1-1-2017

Multi-Value Asymmetry in Number Agreement and Concord

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Abstract
In this paper I present cross-linguistic data of NRNR, TP RNR, and composed plurality to argue for the multi-value asymmetry between the N and the T domain. I propose that the asymmetry can be accounted for by assuming that T heads have multiple unvalued number features while N heads have only one. The proposal is compatible with the unified Agree analysis of concord and agreement and it is further supported by the mismatch cases of multi-valuation.

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1 Introduction

Agreement is phi feature dependency between predicates and their arguments as is shown in (1a). Nominal concord is phi feature dependency between nominals and their modifiers as is shown in (1b). No consensus has been reached regarding the relation between these two dependencies. Baker (2008), Danon (2011) and Carstens and Diercks (2013) among others have argued that one unified mechanism, Agree, is behind both dependencies, while Norris (2014) among others argues that agreement involves Agree and nominal concord involves a distinct mechanism.

(1) a. John runs/*run.
     b. This/*these book is good.

This paper presents a novel asymmetry between agreement and nominal concord regarding multi-valuation, i.e., when one element is in a dependency with two other elements, thus receiving two values. In the schematic configuration in (2), Probe in need of a value stands in the dependency with two Goal elements with values. The asymmetry I will argue for is in (3). An asymmetry like this might indicate a heterogeneous analysis of agreement and nominal concord; however, I will put forward an analysis that is compatible with the unified treatment of concord and agreement.

(2) Goal$_1$ [val$_1$]   Goal$_2$ [val$_2$]   Probe [?]

(3) **Multi-Value Asymmetry**: when N is valued by multiple [SG] values, it is spelled out as singular; when T is valued by multiple [SG] values, it is spelled out as plural.

In Section 2 I present a multi-valuation case in the nominal domain that involves nominal right node raising (NRNR) (Shen 2016, to appear). In Section 3 I present different multi-valuation cases in the verbal domain that involve right node raising (Grosz 2015) and composed plurality in Nocte (Gluckman 2015). Section 4 lays out my proposal accounting for the asymmetry. Section 5 concludes the paper by suggesting future research directions.

2 Multi-Valued N

This section presents data from nominal right node raising constructions (NRNR) and argues that NRNR involves a multi-valued nominal.

2.1 Nominal Right Node Raising

Shen (2016) observes that although the intended reference of the subject in (4) is two students, the head noun is required to be singular. Throughout the paper, the predicate *are a couple* is used to make sure that the

subject refers to two individuals and each conjunct is singular. The same pattern has been found in English, German, Dutch, Icelandic, Polish, Serbo-Croatian, Bulgarian, and Greek among other languages.

(4)   a.   This tall and that short student are a couple.
      b.   * This tall and that short students are a couple.
            Intended meaning: 'This tall student and that short student are a couple.'

Shen assumes a multi-dominance account for NRNR. See Shen (2016) for the detailed analysis and Shen (to appear) for arguments for the analysis. I present a sample derivation in (5). In (5a) the subject *this tall and that short student* involves two conjoined DPs with two sets of demonstrative-num-adj while the head noun is structurally shared[1]. Both num heads carry the valued singular features [SG]. Demonstratives, adjectives, and nouns carry unvalued features [__]. In (5b), the num head in the first conjunct values the unvalued features in the first conjunct, and the num head in the second conjunct does the same in the second conjunct. As a result, the multi-dominated head noun *student* is valued by two singular values, i.e., multi-valued. What is important for our purpose is that the multi-valued noun is spelled out as singular.

