the distribution of single-site clusters in terms of their location, insofar as the overall spatial distribution of single-site territories is not discernably different from those of the total set of clusters and groups. Single-site clusters do, however, seem to be relatively more prevalent in the central zone of the plain. This is perhaps not surprising given that this is the zone of the plain with the greatest number of settlements in general. What remains to be explained is how and why there are so many settlements in this part of the plain that do not belong to multi-site
clusters at the lower threshold for community clustering (i.e., 3 km), despite the high number of settlements in this zone overall. Another zonal difference should also be considered: of the three portions of the plain, it is the eastern zone where the most single-site community clusters are not grouped with another cluster or clusters at the polity-threshold level (i.e., 9 km). This may be explained by the greater number of outlying settlements in the foothills of the Alborz in this zone, as well as two sites to the north of the Gorgan Plain River (Figure 7.15c). In any case, it does appear to be a persistent difference over time and deserves further exploration as to the nature of the connections between these relatively more isolated sites and their nearest neighbors.

There are seven multi-site 3 km clusters at T1, three of which are in the western zone of the plain, and four of which are in the eastern zone of the plain (Figure 7.13a). All seven of the 3 km clusters in the central zone of the plain are comprised of a single site. All but one of the multi-site clusters contain two to four sites, whereas the largest one contains twelve sites. At the upper threshold of what might constitute a community, i.e., the 6 km clusters, there are two multi-site clusters in the western zone, two in the central zone, and two in the eastern zone (Figure 7.13b). One of the multi-site cluster in the west grouped together five 3 km clusters, whereas the other grouped together four smaller multi-site clusters. The central zone represents a concatenation of three single-site clusters into one group and two single-site clusters into another, with two remaining single-site clusters. At this threshold of inclusivity, the eastern zone has one large 6 km cluster that subsumes four of the 3 km clusters and another multi-site cluster that is comprised of two 3 km clusters, as well as a single-site cluster. Thus, at the “community” scale, we are already able to see some interesting patterns with respect to the variation that is possible between the upper and lower thresholds. Scaling up to the 9 km
grouping or “polity” level, the only change from the upper threshold of community is that all of the sites in the eastern zone of the plain belong to a single unit (Figure 7.13c). None of the other 6 km groupings were proximate enough to each other to constitute such a grouping, although many of them are quite close to each other and may reasonably be considered in future analysis to be close enough to constitute a possible polity-scale grouping.

At T₂ there are twelve multi-site clusters at the 3 km threshold (Figure 7.14a). In the western plain, there are two large clusters, one of which has eleven sites and the other which has six. In the central plain, there is more variation, with the largest multi-site cluster having twelve sites and four clusters with two or three sites, as well as a handful of single-site clusters. In the eastern plain, there are two large clusters with eight or more sites, and three two-site clusters, as well as five single-site clusters. At the upper threshold of community boundaries, there are six such units (Figure 7.14b). One is located in the western plain, which encompasses both of the 3 km groups. In the central plain there are two clusters, each of which encompasses four or five of the 3 km groups. In the eastern plain, there are is one large cluster which encompasses the two largest groups from the 3 km level, as well as a single-site cluster. Another 6 km grouping subsumes three of the two-site clusters, and there are still three single-site clusters around the margins to the north, east, and south of the main settlement area in this zone. At the polity threshold level (Figure 7.14c), the central and eastern zones of the plain all belong to a single extraordinarily large group, with the exception of the three more marginal single-site community clusters. This mega-group is comprised of seventeen 3 km community clusters and five 6 km community clusters. This hypothetical polity should be the subject of further investigation, as it is exceptionally large and likely to be organizationally complex.
T3 represents the most spatially extensive pattern of the three phases, with the spread of sites and community clusters distributed most-widely from east-to-west. At the 3 km community threshold, there are six in the western plain, three in the central plain, and eleven in the eastern plain (Figure 7.15a). There are two multi-site clusters in each of the zones of the plain, with the largest of these located in the west, the next largest in the central plain, and the smallest in the eastern plain. At the upper threshold for community clusters (Figure 7.15b), there are four in the western plain, three in the central plain, and three in the eastern plain, following the same scalar pattern as at the lower community threshold, insofar as the communities with the greatest number of sites are located in the western plain. At the polity level of grouping, there are three in the western plain, two in the central plain and seven in the eastern plain, though in the east, all but one of these groups are either single-site or two-site clusters, and the larger group has only four sites (Figure 7.15c). Many of these smaller community clusters in the eastern plain could perhaps be close enough together to be reasonably considered part of the same group, but I chose not to fudge this and stick strictly to the modeling procedure. In any case, the pattern here is clear, there are many more polity-sized groupings at T3 than in previous periods, and those that have been modeled are quite small, only being comprised of two or three community clusters each.

With respect to the excavated sites, Narges Tappeh and Shah Tepe are quite small (0.9 ha and 1.8 ha respectively) and are both located in the western part of the plain, approximately four kilometers from each other. Consequently, their 3 km buffers intersect with each other, and in all periods are members of the same community-cluster. The two sites thus constitute an interesting sample for examining community dynamics with respect to excavated material, especially when considering that Tappeh Anjirab (3 ha) is also located in the near vicinity. With
respect to Tureng Tepe (34 ha), at T1, it constitutes a single-site cluster and is located in a
medium sized hypothetical polity cluster with three other sites at the 6 and 9 km levels,
including another excavated site, Tappeh Hosseinabad (1.5 ha), located just a few kilometers to
the southeast. At T2, Tureng Tepe is also a single-site cluster at the 3 km level, but part of a
larger 6 km cluster, comprising four 3 km clusters. At the 9 km level, Tureng Tepe is one of the
westernmost sites belonging to the large polity that encompasses the entire central zone of the
plain and most of the eastern plain. Similarly, at T3, Tureng Tepe comprises a single-site cluster
at the 3 km level. At the upper threshold of community extent, Tureng is joined with another
single-site cluster, and at the 9 km polity threshold level, a third single-site cluster joins the
group, making it the center of a small polity, bounded on either side by larger multi-community
polities to the east and west. Thus, given the density of excavated sites in the western zone of
the plain and their relative proximity to each other, this sample represents our best opportunity
to study the material aspects of community organization. Concerning the other two excavated
Bronze Age sites, Yarim Tepe (0.9 ha) and Tappeh Bazgir (3.97 ha), so much less is known about
these two sites that it is difficult to see how these might be fit into a community scale analysis,
not to mention that the latter is not a settlement mound. In any case, Yarim Tappeh is located
within the largest stable territorial grouping in the eastern portion of the plain.

