

Feature Arithmetic in the Nominal Domain

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This dissertation looks into ways in which multiple number features interact with each other in agreement. In particular, I look at how an element behaves when it gets two matching or mismatching number features, i.e. multi-valuation. Although agreement and number features have been investigated extensively over the past 20 years and beyond, multi-valuation has not been looked into as a standalone phenomenon across languages and domains. Multi-valuation provides a novel perspective into how feature values are calculated and in turn the nature of features.

In Chapter 2, I look into multi-valuation in nominal right node raising constructions (NRNR). NRNR involves two DPs sharing one head noun (the pivot) e.g. *this tall and that short student*. A cross-linguistic survey reveals that, when the two DPs contain singular marked elements such as demonstratives, the pivot must be spelled out as singular in English, German, Dutch, Icelandic, Slovenian, Serbo-Croatian etc. When the DPs do not contain number marking elements, e.g. possessor DPs in English, the

pivot is spelled out as plural, e.g. *John's and Mary's students*. I argue that a multi-dominance analysis can derive this generalization if one assumes two conditions on multi-dominance. These two conditions can be used as evidence for the Agree-based analysis for DP internal agreement and against the morphological based analyses. I also lay out arguments against the Across-the-Board movement analysis and the ellipsis analysis for NRNR.

In Chapter 3, I report six acceptability judgment experiments regarding matching and mismatching NRNR in English. The first experiment shows some results that are not predicted by the analysis put forward in Chapter 2. After modification to eliminate potential confounds, results from Experiment 2-4 largely conform with the predictions with further assumptions. Experiment 5 and 6 reveal a strong influence from the linear order of feature values.

Chapter 4 extends the empirical scope of the investigation. In Russian, the pivot noun is spelled out as plural even when the two DPs that share the pivot both contain singular markings. To account for this surprising pattern, I extend the investigation to multi-valuation in the VP domain in T' RNR constructions as in *John is glad that Sue, and Bill is proud that Mary, have/has been to Cameroon..* In T' RNR, the auxiliary verb is shared by two clauses, thus agreeing with two singular subjects. In English, the pivot auxiliary can be spelled out as plural while not in languages like Dutch. Thus for

both multi-valued Ns and multi-valued Ts, we observe two agreement patterns across languages: when agreeing with two singular elements, multi-valued Ns must be spelled out as singular in some languages and plural in other languages; the same goes to multi-valued Ts. A survey looking into NRNR and T' RNR in 18 languages reveals that no language can show singular on the pivot T in T' RNR and plural on the pivot N in NRNR. This typological gap indicates a link between multi-valuation and agreement with hybrid nouns. Both phenomena follow the Agreement Hierarchy proposed in the 70s. This connection sheds new light on theories of morphological and semantic agreement and opens up new research venues.

Feature Arithmetic in the Nominal Domain

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A Dissertation

Submitted in Partial Fulfilment of the

Requirements for the Degree of

Doctor of Philosophy

at the

University of Connecticut

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APPROVAL PAGE

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This dissertation is for my grandmother, Yang Dongying.

献给我的奶奶，杨东英。

ACKNOWLEDGEMENTS

I know of three groups of people who would read the acknowledgements of a dissertation: 1. the author of the dissertation who kind of has to; 2. the people who think they might be mentioned; 3. the graduate students who are supposed to read the content chapters but instead procrastinate by reading the acknowledgements. I wrote the following text with all three groups in mind.

Anybody who knows anything about a dissertation knows that it is not one person's work in many ways. I may have put in several hundred hours into the questions, the ideas, and the text. The people I mentioned here put in ten times more than that into teaching, guiding, and forming me along the way. I can not thank them enough.

Susi is the chair of my committee (my Doktormutter) and I go to her for everything: honest opinions, critical assessments, fast and detailed feedbacks that are longer than the draft itself, as well as unconditional encouragement. I never felt insecure to talk to Susi about anything, relevant or irrelevant, and I probably never will. I especially enjoyed the moments where we disagree. Convincing her from time to time is a tough and rewarding job. **Everyone** needs a Susi on their committee.