(5)   a. this tall and that short student   b. this tall and that short student
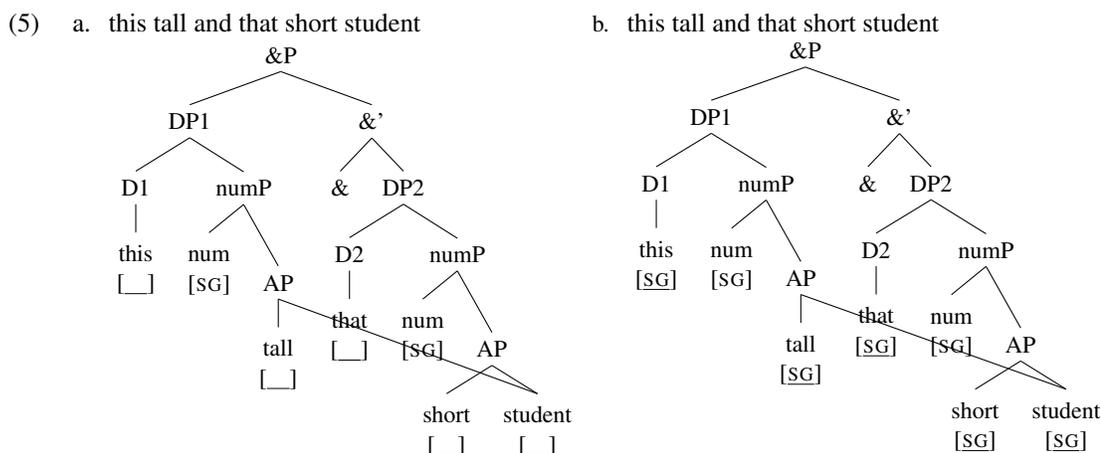
## 2.2 NRNR does not involve across-the-board movement

Apart from multi-dominance, two other analyses have been proposed for right node raising constructions, namely the across-the-board movement (ATB) analysis and the ellipsis analysis. Before moving onto multi-valuation cases in the TP domain, I would like to address potential alternative accounts for NRNR. In Shen (to appear) I presented arguments against the ellipsis analysis. The licensing conditions of NRNR are distinct from those of NPE across languages. In this section, I argue against the ATB movement analysis with NRNR data involving mismatch.

According to the ATB analysis of RNR (Ross 1967, Sabbagh 2007, among others), sentences like (6) start with two full sentences with identical objects (e.g., *apples*). Then the object DPs move from their base-generated positions to a ConjP adjoined position. Similarly, an ATB analysis of NRNR would assume a structure in (7) where two full DPs are conjoined and the singular nominals are moved to the ConjP

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[1]Note that theoretical choice of analyses of APs is not important for the current purpose. The multi-dominance account for NRNR is compatible with theories where AP is adjoined to NP or sits in the specifier position of NP.

adjoined position. Although this analysis can generate the NRNR string, it suffers from several problems. The ATB movement analysis for RNR has been argued against given its island insensitivity and for allowing P-stranding in languages where P-stranding is generally banned (Barros and Vicente 2009). Here I provide empirical evidence against an ATB movement analysis of NRNR.

(6) John likes but Mary hates apples.
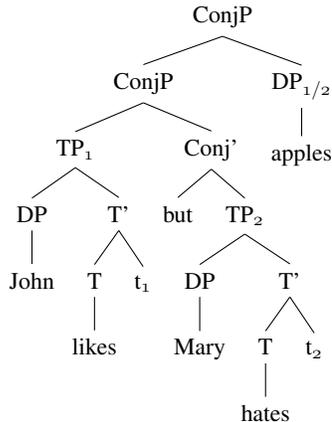
(7) One tall and one short student are ...
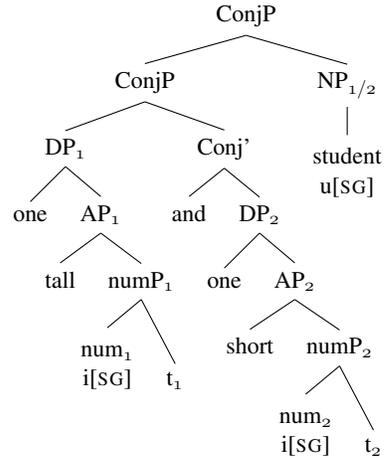
When the two DPs in NRNR differ in number value, the shared nominal agrees with the linearly closest value, i.e., closest conjunct agreement. In (8), when the first conjunct is singular and the second is plural, the shared nominal shows plural marking. When the first conjunct is plural and the second is singular, the shared nominal is marked as singular. This pattern can be accounted for under the multi-dominance analysis: the shared noun agrees with two num heads with different number values. The conflict between the two values postpones the valuation to the PF and after linearization the value on the linearly closest num head gets copied to the nominal in the PF.