Future analysis would benefit from further examining the disaggregated historical
trajectories of individual settlement clusters and groups and their relations to each other over
time. Such histories of settlement clusters and groups would provide a much finer grained view
of the dynamics of the historical life-cycles of both individual and groups of settlement clusters
and about patterns in the formation and transformation of larger-scale social and political
groups. The results of this kind of analysis could generate hypotheses to be tested in a variety of
ways. One important question is whether these territorial models correlate in any way to spatial patterns of material culture variability and/or relatedness. Such correlations or disjunctures would allow us to better discern the degree of overlap between the modeled spatial possibilities for viable territorial units and the actual record of practices of affiliation that would constitute social and political units as such (Chapter 2.2.1).

7.3 Rank-size Analysis

The primary objective of this section is to perform rank-size analysis on the settlement units identified at different scales in the previous section and to thereby evaluate Tosi’s propositions about the emergence and transformation over time of settlement size differentiation. Following from the discussion above, Tosi anticipated recent developments in thinking about spatial scales of settlement hierarchy, insofar as “the observed settlement patterns in a specific region should be considered only as a sample of larger spatial systems” (Palmisano 2017: 227). Thus, I examine rank-size dynamics at multiple levels, i.e., those thresholds of grouping identified in 7.2.2. Such an approach is necessary, because the size of sampling windows has been shown to influence the shape of rank-size curves (Drennan and Peterson 2004: 535-539). To wit, smaller windows tend toward producing primate curves and larger windows tend toward producing more convex or even double-convex curves, indicating that there are multiple nested sets of settlement systems within the zone of analysis (Palmisano 2017: 227).

I first consider the numerical distribution of different rank-size types in aggregate (Table 7.13), before examining them in terms of their geographic distributions (Table 7.14). Finally, I return to Tosi’s predictions to compare the outcomes of my modeling and what differences resulted from the use of different modeling priors and parameters.
7.3.1 Aggregate Results of Rank-Size Distributions

The full set of rank-size plots that was used in this analysis can be found in the Appendix to Chapter 7 (see Electronic Supplementary Files for the R code). At T$_3$, taking all three clustering levels in aggregate (i.e., the right-most column of Table 7.13), lumping the different distribution-types into convex versus primate macro-groups shows that there are ten groups exhibiting primate distributions, eight groups exhibiting convex type distributions, and twenty-one NAs.

Table 7.13 Buffer Cluster Rank-Curve Shape Counts in Aggregate

<table>
<thead>
<tr>
<th>Rank-Size Shape</th>
<th>3 km</th>
<th>6 km</th>
<th>9 km</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>convex</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>convexo-primate</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>double-primate</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>primate</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>primo-convex</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>zipfo-primate</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>NA</td>
<td>16</td>
<td>3</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>T$_1$ Subtotals</td>
<td>23</td>
<td>9</td>
<td>7</td>
<td>39</td>
</tr>
</tbody>
</table>

|                    | 5    |      |      |        |
|                    |      |      |      |        |
| convex              | 4    | 1    | 0    | 5      |
| convexo-primate     | 3    | 0    | 0    | 3      |
| double-convexo-prime| 0    | 0    | 1    | 1      |
| primate             | 3    | 4    | 0    | 7      |
| zipf                | 1    | 0    | 0    | 1      |
| zipfo-convex        | 0    | 1    | 1    | 2      |
| zipfo-convexo-prime | 1    | 0    | 0    | 1      |
| NA                  | 10   | 3    | 3    | 16     |
| T$_2$ Subtotals      | 22   | 9    | 5    | 36     |

|                    |      |      |      |        |
|                    |      |      |      |        |
| convex              | 4    | 3    | 4    | 11     |
| convexo-primate     | 2    | 2    | 1    | 5      |
| primate             | 0    | 3    | 3    | 6      |
| NA                  | 16   | 7    | 4    | 27     |
| T$_3$ Subtotals      | 22   | 15   | 12   | 49     |
| Grand Totals        | 67   | 33   | 24   | 124    |
At the 3 km clustering level, the most notable pattern is the high number of NA distributions, i.e., site groups with only one site and therefore no rank-size distribution. Otherwise, the pattern here is that there are four primate groups and three convex groups. This situation changes at the 6 km grouping level, where there are slightly more primate types than convex types, including one example of double-primate. At the 9 km grouping level there is a wider range of different rank-size types, with slightly more convex-types than primate-types, but overall a fairly even split. This result broadly conforms to the prediction that as the window of analysis shrinks in spatial scope, the more likely there are to be primate-type rank-size distributions. While this in and of itself is not terribly surprising, for the purposes of comparison with Tosi’s predictions, what we see is that at the “community” level (i.e., 3 km and 6 km) there are many more primate-type distributions than convex-type distributions, particularly at the 6 km level. At the 9 km level, there are slightly more convex-type than primate-type distributions.

At T2, in aggregate, there are relatively more convex-type distributions (n=12) compared to primate types (n=7), but as in T1, the most common type is NA, i.e., settlement clusters or groups comprised of only one site. At the 3 km clustering level the situation has flipped back to one of many more convex types than primate, but as at T1, the plurality is constituted by NA. At the 6 km level, there are two convex-types, four primate distributions, and three NAs. At the 9 km level, both settlement clusters with a rank-size distribution are convexo-primate (whether double- or zipfian). Another point to note is that there are many more zipf-type distributions during this period relative to the other two within this temporal framework. Altogether, the counts of rank-size distributions for this period are difficult to interpret on their own, and patterns are more likely to be discernable when space is reintroduced to the analysis below (i.e. Table 7.14).
At T₃, there are quite a few more groups at the 9 km threshold than in the previous two periods (n = 12 compared to n = 7 and n = 5 for T₁ and T₂ respectively). The rank-size distribution counts during this period follow a similar pattern at each of the scales. Generally, there are more convex and convexo-primate groups than primate groups. The main changes between the levels is that the number of NA groups increases with the levels and that there are no primate type groups at the 3 km clustering level.

Recalling Tosi’s predictions of primate in the Proto-Urban phase, primate or double-primate during the Urban Phase and Convex during the Post-Urban Phase, these results both conform to and diverge from Tosi’s historical framework of rank-size dynamics (refer back to Table 7.7). Sticking to Tosi’s predictions for the moment and recalling the levels at which his territorial predictions best matched the modelled territories (i.e., Table 7.11), the levels that should be paid the closest attention for evaluating Tosi’s model are T₁ (3 km), T₂ (6 and 9 km), and all three levels at T₃ (refer to Table 7.13).