I go to Jonathan for knowledge and clarity. He knows and understands just about everything. He would explain to me what I actually did in my work (I would then ask: “wait, what did I do?”). When he says “cool” in our meetings, I know I’m doing ok. Jonathan is also the best teacher I know. Everyone wants to teach like him. My MA supervisor Ad Neeleman said it best: “Jonathan is a star and he is very very nice.” You wish that you had a Jonathan on their committee and I have one.

I go to Željko for enthusiasm and support. His command of cross-linguistic data shaped the research style of this dissertation. Željko is the most enthusiastic person I know about linguistics. He’d get excited by your work and get you excited as well. A fraction of this enthusiasm spills over to his handwriting, the deciphering of which has become a mandatory skill for a UConn linguistics PhD. Željko goes out of his way to support the students. To him, it’s really family business. You want a Željko on your committee and on your side.

I go to Jon.G when I get confused about semantics and I get confused about semantics a lot. When that happens, I can always count on Jon.G to set me straight. I would present what I consider to be some impossible questions, and he would say “oh it’s this”. Then I spend the next half hour asking him to explain what ‘this’ is as if I were a 5 year old. If you want to write something smarter than you are, you need a Jon.G.

I go to Jon.S for the big picture. His patient guidance made Chapter 3 possible. I've always enjoyed our conversations even when his questions are challenging and I wish he was wrong but he was irritatingly right. Weeks and months later, I still found myself thinking about something he said (I'm still thinking about what 21st century linguistics is). I wish I chatted with him more at UConn. You should get a Jon.S on your committee to keep you honest and you should get him sooner rather than later.

In addition to the members of my committee, I thank other faculty members of UConn linguistics: Andrea Calabrese, Marie Coppola, Harry van der Hulst, Magdalena Kaufmann, Stefan Kaufmann, Diane Lillo-Martin, William Snyder. The same goes to the visiting professors and postdocs: Keiko Murasugi, Jairo Nunes, Mamoru Saito, Ian Roberts, Tammy Stark, Scott AnderBois, Matt Hall, Kathryn Davidson, Laura Kalin, Philipp Weisser, Kadir Gokgoz. I have always felt comfortable to knock on their doors and ask the most naive questions. Their lectures and talks made me a more rounded linguist. I thank Catalina Ritton and Tamara Cohen who actually run the department.

I thank my cohort: Troy Messick, Venessa Petroj, Koji Shimamura, Yongsuk Yoo. I don't care about what the others say, we are the best year. Thanks also go to students at UConn linguistics over the past 6 years: Akihiko Arano, Safet Beriša, Karina Bertolino, Ksenia Bogomolets, Pietro Cerrone, Hsu-Te Cheng, Christos Christopoulos, Jean Crawford, Marcin Dadan, Soyoung Eom, Paula Fenger, Yoshiki Fujiwara, Ana

Bastos Gee, Zhanna Glushan, Mary Goodrich, Corina Goodwin, Shengyun Gu, Gísli Harðarson, Ryosuke Hattori, I-Ta (Chris) Hsieh, Jungmin Kang, Pavel Koval, Elena Koulidobrova, Lily Kwok, Renato Lacerda, Sabine Laszakovits, Gabriel Martínez Vera, Irina Monich, José Riqueros Morante, Beata Moskal, Emma Nguyen, Hiromune Oda, Jayeon Park, Roberto Petrosino, Jelena Runić, Hiroaki Saito, Yuta Sakamoto, Tsuyoshi Sawada, Yoshiyuki Shibata, Peter Smith, Laura Snider, Adrian Stegovec, Brendan Sugrue, Aida Talić, Yuta Tatsumi, Abigail Elizabeth Thornton, Lyn Tieu, Neda Todorović, Alexandre L. Vaxman, Julio Villa-García, Shuyan Wang, Ting Xu, Jing (Emma) Yang, Chantale Yunt, Cynthia L. Zocca DeRoma. You are the UConn experience for me and I can not think of a better place to be educated, inspired, and motivated.