(8) a.   One tall and ten short students know each other.
     b.   * One tall and ten short student know each other.
     c.   Ten tall and one short student know each other.
     d.   * Ten tall and one short students know each other.

The CCA pattern can not be straightforwardly generated under the ATB movement analysis according to which the derivation starts with one nominal in each conjunct. There are two potential derivations. If the feature valuation precedes the ATB movement as is shown in (9), the nominals are moved to the ConjP adjoined position without a number value. Since the ConjP ends up with a plural value (given that the predicate shows plural agreement), the nominal at the ConjP adjoined position should get the plural value regardless of the order of the two conjuncts. Sentences in (8) show that this is not borne out. If the feature valuation precedes the ATB movement as is shown in (10), the nominals get the values at their base generated position, resulting in two distinct nominals. ATB movement of distinct elements is blocked, which would predict that mismatch in NRNR is ruled out completely, contrary to the fact. If a late insertion framework of morphosyntax is assumed, the nominals with different values can be seen as feature bundles {[singular] STUDENT} and {[plural] STUDENT}. The feature bundles then get moved to the ConjP adjoined position as a unified feature bundle {[singular] [plural] student} which would be spelled out as a plural noun regardless of the order of the two conjuncts, again contrary to the fact. Thus I conclude that an ATB movement analysis

for NRNR cannot be maintained. It is worth noting that the nominal right node raising construction in Bulgarian can be accounted for under the ATB movement analysis. As is predicted by the second derivation outlined above, mismatches between the two conjuncts are forbidden in Bulgarian NRNR. See Harizanov and Gribanova (2015) for the detailed analysis.

(9) ten tall and one short student know each   (10) ten tall and one short student know each
     other   other
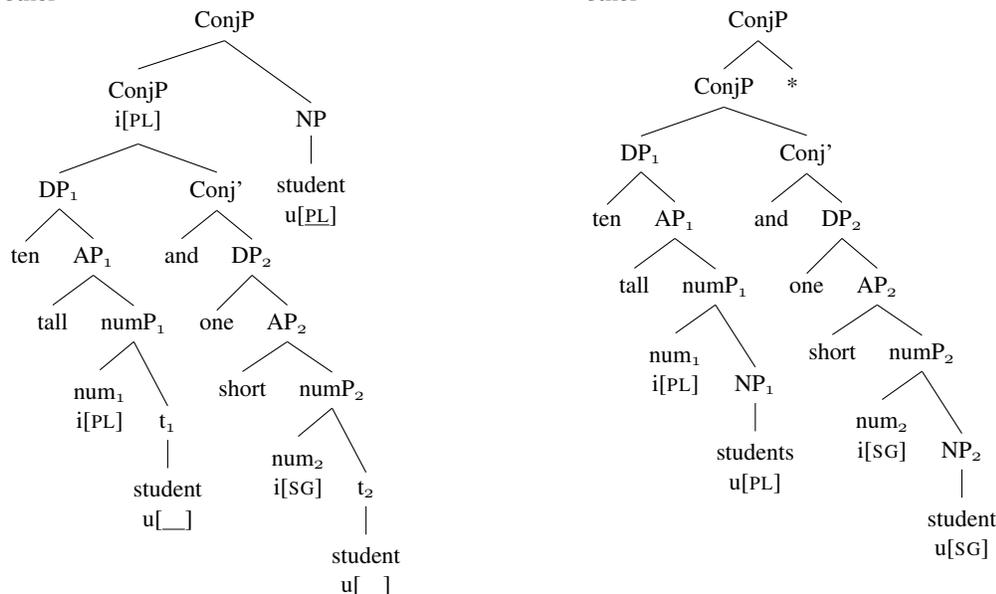
Based on the discussion above, NRNR involves a multi-valued N and when a noun is valued by two singular goals, it is spelled out as singular as shown in (11).