At T₁, therefore, we see that while there are slightly more primate types than convex types, overall, the situation is relatively balanced, and thus diverges from Tosi’s predictions. At T₂, focusing especially on the 6 km and 9 km levels (as per Table 7.11), Tosi predicts the prevalence of primate or double-primate type settlement distributions, which we do see at the 6 km territorial threshold. At the 9 km grouping level, however there are only two territorial units that are not single-site groups, and of these one is double-convexo-primate and the other is zipfo-convex. Recalling the discussion from Chapter 4, a double-convexo-primate distribution indicates the heterarchical pooling of or the hierarchical integration of two primate systems or two primo-convex systems spatially superimposed on each other and a zipfo-convex settlement systems where the largest few sites follow log-normality, with one or more large centers and a
large number of intermediate-sized sites relative to a smaller number of small-sized sites. Thus, the summary in Table 7.13 is slightly misleading, insofar as many of the convex-type distributions at this interval are derived from the 3 km level. Thus, Tosi’s prediction of primate type rank-size distributions at T2 best fits the 6 km level, but not the 9 km level. Finally, at T3, Tosi’s model is the closest to my model, wherein he predicts a high degree of convexity across settlement groups, which is confirmed at all three levels, though interestingly the highest incidence of primate types occurs at the 6 km and 9 km levels, contrary to the generally accepted consensus that larger geographic scales of analysis have a tendency to increase the probability of convex distributions.

Additional observations to note cross-cutting periods and scales are that there is considerable diversity within and across each of the phases, but especially at T1 and T2. It is true that there are more primate-type distributions than convex-type distributions at T3, but which take a variety of forms, including double-primate, primo-convex and zipfo-primate. Each of these types indicates a different settlement morphology, however, with double-primate correlating to a settlement system where the intermediate-sized sites are much larger than the power-law would predict, and the latter two where the settlement system is relatively “top-heavy,” with a greater number of large sites. Interestingly, at T2 there are many more convex-type rank-size distributions than would have been expected, with a more or less even numerical split between purely convex and convex-type distributions.

The incidence of convexo-primate, double-convexo-primate, and zipfo-convexo-primate indicate possible nesting/pooling effects, suggesting that there may be spatially salient settlement hierarchies. T3 conforms best to Tosi’s prediction, with convex-type distributions
outnumbering primate distributions, but it is also significant to note the large number of NA distributions at all three clustering levels.

Table 7.14 Simplified Distribution of Rank-Size Types

<table>
<thead>
<tr>
<th>Lumped and Aggregate Type Groups</th>
<th>Proportion of Total Across Levels = NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁ Slightly more Primate than Convex Types</td>
<td>54%</td>
</tr>
<tr>
<td>T₂ Slightly More Convex than Primate Types</td>
<td>44%</td>
</tr>
<tr>
<td>T₃ Many More Convex than Primate Types</td>
<td>55%</td>
</tr>
</tbody>
</table>

Altogether, the pattern is more complex than might have been expected (Table 7.14). The trendline in this modeling scenario reads as follows in relation to Tosi’s predictions. There is an overall balance of primate-types and convex-types in the Proto-Urban Phase (i.e., T₁), but at the grouping level closest to Tosi’s in terms of territorial predictions, our models are broadly congruent in there being more primateness than convexity. In the following Urban Phase (i.e., T₂), there is greater diversity in types overall, but there is a high incidence of primate types at the meso-scale (i.e., 6 km), whereas the with two large polities at the 9 km level are either a double-convexo-primate or zipfo-convex distribution. I will take this evidence as potentially in line with Tosi’s predictions for this period, but again highlight the range of variation observed. Where Tosi’s and my model fit best is in the territoriality and rank-size distributions of the “Post-Urban Phase,” i.e., T₃, where there are more, smaller territorial units, which exhibit acentrality in the form of convex rank-size distributions. Additionally, the large number of isolated settlements at the 3 km level during T₁ and T₃ should not be ignored. As a whole, what this analysis shows is that Tosi’s predictions were roughly on target, even if the particulars somewhat differ and the picture is more complex, but this ought to have been expected. Another way of examining this greater complexity is to break down the distribution of rank-size
types spatially, by examining their relative prevalence in the three different geographic zones of the plain, as follows.

7.3.2 Geographic Distribution of Rank-Size Types

In addition to the hierarchical site-catchment grouping routine, as discussed in Chapter 4, I also performed multi-scalar k-means clustering analysis as a verification exercise. The k-means analysis indicated a strong tendency across all time periods toward a tripartite division of the Gorgan Plain into western, central, and eastern zones (Figure 6.15). I therefore decided to subdivide the sample of rank-size distributions zonally to examine whether there were any spatially salient trends that might help illuminate the patterns detected in 7.3.1.

### Table 7.15 Geographic Distribution of Counts of Rank-Size Curves for By Zone and Buffer-Threshold

<table>
<thead>
<tr>
<th>Curve Shape</th>
<th>West</th>
<th>Central</th>
<th>East</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>convex</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>convexo-primate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>double-primate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>primate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>primo-convex</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>zipfo-primate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>NA</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Subtotal</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>convex</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>convexo-primate</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>double-convexo-primate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>primate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>zipf</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>zipfo-convex</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>zipfo-convexo-primate</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>NA</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Subtotal</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

455
In terms of the geographic distribution of the rank-size types across these three time slices, there are some distinctive patterns. At T1, the most notable feature is that the NA types are the most common in each of the three zones but make up the largest proportion of types in the central plain. These NA types tend to be concentrated at the community level, whether at the 3 km or the 6 km buffer level. The most interesting differences between the zones are the relatively balanced split between convex-types and primate-types in the western and central zones of the plain across grouping levels, compared to the relative prevalence of primate-type groups in the eastern plain, except at the most inclusive level of grouping, where there is one convexo-primate group and one NA group.

At T2, there are major differences between the different zones of the plain at every level of grouping. For example, at the 3km level, in the west, the most common type is convex, compared to primate and convexo-primate being most common in the central zone, and NA being most common in the eastern zone, followed by convex and convexo-primate. At the 6km level, in the western plain there are only two groups, one primate, the other zipfo-convex; in the central plain, there are two primate groups; and in the eastern plain there is one primate group and one convex group, but three NA groups. This pattern is difficult to make clear sense of other than to note the wide range of variation, and the complete lack of convex-type groups at all levels in the central zone of the plain and the high number of NA groups at all levels in the eastern plain.

