

Taking Possession of the Constant Rate Hypothesis: Variation and Change in Ancient Egyptian Possessive Constructions

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1 Introduction

Since the decipherment of the Rosetta Stone in the early nineteenth century, scholars have been studying the Egyptian language. Such work has relied on philological tools and methodology since the inception of Egyptology, and scholars have made many insightful discoveries and observations regarding the nature of the Egyptian language. But with advances in scientific methodology and investigative research techniques, much more can be added to the body of work that exists on Ancient Egyptian, providing a greater understanding of Ancient Egyptian thought, culture, and life through a deeper understanding of the language and the factors that constrain its development.

Especially relevant is the variationist framework: used to conduct linguistic research since the 1960s, this framework was initiated by Weinreich, Labov and Herzog (1968) and their students (Sankoff et al. 2012, Tagliamonte 2006, Poplack and Tagliamonte 2001, Sankoff and Labov 1979, Sankoff and Sankoff 1973, Labov 1963, 1972).¹ Variationist methodology is based on the concept that all languages have within them natural variation, and indeed there has been “a plea for a variationist approach to the Ancient Egyptian material” (Polis 2014:57) from Egyptologists. This pilot study of ancient Egyptian will do just that, examining variation between two possessive constructions in Middle (c. 2000 BC – 1350 BC) and Late (c. 1350 BC – 700 BC) Egyptian. The first variant is an older and socially prestigious variant, while the second is an innovative variant (Allen 2010, Gardiner 1957). The analysis is based on 1,239 tokens from the Thesaurus Linguae Aegyptiae corpus, extracted from letters and official texts spanning over a millennium.

1.1 Ancient Egypt

The title “Ancient Egypt” refers geographically to modern-day Egypt and parts of the Levant and modern Sudan (Allen 2013), an empire which emerged as a unified nation *circa* 3150 BC and did not fully fall until 30 BC with the death of its last ruler, Cleopatra (Allen 2013). Egypt was one of the first nations to develop writing, which can be dated back as far as 3250 BC (Allen 2013). The written forms of the Egyptian language endured until the death of Coptic in the seventeenth century, making Egyptian the longest continually-attested language in the world (Allen 2013).

Ancient Egypt was divided geographically into two major portions: since the Nile flows south, the northern portion is called Lower Egypt while the northern section is referred to as Upper Egypt, which encompasses some of modern-day Sudan. South of Upper Egypt is the rest of Sudan, formerly known as Nubia. Nubia was often at odds with Egypt, sometimes separate and independent, and other times a vassal state of Egypt. This project’s token set includes textual sources from Nubia in Egyptian by native Egyptian speakers.

In the interest of scale, this pilot study does not investigate every time period in Egyptian history. Instead, I focus on several major periods: the Middle Kingdom and the New Kingdom, and the two Intermediate Periods surrounding them. A Kingdom in Egyptian history refers to a period of several centuries during which the monarchy is stable; an Intermediate Period refers to a time when the kingship was not strong, and the rule of the country fell to the many provincial leaders, called nomarchs. Each Kingdom and Intermediate Period is divided further into dynasties, periods of a century or two of a single family’s or group’s rule of the country. Table 1 illustrates the division of time periods observed in this study, and which stage of the Egyptian language they correspond to.

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¹See Tagliamonte 2006 for further reading.



Figure 1: Map of Ancient Egypt (Kerr 2008).

Since the beginnings of Egyptian language, two scripts were used: hieroglyphic and hieratic. The more famous hieroglyphic script was used in writing official texts on more permanent material, such as stone or mud-brick. Hieratic is essentially a cursive version of hieroglyphic, used more commonly and often written on less permanent materials, such as papyrus or cloth. I investigate tokens from texts written in both hieratic and hieroglyphic.

Kingdom	Dynasties	Language Stage(s)
Middle Kingdom c. 2055 BC – 1650 BC	11 – 12	Middle Egyptian / Late Egyptian
2 nd Intermediate Period c. 1650 BC – 1550 BC	13 – 17	
New Kingdom c. 1550 BC – 1069 BC	18 – 20	Late Egyptian
3 rd Intermediate Period c. 1069 – 664 BC	21 ²	

Table 1: Time periods observed in this study and their corresponding language stages (Allen 2010, Hoch 1994, Gardiner 1957).

2 The Variable

The two variants of the possessive construction can often be seen together, even in the same text:

²While the Third Intermediate Period contains more than Dynasty 21, this is the only portion of the period for which I was able to obtain data.