(11)   Goal$_{[SG]}$ Goal$_{[SG]}$ Noun$_{[SG]}$
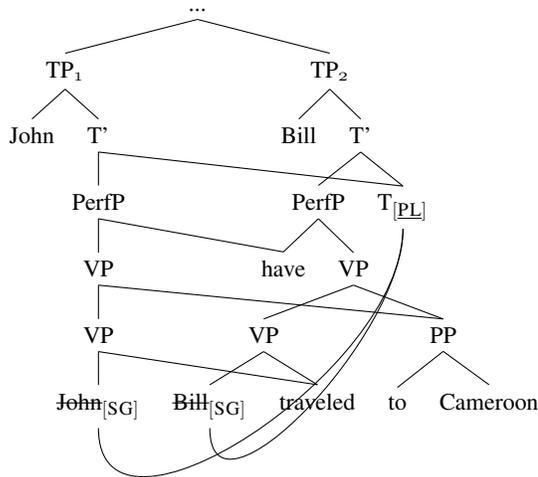
3 Multi-Valued T

3.1 TP RNR

Postal (1998), Yatabe (2003), and Grosz (2015) observe a summative agreement pattern in (12) where the auxiliary *have* shows plural agreement despite that both of the embedded subjects (*Bill* and *John*) are singular. Grosz notes that languages including Western Armenian, Standard Gujarati, Hebrew, Italian, Austrian German, and Czech show summative agreement in RNR.[2]

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[2]Note that the acceptability of summative agreement in (12) is subject to inter-speaker variation. At least three experiments have been conducted by Yatabe (2003), Grosz (2015), and Barros and Vicente (2011). The results show that there is no significant difference between the singular agreement and the summative agreement, with the average

(12) Sue is proud that Bill$_{[SG]}$ and Mary is glad that John$_{[SG]}$ have$_{[PL]}$ traveled to Cameroon.

Grosz (2015) argues for a multi-dominance analysis for the summative agreement in (13) where the T merges with both PerfPs and agrees with both the embedded subjects. Following this analysis, the T in TP RNR is multi-valued by two singular values. What is important here is that the multi-valued T in (12) is spelled out as plural. One can immediately see the difference between multi-valuation in the NP domain and the TP domain.

(13)

3.2 Composed Plural in Nocte

Multi-valuation does not only occur in RNR constructions. Gluckman (2015) observes that in Nocte the marker -*e* used on intransitive verbs in sentences with 1st person plural subjects in (14a) is also used on the transitive verbs in sentences in which the subject is 1st person singular and the object is 2nd person singular (14b)[3]. Gluckman notes that similar phenomena are observed in Karuk (Hokan), Yimas (Papuan), Wayampi (Tupí-Guaraní), Mapudungun (S.A. isolate), Bolinao (Austronesian), Tongva (Uto-Aztecan), Anindilyakwa (Australian), and Colloquial Ainu (Ishikari dialect). What is important is that in (14b), neither the subject nor the object is plural and yet the verbal marker is plural.
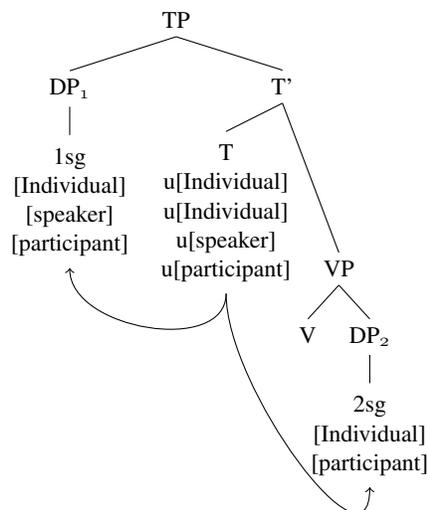
(14) a. ni   roantang rang- ka **-e**.
          1$_{[PL]}$ always   asp- go -1$_{[PL]}$.
          'We always go.'
      b. nga   -ma   nang hetho **-e**.
          1$_{[SG]}$ -nom 2$_{[SG]}$ teach -1$_{[PL]}$.
          'I shall teach you.'

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around 2 on a 5 point scale in Barros and Vicente (2011) and around 2.5 on a 5 point scale in Grosz (2015). Following Barros and Vicente (2011), Grosz (2015) suggests that the singular agreement involves an ellipsis analysis of RNR. Brian Dillon (p.c.) suggests that the string *Bill and Mary's* in (12) creates an illusory controller for the plural agreement; further experimental evidence is needed.