<table>
<thead>
<tr>
<th>T3</th>
<th>convex</th>
<th>convexo-primate</th>
<th>primate</th>
<th>NA</th>
<th>Subtotal</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3</td>
<td>2 1 1 4</td>
<td>2 2 1 5</td>
<td>1 1</td>
<td>1 1 2 6</td>
<td>11 5</td>
<td>40 14 12 66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 2 3</td>
<td>1 1</td>
<td>1 1 2 6</td>
<td>5 6 3 16</td>
<td>46 24 16 86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 1 5</td>
<td>5 3 1 9</td>
<td>7 3 3 13</td>
<td>27</td>
<td>48 28 20 96</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 3 12</td>
<td>7 6 3</td>
<td>9 6 6 21</td>
<td>49</td>
<td>48 28 20 96</td>
</tr>
</tbody>
</table>

456
At T₃, convex-type groups are by far most prevalent in both the western and eastern zone of the plain at all clustering levels. Interestingly, convexo-primate types are only found in the central plain, and here they are the predominate rank-size distribution type aside from NA. Primate types see their greatest relative proportion across the levels in the western plain at this juncture, especially at the more inclusive levels of grouping, though it should be mentioned that there are more primate-type groups than convex-type groups at the most inclusive (i.e., 9 km) level of grouping. As in the previous time-slice, NA type distributions have the greatest relative proportion in each of the three zones of the plain, but are proportionally most prevalent in the eastern plain, with a notably high number at the most inclusive grouping levels.

Altogether, these patterns show that the variation observed in the previous section is at least partially spatially conditioned and that the three difference zones of the plain exhibit contrastive rank-size distribution patterns. For example, in the western plain, T₁ and T₂ exhibit the greatest spread of types, but with convex-type distributions being consistently more prevalent relative to primate types over time. In the central plain, T₁ is dominated by NA types, followed by a phase in which primate types are the most prevalent in T₂, with convexo-primate being the most frequent non-NA type in T₃. The western plain begins the sequence with primate types being most common, transitioning to a phase in T₂ of mostly convex and NA types, which continues into T₃. Another interesting trend concerns the relative prevalence of NA type distributions (i.e., single-site groups) over time and space: in the western and central plains, NA types are relatively quite prevalent at T₁, drop in frequency at T₂, and increase in prevalence again to T₃, contrasted with the opposite pattern in the eastern plain.

7.3.3 Evaluating the rank-size dynamics of Tosi’s model
How does this model of multi-scalar settlement rank-size dynamics relate to the spatial-organizational components of Tosi’s model? As discussed above, Tosi’s model outlines a developmental sequence for settlement rank-size dynamics in the broader region, beginning with the emergence of size-differentiation of sites during the Pre-Urban Phase (i.e., Chalcolithic), the continued growth of centers in the Proto-Urban Phase (i.e., Late Chalcolithic and Early Bronze Age), the appearance of intermediate-sized centers and so-called “settlement hierarchies” during the Urban Phase (i.e., Middle Bronze Age), and a major pattern-shift during the Post-Urban Phase (i.e., Late Bronze Age) to a settlement system comprising many more small sites of roughly similar size. Translated into the rank-size idiom, we might see this as the emergence of primate systems, followed by an entrenchment of primateness (i.e., T₁), followed by a period of primate+ systems, including convexo-primate, primo-convex systems, and zipfo-primate (i.e., T₂), succeeded by a period dominated by convex-type settlement systems (i.e., T₃). What we see instead, is in aggregate, that the proportion of convex types relative to primate types increases over time, but that there are a large number of single-site settlement systems in all periods.

**Table 7.16 Simplified Geographic Distribution of Rank-Size Types (\* Indicates 75%+ NA)**

<table>
<thead>
<tr>
<th>Proportional Prevalence of Lumped Types by Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>West</strong></td>
</tr>
<tr>
<td><strong>Central</strong></td>
</tr>
<tr>
<td><strong>East</strong></td>
</tr>
<tr>
<td>T₁</td>
</tr>
<tr>
<td>T₂</td>
</tr>
<tr>
<td>T₃</td>
</tr>
</tbody>
</table>

The most important result of the rank-size analysis is the diversity across time, space, and scale, though it should be noted that the most common types in order of frequency are NA, primate, convex, convexo-primate, zipfo-convexo-primate, and zipfo-primate (Table 7.16).
Regarding the geography of strict contemporaneity clusters, the three regions of the plain change quite a bit over time according to distinct trajectories. In the western zone, T₁ is a split between convexo-primate and primate, followed by a shift toward more convex at T₂, and finally primate at T₃. In the central zone, NA types are dominant at T₁ with a convex component as well, before being an even split between convexo-primate and primate at T₂, and an even mix of convex, convexo-primate, and primate at T₃. In contrast to previously discussed configurations, in this scenario, the eastern plain is more straightforward, being predominantly convex at T₁ and predominantly primate at T₂-T₃. In the buffer-cluster strict contemporaneity configuration, the western plain is primarily convex at T₁, primarily Zipfian at T₂, and an even split between convex and primate at T₃. The central zone is a split between convex and zipfo-primate at T₁, primate at T₂, and convexo-primate at T₃. The eastern zone is a split between primate and double-primate at T₁, NA at T₂, and convex at T₃.

On balance, what this shows at a more general level is that the settlement organization of the Gorgan Plain varies considerably over time and space and that the patterns of variation

### Table 7.17 Overall Counts of Rank-size Curve-Shape by Period (Scale Collapsed)

<table>
<thead>
<tr>
<th>Row Labels</th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
<th>Grand Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>21</td>
<td>16</td>
<td>27</td>
<td>64</td>
</tr>
<tr>
<td>primate</td>
<td>12</td>
<td>18</td>
<td>18</td>
<td>48</td>
</tr>
<tr>
<td>convex</td>
<td>16</td>
<td>11</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>convexo-primate</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>zipfo-convexo-primate</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>zipfo-convex</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>zipfo-primate</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>double-primate</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>zipf</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>double-convexo-primate</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>primo-convex</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>double-primo-convex</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

459
are both subtle and complex. As described in previous sections, for the purpose of this analysis, a variety of forms of aggregation have been employed to describe the gross trends in these data; future analyses will benefit from decomposing these aggregations and examining the transformations over time in individual settlement clusters and groups in isolation from each other before re-aggregating the results to further specify and interpret these patterns of variation in settlement organization as abstracted in the form of rank-size distributions. In particular, it will be important to examine the differences between the spatial territorial units containing the largest sites, such as Tureng Tepe in the western zone and Qabrestan-e Soltan ‘Ali and Tappeh-ye Mashhad-e Ramiyan in the central zone in particular.