- (1) a. *jr* *grt* *n3-n* *wt* *qd.n* *n=j*
 PRT now DEM(PL) apartment give.PRF to=1SG
 sn=j
 brother=1SG
 ‘... now as for these apartments that **my brother** gave to me...’
 (Collier and Quirke 2004:104)
- b. *p3y=j* *sn* *sd3wty* *kf3-jb*
 DEM=1SG **brother** treasurer discreet-heart
 ‘... **my brother**, the trustworthy (lit. discreet of heart) treasurer ...’
 (Collier and Quirke 2004:104)³

The variant in (1a) is an example of the old variant, comprised of a possessum followed by its possessor clitic, which attaches to the right of the possessum. The old variant is said to be a feature of the Middle Egyptian stage of the language, while the new variant, shown in (1b) is one of the many features of Late Egyptian, though both variants are known to be used in Late Egyptian (Allen 2013, Junge 2005, Gardiner 1957). The new variant seen in (1b) is comprised of demonstrative/definite article, possessor clitic attached to the article, and finally the possessum at the end of the construction. The change from old variant to new never achieves completion; that is, the new variant never completely replaces the old, but by the time of the last stage of Egyptian, there are precious few tokens of the old variant (Egedi 2010). The new variant is thought by Egyptological scholars to have emerged in spoken language sometime during the early Middle Kingdom (c. 2055 BC–1650 BC), but such Late Egyptian features do not appear in writing until much later (Allen 2010, Junge 2005, Gardiner 1957). As such, the new variant is sometimes difficult to find in writing from the Middle Kingdom, but there is evidence for its existence in vernacular texts during the later dynasties of this period (Hoch 1954).

During the New Kingdom, the new variant is said to become much more prominent in the written language (Kupreyev 2012, Junge 2005, Allen 2010, Gardiner 1957), specifically after a fairly turbulent time in the country’s history known as the Amarna Period (Kupreyev 2012).

The Amarna Period was a period of Egyptian history that took place during the latter part of Dynasty 18 of the New Kingdom (1353 BC–1292 BC). The pharaoh Amenhotep IV had ruled Egypt for just five years when he embarked on a departure from the nation’s traditional polytheistic religion in order to institute monotheism. He instated as sole deity his favourite god, the sun-disk Aten, changing his name to Akhenaten in order to suit his new preferences (Redford 1984). He also had an entire city constructed, moving the whole of the capital to a place he called Akhetaten (‘horizon of the Aten’) which is now known as Amarna (Redford 1984). During his reign, many innovative forms of art and literature flourished along with Akhenaten’s new religious practices. It is thought that social reforms were a part of this period as well: there are more textual sources about the women of the Amarna Period than in any other time during Egyptian history, the contents of which indicate that women at Amarna seem to have played a large part in royal and religious freedoms associated with this time—and indeed the queen, Nefertiti, is often said to have influenced many of Akhenaten’s religious reforms (Dodson 2009, Arnold, Allen and Green 1996, Moran 1992, Redford 1984).

After Akhenaten’s death, almost everything reverted back to its previous state, including the capital city, beginning as soon as his son, the boy-king Tutankhamen, ascended to the throne. However, the progress of language change could not be stopped, and whatever changes the environment of the Amarna Period had allowed to flourish continued, including, scholars say, an increased prevalence of the new possessive variant (Kupreyev 2012).

Given this information, the prediction is that we will not see the new variant until the Middle Kingdom, and that it will be first seen in vernacular texts like letters. Then we should see an increase of the use of the new variant in the first part of the New Kingdom, followed by a massive influx of new variant tokens during and after the Amarna Period.

Egyptological philologists also claim that, during the New Kingdom, there are two different forms of Egyptian that appear in textual sources: one form used for vernacular texts and another

³Both tokens in (1) come from papyrus UC 32058, written during the reign of Amenemhat III, during Dynasty 12 in the Middle Kingdom. It currently resides in the Petrie Museum.

for more official documents (Allen 2013, Junge 2005). The form for these formal texts is said to retain more Middle Egyptian features like the old possessive variant, while the vernacular form is said to reflect spoken language more accurately, presumably employing more uses of the new variant. Both forms are said to be quite different from each other, so in this project I test the idea that these two forms may be an example of diglossia; a different written dialect, of sorts. Style shift is a more likely explanation for any differences in this instance, especially since the two written forms are divided between formal and vernacular texts, but we cannot make this assumption without data to back up this claim.

If the difference between formal writing and vernacular writing is truly style shift, we should see evidence of the Constant Rate Effect, which states that different linguistics contexts may have different initial frequencies of any new variant, but that the rate of increase of such a variant will be the same across these contexts (Kroch 1989). In this case, we can consider each text type a different “context.” The new possessive variant should increase at the same rate over time in vernacular and formal texts. If these different writing types are instead an example of diglossia, then we should see a difference between formal and vernacular texts in the rate of increase of the new variant.