[3] Apart from this pattern, Nocte also shows a person hierarchy 1>2>3 where the the verb shows 1sg agreement in a sentence where the subject is 2sg and the object is 1sg. See Gluckman (2015) for a detailed analysis.

Gluckman proposes that Nocte has both subject agreement and object agreement and that the *-e* marker is a local portmanteau that spells out both the subject and the object agreement. In particular, the plural marking in (14b) is a 'composed plural' with two singular arguments. In (15), the probe T has two individual features, one speaker feature, and one participant feature. It first agrees with the 2nd person singular object and checks one individual feature and the participant feature. The probe then agrees with the 1st person singular subject and checks the other individual feature and the speaker feature. The checked features are identical to the 1st person plural; thus, the same morphological marker is used.

(15)

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                          TP
                 ┌─────────┴─────────┐
               DP₁                   T'
                │              ┌──────┴──────┐
               1sg             T
           [Individual]   u[Individual]
            [speaker]     u[Individual]
           [participant]   u[speaker]
                          u[participant]    VP
                                         ┌──┴──┐
                                         V    DP₂
                                               │
                                              2sg
                                          [Individual]
                                          [participant]
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As is shown in this section, both the TP RNR in a variety of languages and the local portmanteau in Nocte-like languages involve multi-valuation, and the T heads valued by two or more singular features are spelled out as plural as shown schematically in (16). Comparing with the multi-valued NP in (11), we can clearly see an asymmetry between the TP domain and the NP domain in (17).

(16)   Goal$_{[SG]}$ Goal$_{[SG]}$ T$_{[\underline{PL}]}$

(17)   **Multi-Value Asymmetry**: when N is valued by multiple [SG] values, it is spelled out as singular; when T is valued by multiple [SG] values, it is spelled out as plural.

4 Deriving the asymmetry

4.1 Proposal

The feature dependency in the TP domain is generally argued to involve the process Agree. Whether the feature dependency in the NP domain also involves Agree or some distinct mechanism is an ongoing debate (see Baker 2008, Danon 2011, Carstens and Diercks 2013, Norris 2014). The cross-linguistic cases in previous sections showcase the Multi-Value Asymmetry between the NP domain and the TP domain, which may indicate that the mechanisms behind feature valuation of N and feature valuation of T are distinct. In

this section I argue for an account for the asymmetry that is compatible with the unified analysis of predicate-argument agreement and nominal concord. Rather than different mechanisms, I attribute the asymmetry to different feature set-ups of N and T. Following the idea in Gluckman (2015), I propose that T heads have two unvalued number features. Note that this assumption differs from Gluckman in that I assume a traditional singular/dual/plural feature inventory rather than the Individual features. Furthermore, I propose that Ns have only one unvalued number feature. The feature set-ups are schematized in (18). The spell-out rules I assume are in (19) where one single instance of the singular feature is spelled out as singular, and multiple instances of singular features and any instance of plural features are spelled out as plural.

(18)   a.   N = [Num:__]
       b.   T = [Num:__, Num:__]

(19)   a.   [SG] ↔ singular
       b.   [SG, SG] ↔ plural
       c.   [PL, SG] ↔ plural
       d.   [PL, PL] ↔ plural

4.2 Derivation

Before deriving the asymmetry laid out above, it is necessary to spell out the assumptions I follow in addition to the proposed feature set-ups. I assume that the morphological agreement and concord are reflexes of Agree, i.e., a unified treatment of argument-predicate agreement and nominal concord. I follow Chomsky (2000, 2001) and Bhatt and Walkow (2013) in assuming a two step Agree process. Match: the probe first MATCHES with the goal to ensure feature identification. Valuation: the feature on the probe gets VALUED by that on the goal. I assume it is a functional head NUM that carries valued number features; other elements like determiners, adjectives, and nominals come with unvalued number features.