**7.3.4 Potential Confounding Variables**

As alluded to above, there are some potential confounding variables affecting the rank-size distribution outcomes. That is, there are positive correlations between certain rank-size outcomes and three factors: the size of largest site in a group, the number of sites in group, and group area. As made clear by Palmisano (2017), the last of these three has been recognized for some time in the discipline; as the areal extent of analysis increases, the likelihood that a rank-size distribution will exhibit convexity also increases. This is due to the fact that larger sampling windows are more likely to encompass multiple independent settlement systems, which when “pooled” together in this fashion, produce a sort of “interference pattern” as in Figure 7.16.
Using a set of dummy figures for a series of site-sizes to produce two different hypothetical settlement clusters exhibiting primate distributions (left and middle plots of 7.16), I added these two distributions together (as would happen if these two clusters were lumped together in the same window of analysis) to create the right-most plot, which is a convexo-primate distribution. This simple counterfactual thus raises the question of whether convexo-primate distributions, along with double-convexo-primate and zipfo-convexo-primate distributions are not actually comprised of smaller independent settlement systems that have been accidentally lumped together, or whether something like this kind of spatial patterning is what is actually being discussed when scholars invoke the term “settlement hierarchy” (Adams 1981: 75-76; Drennan et al. 2015: 77-79).

From Table 7.18, we can see the relation between these types and the site size and grouping area measurements. The most consistently high-scoring rank-size types across these three metrics are double-convexo-primate and double-primate, of which there are only 5 total groups overall which manifested these two rank-size distributions. Next most consistently high scoring on these metrics are the most common distributions, i.e., convex, convexo-primate, and primate.
<table>
<thead>
<tr>
<th></th>
<th>Sites N Per Grouping Max</th>
<th>Sites N Per Grouping Mean</th>
<th>Max Size Largest Site Per Grouping</th>
<th>Mean Size Largest Site Per Grouping</th>
<th>Max Grouping Area</th>
<th>Mean Grouping Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common types</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>convex</td>
<td>20</td>
<td>6.0</td>
<td>6.6</td>
<td>3.6</td>
<td>1092.9</td>
<td>341.4</td>
</tr>
<tr>
<td>convexo-primate</td>
<td>30</td>
<td>9.0</td>
<td>34.0</td>
<td>6.0</td>
<td>1963.1</td>
<td>412.7</td>
</tr>
<tr>
<td>primate</td>
<td>21</td>
<td>5.2</td>
<td>34.0</td>
<td>18.4</td>
<td>1526.0</td>
<td>338.2</td>
</tr>
<tr>
<td><strong>Rare types</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>double-convexo-primate</td>
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<td>55.0</td>
<td>34.0</td>
<td>34.0</td>
<td>4299.3</td>
<td>4299.3</td>
</tr>
<tr>
<td>double-primate</td>
<td>25</td>
<td>17.0</td>
<td>12.4</td>
<td>9.6</td>
<td>1936.2</td>
<td>927.8</td>
</tr>
<tr>
<td>double-primo-convex</td>
<td>5</td>
<td>5.0</td>
<td>2.2</td>
<td>2.2</td>
<td>27.7</td>
<td>27.7</td>
</tr>
<tr>
<td>primo-convex</td>
<td>4</td>
<td>4.0</td>
<td>2.2</td>
<td>2.2</td>
<td>486.7</td>
<td>486.7</td>
</tr>
<tr>
<td>zipf</td>
<td>2</td>
<td>2.0</td>
<td>1.9</td>
<td>1.6</td>
<td>291.8</td>
<td>291.8</td>
</tr>
<tr>
<td>zipfo-convex</td>
<td>19</td>
<td>12.6</td>
<td>6.2</td>
<td>4.6</td>
<td>1130.5</td>
<td>465.1</td>
</tr>
<tr>
<td>zipfo-convexo-primate</td>
<td>12</td>
<td>6.1</td>
<td>6.2</td>
<td>5.3</td>
<td>556.9</td>
<td>136.8</td>
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<tr>
<td>zipfo-primate</td>
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<td>3.8</td>
<td>12.4</td>
<td>5.7</td>
<td>515.7</td>
<td>229.7</td>
</tr>
<tr>
<td>NA</td>
<td>1</td>
<td>1.0</td>
<td>34.0</td>
<td>4.0</td>
<td>254.4</td>
<td>225.6</td>
</tr>
<tr>
<td><strong>Grand Means/Maxes</strong></td>
<td>55</td>
<td>5.1</td>
<td>34.0</td>
<td>7.6</td>
<td>4299.3</td>
<td>335.6</td>
</tr>
</tbody>
</table>

These most common distribution types warrant some more explication. Important to remember is that the number of sites per grouping is a linked variable to the area per grouping measures, as the areas were generated as site-catchments. In any case, the results that standout most prominently are: 1) that the convexo-primate distributions have the largest maximum and mean area size and 2) that the convexo-primate and primate distributions score much higher on the size of largest site per group metrics, both in the maximum and the mean, than convex distributions. This last point is particularly crucial, insofar as it goes some distance toward explaining why Tosi’s modeling parameters produced the pattern discussed in 7.1.1. That is, a “center-focused” model of territoriality under these conditions was always more likely to produce primate distributions.

These results are in keeping with previous findings, and also suggest that rank-size distributions may potentially tell us less about settlement dynamics than previously thought.
The correlations between group site count, maximum site size and areal extent measurements discussed above also appeared in the modeling scenarios that I conducted using multi-scalar k-means clustering as an alternative to the site catchment buffering routine; this suggests that the results are not just an artifact of the particular analytical procedure that I deployed. Of course, correlation does not equal causation, and a more systematic study of this problem is required continue to study how these variables are interrelated.

7.4 From “Proto-State Structures” to Multi-Scalar Geographies

This analysis has demonstrated a number of points. Firstly, when we take strict-contemporaneity as a criterion for the selection of an analytical sample with respect to settlement patterns, we can be sure that we are dealing with synchronic windows, however restricted these may be. There are a number of approaches to establishing strict contemporaneity, but for the purposes of this study, I have chosen to follow Kintigh (1994), identifying the transitions between periods as snapshots in which we can be certain that sites of the Dewar type a/b or b/c with respect to a given period of interest y were simultaneously occupied.