3 Corpus and Methods

This study made use of 1,239 tokens from the *Thesaurus Linguae Aegyptiae*, a free online corpus of over 1.1 million words. It is actually a series of corpora, comprised of texts ranging from pre-dynastic times (c. 3200 BC) to the end of demotic writing (400 AD), and encompasses three script types: demotic, hieratic and hieroglyphic. In the interest of scope, this project focuses only on the texts in those time periods surrounding the rise of the new variant (the texts from the Middle and Late Egyptian stages) in both hieratic and hieroglyphic. Table 2 illustrates the time periods involved and their corresponding language stages.

Time Period	Dynasties	Language Stage – Spoken	Language Stage –Written
Middle Kingdom c. 2055-1550 BC	11 – 17	Middle Egyptian / Late Egyptian	Middle Egyptian
Pre-Amarna New Kingdom c. 1550-1323 BC	18	Late Egyptian	Middle Egyptian-esque in official texts; Late Egyptian in vernacular texts
Post-Amarna New Kingdom c. 1323-800 BC	19 – 21		Middle Egyptian-esque in official texts, with more Late Egyptian features than previous; Late Egyptian in vernacular texts

Table 2: Revised time period divisions and their corresponding language stages.

The token set included texts from letters, which itself was divided into everyday letters, letters to the dead, and letters to/from kings. The prediction is that the more formal of these letters (those to and from kings) should favour the use of the old variant more than do the other letter types. Everyday letters should favour the new variant, and letters to the dead even more so. Do not be misled by the name: letters to the dead are much less formal than they seem. Egyptians believed that the spirits of the deceased lived in a world quite similar to ours and readily communicated to their loved ones when offered the traditional tokens of bread and beer. Letters to the dead would include offerings such as these, and generally would implore deceased relatives to use their newfound spiritual influence to improve the circumstances of those still living, whether that be obtaining better positions, growing better crops, or easing childbirth, among other things. Letters to the dead could also include letters to deceased friends and family members that simply updated those who had crossed over on the lives of those loved ones they left behind. As such, these letters are

expected to be the least formal, as it would be similar to the most vernacular of everyday letters, equivalent to conversing with a cherished friend (Gardiner and Sethe 1928). The more official texts included such items as royal decrees, pharaonic propaganda, and “autobiographical” tomb texts. These texts are autobiographical in the sense that they relay events in the lives of their authors, but they were often strongly embellished so as to make the subject appear much more interesting and important than they may have been in actuality. Tokens from these more formal texts were only taken from the New Kingdom periods, as this is when the “split” between the two written forms is said to have happened (Allen 2013). Crucially, no tokens of the new variant were found in such texts from the Middle Kingdom.

Finally, I obtained some tokens from poems, but found so few that these tokens are excluded from all but the main distributional analyses. The distributional and logistic regression analyses were conducted using GoldVarb (Sankoff, Tagliamonte and Smith 2012), while logistic functions were manipulated using Maple 13 (2009).

4 Results

The overall distributional results, including tokens from poems, are illustrated in Table 3.

	Old Variant	New Variant	Total
N	832	407	1239
%	67	33	100

Table 3: Overall results.

It is evident that the majority of tokens (approximately 2/3) are the old variant. The remaining 1/3 are new variant tokens. This is not surprising; since we began at the New Kingdom, it is to be expected that few new variant tokens will be found during that time.

A multivariate analysis was performed with GoldVarb using the old variant as the application value, and including both text type and time period as factors. Both factors were statistically significant.

Table 4 shows the distribution of both variants over time. We can see that while the Middle Kingdom almost exclusively favours the old variant (FW 0.95), we do see instances of the emerging new variant. As time goes on, the new variant begins to increase in use. By the time of the post-Amarna New Kingdom, the new variant is strongly favoured (FW 0.31). The overall numbers display only a 50/50 split between the variants by the time of the post-Amarna New Kingdom, but the factor weights indicate that the tide is changing in favour of the new variant when compared to the Middle Kingdom.

Time Period	Old Variant		New Variant		FW
	N	%	N	%	
Middle Kingdom	208	95.4	10	4.6	0.95
Pre-Amarna New Kingdom	181	86.2	29	13.8	0.53
Post-Amarna New Kingdom	443	54.6	368	45.4	0.31

Table 4: Variants over time.