In the NRNR case in (20) where a nominal is valued by two singular features, the unvalued feature on the head noun matches with the unvalued features on both the adjectives, establishing a feature identification. The unvalued feature on *tall* matches with and gets valued by the valued feature [SG] on NUM_1; the unvalued feature on *short* does the same with NUM_2 as is shown in (20b). Since both the adjectives now have [SG], the head noun in principle can get two [SG]s from the adjectives. However, since the head noun only has one unvalued number feature, only one of the two [SG]s can get copied onto the head noun. In this case, the two values are the same, it is trivial which [SG] gets to the head noun in the end in (20c)[4]. As a result, the multi-valued noun is spelled-out as singular according to the spell out rules in (19).[5]

(20)   a.   One $\text{NUM}_{1[\text{SG}]}$ tall$_{[\_\_]}$ and one $\text{NUM}_{2[\text{SG}]}$ short$_{[\_\_]}$ student$_{[\_\_]}$ are a couple.
       b.   One $\text{NUM}_{1[\text{SG}]}$ tall$_{[\text{SG}]}$ and one $\text{NUM}_{2[\text{SG}]}$ short$_{[\text{SG}]}$ student$_{[\_\_]}$ are a couple.
       c.   One $\text{NUM}_{1[\text{SG}]}$ tall$_{[\text{SG}]}$ and one $\text{NUM}_{2[\text{SG}]}$ short$_{[\text{SG}]}$ student$_{[\text{SG}]}$ are a couple.

On the T side, Grosz (2015) argues for a multi-dominance analysis for the summative agreement in (21a) (see (13) for the structure). The multi-dominated T head matches with both embedded subjects *Bill* and *John*, each of which has a [SG] in (21b). Just like the multi-dominance structure in NRNR, the T head is valued by two [SG] values simultaneously. Since as I proposed the T head has (at least) two unvalued

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[4]One way to implement this process is that the valuation is postponed to the PF and the linearly closest [SG] gets copied to the head noun.

[5]The proposal also works if the head noun skips the unvalued features on the adjectives and matches with the valued features on the NUM heads.

number features, it can host these two values, namely one [SG] from *Bill* and one [SG] from *John*. The T head with two instances of [SG] is thus spelled out as its plural form in (21c).

(21)　a.　Sue's proud that Bill and Mary's glad that John have travelled to Cameroon.
　　　b.　Sue's proud that **Bill**$_{[SG]}$ and Mary's glad that **John**$_{[SG]}$ **have**$_{[\_\_,\_\_]}$ travelled to Cameroon.
　　　c.　Sue's proud that **Bill**$_{[SG]}$ and Mary's glad that **John**$_{[SG]}$ **have**$_{[SG,SG]}$ travelled to Cameroon.

For the composed plurality in Nocte and Nocte-like languages, I adopt the essence of Gluckman (2015)'s analysis shown in (15). As I proposed, the T head has two unvalued number features: it first matches with and gets one [SG] value from the 2nd person singular object in (22b). Then T gets another [SG] valued from the 1st person singular subject in (22c). The two [SG] values are realised as the plural form of T.

(22)　a.　Subject$_{[SG]}$ T$_{[\_\_,\_\_]}$ Object$_{[SG]}$
　　　b.　Subject$_{[SG]}$ T$_{[\mathbf{SG},\_\_]}$ **Object**$_{[SG]}$
　　　c.　**Subject**$_{[SG]}$ T$_{[SG,\mathbf{SG}]}$ Object$_{[SG]}$

As is shown above, despite the apparent asymmetry between predicate-argument agreement and nominal concord regarding multi-valuation, the current proposal can derive the multi-valuation asymmetry while maintaining a unified Agree analysis of agreement and concord.

The current proposal is further supported by mismatched cases of multi-valuation. As is already shown, mismatch cases in NRNR show closest conjunct agreement. (23a) and (23c) are well-formed since the head nouns show the same value as the second conjunct. (23b) and (23d) are unacceptable.

(23)　a.　One tall and ten short students know each other.
　　　b.　* One tall and ten short student know each other.
　　　c.　Ten tall and one short student know each other.
　　　d.　* Ten tall and one short students know each other.