I'd like to thank all my informants who have tolerated me over the years. Some of you stopped replying to my emails and began to avoid eye contact for good reasons. I thank Enas Albasiri for Arabic; Hasmik Jivanyan for Armenian; Karina Bertolino, Cynthia DeRoma, Ronato Lacerda for Brazilian Portuguese; Vesela Simeonova for Bulgarian (simply the best); Fenna Bergsma, Ava Creemers, Paula Fenger, Beata Moskal for Dutch; Jonathan Bobaljik, Tamara Cohen, Heidi Harley, Laura Kalin, Heidi Klockmann, Lily Kwok, Diane Lillo-Martin, Troy Messick, Emma Nguyen, Pete Smith, Laura Snider, William Snyder, Brendan Sugrue, Abigail Elizabeth Thornton, Chantale Yunt for English; Karoliina Lohiniva for Finnish; Christos Christopoulos for Cypriot Greek; Alexander Goebel, Lisa Hofmann, Magdalena Kaufmann, Stefan Kaufmann,

Sabine Laszakovits, Ulrike Steindl, Philipp Weisser, Susi Wurmbrand for German; Hadas Kotek, Idan Landau for Hebrew; Dóra Kata Takács for Hungarian; Pietro Cerone, Roberto Petrosino, Sandra Villata for Italian; Marcin Dadan, Asia Pietraszko for Polish; Vanessa Petroj for Romanian; Ksenia Bogomolets, Vadim Kimmelman, Pavel Koval, Elena Koulidobrova, Nina Radkevich for Russian; Safet Beriša, Željko Bošković, Vanessa Petroj, Jelena Stojković, Aida Talić, Neda Todorovic for Serbo-Croatian; Veronika L Richtarcikova for Slovak; Marko Hladnik, Adrian Stegovec for Slovenian; Gabriel Martinez Vera for Spanish. Thank you for sharing your native knowledge with me. Let's keep in touch.

Chantale Yunt proofread this dissertation. You are the real MVP.

This dissertation was finalized at Goethe University Frankfurt. A welcome change of scenery after Storrs. My days at Frankfurt have been great on all levels. I would like to especially thank Caroline Fery, Katharina Hartmann, Heidi Klockmann, Johannes Mursell, Beata Moskal, Matthieu Segui, and Pete Smith. My gratitude also goes to all the students of the Graduate School on Nominal Modification: Priscilla Lola Adenuga, Fenna Bergsma, Abigail Anne Bimpeh, Astrid Göwein, Eugenia Greco, Lydia Grohe, Melanie Hobich, Mariam Kamarauli, Yat Han Lai, Carolin Reinert, Ruby Sleeman, Sanja Srđanović, Yranahan Traoré. Thanks bosses!

Over the years I have gained a lot from the linguistics community in general. I especially thank Vera Gribanova, Heidi Harley, Boris Harizanov, Andrew Nevins, and Jana Willer Gold for their comments and help with this dissertation.

It wouldn't be an exaggeration to say that climbing has kept me sane. Climbing and the carb-infested meals after it. My gratitude goes to Jonathan, Susi, and Leo who invited me to my first climbing trip to the Stone Age Rock Gym on May 12, 2014. Thanks to Jen and Kevin for the amazing experience at the best rock gym I've ever been. Thanks to Aida, Jayeon, and Yong for climbing with me regularly since the end of 2015 and to Laura, Yoshiki, Chris, Alex Göbel, and Brendan for the occasional company. I am especially in debt to Aida who has been my climbing partner since 2015. Climbing is what it is to me mainly because of Aida. She is this ball of positivity that has always always been supportive when I went to the dark side during climbing, dissertation, and job hunting. Hvala! I am lucky enough to have found people to climb with in Frankfurt. Bouldering with Melanie Hobich and Fenna Bergsma has become a weekly staple that I look forward to.