Second, I have demonstrated that the parameters of Tosi’s model produce a distorted picture of the political-geographic dynamics of the third millennium in the Gorgan Plain. His model infers the presence of polities, or as he terms them “proto-state structures,” as territorially anchored in large central sites. This modeling parameter has several consequences, principally a depressed count of such territorial units, and ultimately results in the postulation of polities that exclusively exhibit primate-type rank size distributions. When we define polities based on the spatial relations between the entire sample of sites, modeling territorial units from the bottom up instead of from the top-down, we arrive at a much larger sample of such
territorial units and which are more diversely organized. Moreover, not only is there more temporal variation in territorial and rank-size dynamics than predicted, but also more spatial variation, with the three broad geographical zones of the Gorgan Plain experiencing distinct trajectories from each other.

The results of my territorial and rank-size model using the bottom-up parameters can be clearly compared to Tosi’s model. With respect to the number of polities over this interval, Tosi’s model predicts two at $T_1$, four at $T_2$, and two again at $T_3$; the results of my model show there were five multi-community polities in the Gorgan Plain during the early third millennium, two in the mid-third millennium, and eight toward the end of the third millennium; the average territorial extent of these polities increased from ca. 700-900 km$^2$ to ca. 1250-2700 km$^2$ between the first two phases and decreased to ca. 475-600 km$^2$ by the final phase. In the case of the first two phases, these modeled territory-sizes are larger than what Tosi predicted, though for the final phase, may be on target. Finally, with respect to rank-size dynamics, my model shows that Tosi’s inference of increasing convexity over time is broadly correct, but that the overall situation is considerably more complex and varied.

Altogether, what we see is that some of Tosi’s predictions were remarkably accurate, if not terribly precise. This is all the more impressive considering that, as far as can be discerned, he drew his conclusions from simple visual inspection of site distribution maps and did not engage in any kind of formal modeling. The advantage that the kind of modeling presented here to evaluate Tosi’s predictions is that it provides a more rigorous framework for evaluation of different assumptions and parameters, and also presents the possibility for identifying more nuanced and subtle patterns. There is still a great deal of work to be done with respect to charting the life-cycles of individual settlement clusters qua “communities” and their
relationship to groups of settlement clusters *qua* “polities,” but this will have to be the subject of a separate study.

At any rate, these results further indicate the distinctiveness of the Gorgan Plain’s landscapes of settlement within the broad region of Eastern Iran, Southern Central Asia, Afghanistan, and the Indo-Iranian Borderlands during the third millennium BCE. As previously discussed, in terms of physical geography, the Gorgan Plain differs from these other centers of settlement insofar as it is located in a region where rainfed agriculture is possible. But in terms of cultural geography, the Gorgan Plain is home to many more and, on the whole, smaller sites than the other regions. Indeed, the largest site, Tureng Tepe (34 ha), is smaller by a factor of a third to a half than each of Namazga Depe, Altyn Depe, Gonur, Mundigak, Shahdad, and ca. 23% the maximum size of Shahr-i Sokhta. Additionally, where many of these regions only have between three and forty documented third millennium sites, the Gorgan Plain has minimally 235 sites for which a location could be positively identified, and for which chronological information could be verified. Removing either of these constraints increases the number of Bronze Age Sites in the region considerably.

Third, I have added confirmatory evidence to Palmisano’s suggestion that rank-size curves are affected by a number of confounding variables, primarily the maximum and average size of a site in a settlement cluster or group and the areal extent of a given group’s modeled territory. At a more general and theoretical level, I have introduced the question of nesting and pooling as part of a critique of the study of so-called “settlement hierarchies.” As acknowledged by Adams (1981) and Drennan et al. (2015) so-called “settlement hierarchies” cannot be identified from either site-size histograms or rank-size plots. What I have shown is that such “hierarchies” cannot be straightforwardly identified from rank-size indices either.
Crucially, however, settlement “hierarchies” can be rethought in terms of their spatiality; to wit, they can be identified through inspection of the spatial overlap between the geographic distributions of clusters at different scales, thereby documenting the presence of “nesting” and “pooling” relations between groupings at different scales. Nesting describes the relation when a group at one scale spatially overlaps with only one group at the next less-inclusive scale of grouping; “pooling” refers to the situation when a group at one scale overlaps with two or more groups at the next less-inclusive scale of grouping. The question remains as to whether there are other spatial configurations that could reasonably be referred to as a “settlement hierarchy,” and to what these spatial patterns might correlate in social terms. The former question can be addressed with reference to a larger body of settlement distributions, perhaps in a regional or interregional context; the latter question will depend upon the availability of a material record that can be analyzed with sufficient rigor to demonstrate the patterns of social and political affiliation between groups of sites.
CHAPTER 8. CONCLUSION

This dissertation has addressed a question of broad interest in prehistoric archaeology: how are long-distance trade and polity-formation related to each other? A persistent lineage of archaeological thought has understood long-distance trade as having an important role in driving political complexity, an idea that can be found everywhere from state-formation theories, peer-polity interaction, interaction spheres, World Systems analysis, and beyond. I have sought to examine this relationship through a case study of the Gorgan Plain of northeastern Iran from the late Chalcolithic through the Late Bronze Age, ca. 3200-1600 BCE. In so doing, I have evaluated the evidence for the region’s connections to its neighbors via trade, exchange, and interaction across this chronological interval in the context of broader discussions concerning general trends in the Ancient Near East more widely. I have also reconstructed the settlement record of the Gorgan Plain and compared it to two models of political geography that have been proposed to describe and explain the historical trajectories of settlement and their relationship to political and social organization over time.

I found that this case study diverges from prediction, and that the period of the Gorgan Plain’s greatest direct involvement in interregional trade follows rather than precedes a period of territorial integration that might reasonably be understood as an episode of polity formation. This conclusion must be regarded as tentative, however, given a number of caveats. Most important among these are the level of imprecision involved in the region’s chronologies, and the lack of a comprehensive inventory of the region’s regional and interregional connections, particularly with regard to the mid-third millennium. Both of these problems and many others stem from the fact that the full record of the most significant excavations at the region’s most
important Bronze Age site, i.e. Tureng Tepe, remains as yet unavailable (but see Bessenay-Prolonge 2017, 2018; Bessenay-Prolonge and Vallet 2016; Martinez 1990).

In any case, this investigation has required engagement with a number of different literatures. First, I posed the question of how site distributions are related to social and political organization. There are two primary theoretical frameworks through which this question has been addressed, the political landscape and political geography. While the former is a robust model for understanding political life in the ancient past, it is unsuitable for the kind of empirical record at our disposal with respect to the Bronze Age of northeastern Iran. By contrast, political geography focuses our attention on problems of boundaries, territory, and spatial-structure, which due to the nature of the available evidence, is much more amenable to direct evaluation of the two primary models that have been used to understand the spatial organization of Bronze Age society in Iran.