The current proposal correctly predicts this CCA pattern for NRNR but not for TP RNR. When the two goals in NRNR are of the same value, the head noun gets that value. When the two goals that the head noun agrees with are of different values and given that the head noun only has one unvalued number feature (only one 'slot' for one value), the valuation operation can not proceed. Here I follow Bhatt and Walkow (2013) who argue that when the valuation cannot proceed in the syntax, it is postponed to PF where linearization occurs. The probe then will chose the value on the linearly closest goal that it matched with. I argue that the same happens in NRNR as is shown in (24): valuation of the head noun in mismatched NRNR cases is postponed to PF, when the value on the closest (second) NUM head is copied onto the noun; in other words, closest conjunct agreement.

(24)　a.　Ten tall$_{[PL]}$ and one short$_{[SG]}$ student$_{[\_\_]}$ are a couple.
　　　b.　Ten tall$_{[PL]}$ and one short$_{[\mathbf{SG}]}$ student$_{[\mathbf{SG}]}$ are a couple.

The mismatch case of multi-valued Ts is showcased in the TP RNR in English. The current proposal that Ts have multiple unvalued number features predicts that the T in mismatch cases would be spelled out as plural, the same as the matching cases. The value of the first goal would be copied onto the first number value 'slot' and the value of the second goal would be copied onto the second 'slot'. According to the spell-out rules, [PL,SG] is spelled out as plural. The derivation is schematised in (25). This prediction is borne out in (26), as the T *have* is plural regardless of the order of the two embedded subjects.

(25) a.   Sue's proud that the twins[PL] and Mary's glad that John[SG] have[__,__] traveled to Cameroon.
      b.   Sue's proud that the twins[PL] and Mary's glad that John[SG] have[PL,SG] traveled to Cameroon.
(26) a.   Sue's proud that the twins and Mary's glad that John have traveled to Cameroon.
      b.   Mary's glad that John and Sue's proud that the twins have traveled to Cameroon.

5 Conclusion

In this paper I present cross-linguistic data of NRNR, TP RNR, and composed plurality to argue for the multi-value asymmetry between the N and the T domain. I propose that the asymmetry can be accounted for by assuming that T heads have multiple unvalued number features while N heads have only one. The proposal is compatible with the unified Agree analysis of concord and agreement and it is further supported by the mismatch cases of multi-valuation.

The most obvious question for the current proposal is whether this difference in feature set-ups of Ns and Ts is inherent or accidental in the languages discussed above. If such difference is inherent to the categories, what is the deeper theoretical reason? If such difference is accidental, one should be able to find languages with plural Ns in NRNR and/or singular Ts in TP RNR. Grosz (2015) reports several languages showing singular Ts in TP RNR (Croatian, Dutch, Greek, and northern dialects of German). However, to make sure that the T heads have only one number feature in a language, one would need to rule out alternative analyses of TP RNR such as ellipsis and ATB movement. Grosz (2015) notes that Croatian may be such a language. On the N side, Harizanov and Gribanova (2015) observe that in Bulgarian (27) the head N in NRNR is plural. Russian seems to behave the same in certain cases. Thus Bulgarian and Russian might be candidates for languages with multiple features on Ns. However, Harizanov and Gribanova (2015) also note three restrictions on the plural pattern: the string $Adj_{[sg]}$ and $Adj_{[sg]}$ $N_{[pl]}$ is unacceptable when 1) the two conjuncts are mismatched in number value; 2) when the head noun is pluralia tantum; and 3) when the head noun has a suppletive plural form. All of these restrictions are unexpected if (27) involves the same structure as the NRNR in other languages I discussed above. Harizanov and Gribanova (2015) argue for an ATB movement analysis for Bulgarian NRNR. More research is required to identify a language with multiple number features on the N heads.

(27) a.   bălgarsk-i-ja i rusk-i narod-i
            Bulgarian-SG.M-the and Russian-SG.M nation-PL.
            'the Bulgarian and Russian nations'
            (two nations: a Bulgarian nation and a Russian nation)
      b.   părv-a-ta i posledn-a stranic-i
            first-SG.F-the and last-SG.F page-PL
            'the first and last pages'
            (two pages: a first and a last one)

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