Table 5 displays the distribution of both variants by text type. It is at this point that the tokens from poetry must be excluded. Since there are only 18 of them, they cannot be used as a text type in their own right in the logistic regression analyses, and there was no convincing reason to group them with either official texts or any of the letter types. In the analyses that follow, only the 1,221

tokens from letters and official texts are included.

Text Type	Old Variant		New Variant		FW
	N	%	N	%	
official texts	300	90.4	32	9.6	0.87
letters to the king	60	66.7	30	33.3	0.40
everyday letters	436	57.1	327	42.9	0.33
letters to the dead	21	58.3	15	41.7	0.27
Total	817		404		

Table 5: Variants by text type.

Table 5 tells us that the predictions regarding text type are borne out: official texts strongly favour the old variant (FW 0.87), while letters (especially letters to the dead) strongly favour the new variant. However, no tokens of official texts were available from the Middle Kingdom, so to be certain that our story is accurate, we must look at variants by text type in the New Kingdom periods only. This is shown in Table 6.

Text Type	Old Variant		New Variant		FW
	N	%	N	%	
official texts	300	90.4	32	9.6	0.87
letters to the king	46	60.5	30	39.5	0.40
everyday letters	248	43.9	317	56.1	0.33
letters to the dead	15	50.0	15	50.00	0.27
Total	609		394		

Table 6: Variants by text type in the New Kingdom.

These results are in line with Egyptological claims: they illustrate the emergence of the new variant in more vernacular texts and its rarity in official texts. But we still do not have an accurate picture of how the new variant increases over time in each text type. To obtain further insight, Table 7 shows the rate of use of the new variant by text type in each time period. In official texts, letters to the king, and everyday letters, change goes in the direction predicted: the new variant's usage rate increases from the Pre-Amarna period to the Post-Amarna period. Change goes in the opposite direction from what is predicted in the letters to the dead, but there are so few tokens that we cannot count these "wrong" changes as evidence against the predicted change.

A solution to this might be grouping the letters together. Table 8 illustrates the distribution over variants over time when letters are combined. We can also see from Table 8 that when the new variant is introduced to letters it has a usage of about 5%, while the old variant is used about 95% of the time. Likewise, the same distribution occurs when the new variant emerges in official texts in the next time period. This is consistent with the style shift hypothesis: the rate of use of the new variant is the same even though it is introduced to each context at different times. However, once we look at the next time periods over for each text type, the rates do not appear to be the

same at all. The distribution of Ns in each box confounds our ability to observe the correct rate of change.

Time Period	official texts		letters to the king		everyday letters		letters to the dead	
	N	%	#	%	#	%	#	%
Pre-Amarna	8/137	5.8	2/24	8.3	28/42	66.7	5/7	71.4
Post-Amarna	24/195	12.3	28/52	53.8	303/523	57.9	10/23	43.5

Table 7: Rate of use of the new variant by text type and time period.

Time Period	official texts		letters	
	N	%	#	%
Middle Kingdom	N/A	N/A	10/218	4.6
Pre-Amarna	8/137	5.8	19/57	33.3
Post-Amarna	24/195	12.3	255/461	55.3

Table 8: Revised variants by text type and time period.

4.1 The Constant Rate Hypothesis

Since our numbers are so opaque, we must find another way to calculate the rate of change for both official texts and letters. In this case, the rate of change is the rate of the increase of the new variant over time.⁴ To calculate this, I input the values from the above analysis into a logistic function. This idea is not new: language change is always modeled using the S-curve created by a logistic function, mapping the rate of increase of the new form over time. All language change is proposed to occur in this way: a slow rise at first, then a rapid increase in the use of the new form, and a final, plateau stage where the form either completely or mostly overtakes the older form(s) (Kroch 1989, Zuraw 2003).

$$(2) \quad P = \frac{e^{k+st}}{1 + e^{k+st}}$$

(Zuraw 2003: 148)

In the above equation, p is the percentage of the new variant, t is time (in our case it is the midpoint of each time period), k is the y -intercept (the initial frequency); and s is the slope (the rate of change). Maple is used to solve for s . Since there are three time periods from which letter tokens were taken, and therefore three different p and t values, Maple combines these three data points and produces the equation that best fits all of them. The resulting s value is our slope.

Going through this process for letters and then for official texts (with its two data points) gives us the results illustrated in Figure 2, where the blue line represents the rise of the new variant in letters, and the red represents its rise in official texts. The slope for each of these equations is the same, at 3.3 for both letters and official texts, meaning that the rate of change in letters as compared to official texts is the same, despite their differing initial frequencies of the new variant.