I have also examined the political and economic geography the Ancient Near East with an emphasis on Iran. This topic has often been understood through a relational lens, which has focused attention on trade, exchange, and interaction between the different regions comprising this “world system.” The evidence for interregional connections during the Bronze Age in the Ancient Near East has not only been used for chronology-building, in fact, scholars have long recognized that these material parallels index a range of social processes, providing evidence of contact and interconnection deep into prehistory. In the decades since the first proposal of the connection between regional trade, the development of craft specialization, and the production of surpluses on the one hand, and the emergence of elites and durable social inequality as part of the emergence of the state on the other – it has become nearly common-sense that long-
distance trade, whether in luxuries or in utilitarian items, is closely linked to the emergence of early complex polities both in the heartland and the peripheral regions of the Ancient Near East.

Major challenges in evaluating the veracity of this and similar accounts include: (1) inconsistencies in the culture-historical chronologies of particular regions, which result in (2) difficulties in harmonizing inter-regional chronologies, (3) a lack of systematic and quantitative studies of the material indices of this trade and exchange as well as of settlement pattern data, and finally, (4) the manner in which “parallels” are put to use in the secondary literature, where they are often decontextualized or otherwise not placed in a specific enough chronological framework to assess the timing/duration/intensity of contacts between regions. Consequently, a major empirical objective of this dissertation has been to address these challenges head-on. This aim supports the further goals both of evaluating the models proposed for the political geography of Bronze Age Iran and reasoning about the relationship between political-geographic trends and broader patterns of trade, exchange, and interaction in the Bronze Age World System.

In terms of the methodologies and empirical investigations involved in the pursuit of answers to the quandaries posed above, the practical question of “how do we identify and characterize political geographic patterns through archaeological settlement patterns?” motivated much of the analysis. I tackled this problem using three primary methods to perform quantitative, spatial and organizational analysis of the Gorgan Plain settlement record, namely Exploratory Data Analysis of regional settlement demography (e.g., Drennan et al. 2015), site-catchment modeling (Ullah 2011; Wilcox et al. 2007), and rank-size analysis (Palmisano 2017; Falconer and Savage 2009). Each of these methods has its particular drawbacks, but their strengths lie in that they produce easily understandable measures and visualizations that
serve as proxies for charting broad historical transformations in territoriality and political organization over time. Given that the settlement patterns of the Gorgan Plain have never been subject to any kind of systematic descriptive analysis, at each stage of this analysis I have prioritized computational simplicity over elegant and sophisticated modeling. While a great deal more about these methods can be said, I pursued a “proof-of-concept” approach and stuck as closely as possible to the primary objective of evaluating Tosi’s model of polity-formation in Bronze Age “Turan.”

Concomitantly, I also directly addressed the particularities of why the Gorgan Plain settlement data has never been properly analyzed, namely due to the fact that the total record is fragmented and incompletely published in English (e.g., Arne 1945; Sauer et al. 2013), Farsi (e.g., ‘Abbasi 2011; Mortezaei and Farhani 2008), and Japanese (e.g., Shiomi 1974, 1976). Despite this fractured record, these surveys share very similar objectives, methodologies, and data presentation strategies; consequently, these sources did not pose any inordinate challenge to synthesis, nor did they require the construction of an object-ontology to harmonize divergent terminologies. Nevertheless, the process of data synthesis and integration required evaluation of the reliability of these surveys. Thus, I performed source criticism to extract the maximum possible amount and variety of information from the maps and data tables that comprised these records. Through a process of digitization, modeling, formalization, and record-augmentation via a systematic restudy of the survey records using QuickBird satellite imagery accessed via Google Earth Pro, I was able to build a relational geo-spatial database that could not only afford cartographic re-presentations of the data, but also quantitative analysis and spatial modeling.

Another central intervention in this dissertation was the effort expended to ameliorate the patchy and/or uncertain chronological information manifest in the survey records. The
major problem here is that the regional relative chronology of the Gorgan Plain has been confused by inconsistencies and imprecision in the comparison of its major excavations. This is a particular problem with respect to the primary source of chronological information for the Gorgan Plain survey records, which incorrectly defines the Early Bronze Age on the basis of culture-historical strata. Indeed, there is considerable disagreement between the sources over which periods the cultural strata of Tureng Tepe, Shah Tepe, and Narges Tappeh belong to.

Nevertheless, it is possible based entirely on the published monographs to confidently correlate diagnostic ceramic types with specific periods, and furthermore to use this information be used to date surface ceramics. In my analysis, I evaluated the equivalences of cultural strata at key Gorgan Plain sites proposed by different authors to revise and determine the correct relative position of the Bronze and Chalcolithic layers through an examination of chronograms and parallels. I also correlated these cultural strata to an absolute chronology anchored in the $^{14}$C column from the Deshayes excavations at Tureng Tepe (1960-1977). These two procedures allowed me to systematize the information presented in the legacy sources and to at the very least provide an explicit record of how this chronological information relates to the survey data.

The most important conclusions reached in Chapter 5 relate to the position of Shah III-IIb on the one hand, and to the positioning of the final phases of each of the three key sites on the other. While this exercise was useful in specifying the precise points of connection that can be used to harmonize the phases of individual sites, it does not resolve questions related to the validity of the divisions of particular strata at Shah Tepe and Narges Tappeh (i.e., Shah III-IIb and Narges IIIb2-3) a problem that has also plagued attempts to understand Tepe Hissar as well. Thus, the regional chronology, while still exhibiting some as yet unresolvable ambiguities, has been clarified to the extent possible on the basis of synthesis of chronograms and cross-referencing of
ceramic parallels. The differences between the sources have been clarified and their relative reliability has been assessed. With respect to our ability to date surface ceramics, this should now theoretically be entirely possible for much of the third millennium, provided that the sample of surface ceramics is comprised of suitably diagnostic specimens. The chronology of ‘Abbasi’s site gazetteer is still quite problematic, however, due to the major discrepancies between how he and others define the Early and Middle Bronze Age in particular. It may be the case that we need to for now treat this information as if it were correct, and to re-evaluate it later, when a fuller data set of surface ceramics is available (e.g., from the Gorgan Plain Wall Survey and/or the Hiroshima University Survey). Nevertheless, while there is still a large amount of work to be done on this subject, it is likely that only new and much more contextually-controlled excavations will be able to resolve the chronological problems of the Gorgan Plain, and it is not clear when, if ever, this work will be accomplished.

In any case, my ultimate analytical intervention with respect to the relationship between trade and polity-formation has two key components. Firstly, the period in which the region experiences the greatest political-geographic consolidation does correlate to the period of the Middle Asian Interaction Sphere, but there is no drop-off in interregional interaction after this period. Subsequently, the network reorganizes along a different axis, connecting the Gorgan Plain more directly to Central Asia and Anatolia, rather than indirectly to the Plateau and the Gulf. Interestingly, it is precisely when the Gorgan Plain becomes a center of Transcaspian trade around the turn of the second millennium that the region experiences the greatest degree of geographic and organizational fragmentation. These results have led me to question not just models of secondary or proto-state formation across the broader region of the lands between Mesopotamia, the Indus Valley, and the Amu Darya during the third millennium BCE, but also
the role of trade in the development of political complexity. This argument has important implications, not just in archaeology, but in today’s world as well, in light of the competing hegemonic models that dominate global trade, i.e., between the American finance-oriented free markets and China’s infrastructure-oriented Belt-and-Road Initiative and the impact that these two models can have on the social and political life of resource-rich but less powerful nation-states caught in between, such as Iran.

My results not only noticeable shifts over time in the geographic distribution of rank-size patterns, but also distinct differences between the sub-regions of the plain over time. Most importantly, at no time were hierarchically organized settlement systems predominant, and in fact, the trend over time is toward greater heterarchicalism. I also identify a greater range of variability in territorial and settlement organization, as well as increasing instability over time in both domains. Thus, the spatial patterns are complex, but the main take-away is that there is a great degree of organizational heterogeneity both within and between periods across space. Therefore, I argue that: (1) the political geography of this time and place is far more fractured and variable than previously recognized and (2) the timing, intensity, and directionality of regional and interregional connections between the Gorgan Plain and its neighbors near and far do correlate to trends in regional settlement, but in some unexpected ways. One important finding is that in all periods, the main trade contacts between the Gorgan Plain and other regions are with its immediate neighbors. While inter-regional links with more distant regions are continuously present, they vary over time in intensity, in terms of what is traded, and with whom. This finding has implications for all of the regions of the so-called “Indo-Iranian Borderlands” or the “Turanian Basin” during the Bronze Age, suggesting that their regional dynamics require reconsideration. Moreover, methodologically, I make the case that settlement
pattern analysis is best conducted on sets of contemporaneous occupations, and results are most robust when multiple spatial and temporal scales are considered. A broader implication of my argument is that the spatial structure of settlement does not map onto socio-political structure in any predictable fashion. Analysis must therefore measure and describe spatial patterns at multiple scales and contextualize them in relation to other observations.

Consequently, the various polity-formation models proposed for the Gorgan Plain and its neighbors during the Bronze Age must be revised. As I show, one of the major empirical claims of such polity-formation theories – i.e., that demographic agglomeration at large central sites during the Middle Bronze Age indicates the emergence of urbanism and “proto-states” – does not stand up to scrutiny. Instead, a mosaic of geographically distinct communities with a greater diversity of spatial configurations took shape in the Gorgan Plain, but it remains uncertain the extent to which these communities were integrated with each other through shared material-cultural practices and socio-political institutions. In purely spatial terms, there is evidence for the possible formation of larger socio-political units ca. 2400 BCE, but this fact alone is not enough to definitively accept or reject such a hypothesis. The next step in this research is directed toward further illumination of these domains and will stand to continue to contribute to broader anthropological conversations around community- and polity-formation among complex, but non-state societies in relation to trade, exchange, and interaction at multiple scales.
APPENDIX TO CHAPTER 7

T₁ – 3 km Settlement Clusters Full Rank-Size MultiPlot

Solution (1_1)_#1
Solution (1_1)_#4
Solution (1_1)_#7
Solution (1_1)_#10
Solution (1_1)_#13
Solution (1_1)_#16
Solution (1_1)_#19
Solution (1_1)_#22
Solution (1_1)_#25
Solution (1_1)_#28
Solution (1_1)_#31
Solution (1_1)_#34
Solution (1_1)_#37
Solution (1_1)_#40
Solution (1_1)_#43
Solution (1_1)_#46
Solution (1_1)_#49
Solution (1_1)_#52
Solution (1_1)_#55
Solution (1_1)_#58
Solution (1_1)_#61
Solution (1_1)_#64
Solution (1_1)_#67
Solution (1_1)_#70
Solution (1_1)_#73
Solution (1_1)_#76
Solution (1_1)_#79
T₁ – 6 km Settlement Clusters Full Rank-Size MultiPlot

Solution (t1_gid_6km) #1

Solution (t1_gid_6km) #2

Solution (t1_gid_6km) #3

Solution (t1_gid_6km) #4

Solution (t1_gid_6km) #5

Solution (t1_gid_6km) #6

Solution (t1_gid_6km) #7

Solution (t1_gid_6km) #8

Solution (t1_gid_6km) #9
T₁ – 9 km Settlement Groups Full Rank-Size MultiPlot

Solution (t1_gid) #1

Solution (t1_gid) #2

Solution (t1_gid) #3

Solution (t1_gid) #4

Solution (t1_gid) #5

Solution (t1_gid) #6

Solution (t1_gid) #7
T₂ – 3 km Settlement Clusters Full Rank-Size MultiPlot
T₂ – 6 km Settlement Clusters Full Rank-Size MultiPlot

T₂ – 9 km Settlement Groups Full Rank-Size Plot
T₃ – 6 km Settlement Clusters Full Rank-Size MultiPlot

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Solution (t3_gid_6km) #1

Solution (t3_gid_6km) #2

Solution (t3_gid_6km) #3

Solution (t3_gid_6km) #4

Solution (t3_gid_6km) #5

Solution (t3_gid_6km) #6

Solution (t3_gid_6km) #7

Solution (t3_gid_6km) #8

Solution (t3_gid_6km) #9

Solution (t3_gid_6km) #10

Solution (t3_gid_6km) #11

Solution (t3_gid_6km) #12

Solution (t3_gid_6km) #13

Solution (t3_gid_6km) #14

Solution (t3_gid_6km) #15
T₃ – 9 km Settlement Groups Full Rank-Size MultiPlot

Solution (t₃_gid) #1

Solution (t₃_gid) #2

Solution (t₃_gid) #3

Solution (t₃_gid) #4

Solution (t₃_gid) #5

Solution (t₃_gid) #6

Solution (t₃_gid) #7

Solution (t₃_gid) #8

Solution (t₃_gid) #9

Solution (t₃_gid) #10

Solution (t₃_gid) #11

Solution (t₃_gid) #12

482
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