Dividing the results by dynasty gives us more data points with smaller time intervals; a more accurate measure of the change over time. Now there are five data points for letters and three for official texts. The logistic function for these new points is illustrated in Figure 3. The slope for

⁴The rate of change could easily refer to the rate of decrease of the old variant over time instead, but it is much more straightforward to work with positive integers.

each of the functions in Figure 3 is 4.1; the rate of increase of the new variant is the same in both letters and official texts.

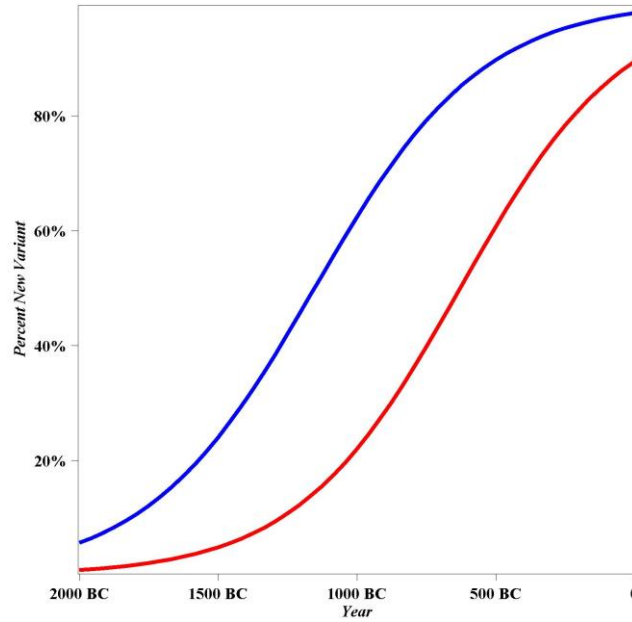


Figure 2: Rate of increase of the new variant (three data points for letters; two for official texts); Slope: 3.3.

These findings do not support the idea that official texts and letters are separate linguistic entities, but rather demonstrate that they are cases of the same variable being used in different linguistic contexts. When the initial frequencies of a new variant differ across contexts but the rate of change in both contexts is the same, this supports the Constant Rate Hypothesis. The alternative is that two unrelated varieties somehow converged on the same rate of change by coincidence.

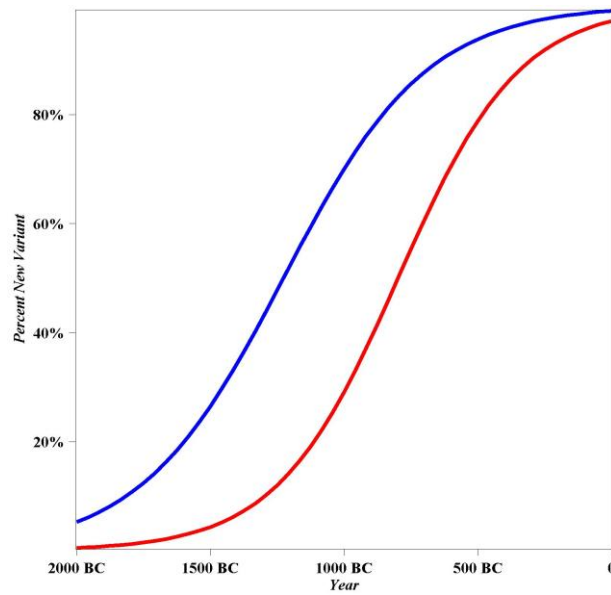


Figure 3. Revised rate of increase of new variant (five data points for letters, three for official texts); Slope 4.1.

5 Discussion

The results of this preliminary study are promising for the future of Egyptological research, and for linguistic research using variationist methods on the morphosyntax of ancient languages. For one, it shows that such research is possible with the textual data that we possess from ancient sources and without the traditional sociolinguistic interview. It is also exciting for the future of sociolinguistics: Egyptian was written for several millennia, and this pilot study shows that we will be able to use this data to observe language change and variation on a larger scale than ever before.

This pilot study also shows how similar ancient languages actually are to modern ones in terms of their natural variation, the way they change, and the linguistic principles that affect them. This falls in line with the Uniformitarian Principle, which states that “the forces operating to produce linguistic change today are the same kind and order of magnitude as those which operated in the past five or ten thousand years” (Labov 1972:275).

Future work on these possessives will include more tokens from other text types, controlled for script type, time period, and location; as well as linguistic factors such as noun alienability, phrase complexity, and clitic phi-features. Future work will also compare the two nominal possessive types to discover whether the same forces affect their usage. Until then, this is simply the first step in an undertaking that will provide valuable insight into language change and variation over time and across a wider range of language types.

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