I am fortunate enough to call some great people my friends, who I can share my frustration, anxiety, and insecurity with. So thank you Aida, Lyn (my work mom), Paula (the Hug Machine), Troy, 陈宇, Yimei. I would have exploded if it weren't for you.

最后我要感谢我的父母，申晋鸣和刘源园。是你们一直以来的支持和鼓励让我在语言学这条路上走到了现在。

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Chapter 1

Introduction

Agreement phenomena have been some of the core research inquiries in generative linguistics. In the Minimalist framework, it is often understood as a dependence relation between an element in need of a feature value and an element with that feature value as in (1).

- (1) a. John_[SG] runs_[SG].
 b. this_[SG] book_[SG]

Much research has made headway regarding the nature of the agreeing process and the inner structure of phi features. At the same time, the research has also inspired new questions and for old questions to be looked at from a new perspective. For example, whether there is a difference in the nature of DP internal agreement (traditionally labeled *concord*) and argument-predicate agreement: what are the feature set-ups of demonstratives, articles, adjectives, and possessive pronouns; whether semantic agreement and morphological agreement are both required; whether phi features themselves

involve a elaborated structure; is there any correlation between the agreement on N and T in a given language. In this dissertation, I touch upon these issues and approach them from a novel perspective.

Despite the rich empirical findings in the previous literature on agreement, it has been largely discussed as a dependence relation between two elements (either in a matching relation in the constraint-based approach, or in a probe-goal relation in the derivation-based approach). Phenomena that diverge from this norm have been noted, but not been incorporated in the theory of agreement. In this dissertation, I focus on one of these ‘abnormal’ agreement phenomena: cases where one probe appears to stand in agreement relation with multiple goals, i.e. multi-valuation. I show that looking into multi-valuation phenomena provides insights to longstanding questions on agreement. This opening chapter introduces issues and concepts I will be discussing throughout the dissertation.

Nominal Right Node Raising and multi-dominance

Although multi-valuation can be observed in several constructions, the most familiar one is the Right Node Raising (RNR) constructions. RNR constructions involve an element (the *pivot*) being shared by two larger constituents. In (2), the pivot *apples* is shared by two conjoining clauses. RNR constructions have been discussed extensively in the literature (for a recent overview see [Citko \(2017\)](#)).

- (2) John likes but Mary hates *apples*.

Most previous research has focused on RNR cases where the pivot is shared by two clauses, largely because clauses allow more diagnostics and manipulations. Not much previous research has looked at RNR within the nominal domain (see [Harizanov and Gribanova \(2015\)](#)). I take a detailed look at Nominal Right Node Raising construction (NRNR) in (3) where the pivot noun *student* is shared by two DPs as opposed to two clauses. I show that existing approaches to RNR are not equally successful in accounting for the patterns in NRNR across languages. In English, we already see a curious pattern in (3) where the DPs with demonstrative+adjective are compatible with a singular pivot while possessor DPs like *John's and Mary's* only allow a plural pivot. This pattern is also observed cross-linguistically.

- (3) a. This tall and that short *student* are a couple.
 b. *This tall and that short *students* are a couple.
 c. *John's and Mary's *student* are a couple.
 d. John's and Mary's *students* are a couple.

Three major approaches have been proposed for RNR: (1) ellipsis (e.g. [Hartmann \(2000\); An \(2007b\)](#)), (2) across-the-board movement (e.g. [Sabbagh \(2008\); Harizanov and Gribanova \(2015\)](#)), (3) multi-dominance (e.g. [Abels \(2004\); Citko \(2005\)](#)). The recent discussion involves whether RNR constructions can receive a unified account and

whether all three approaches are necessary (see for example [Barros and Vicente \(2011\)](#); [Larson \(2012\)](#)). Diverging from the usual arsenal of syntactic operations, the nature of and the motivation for multi-dominance has been questioned. I will argue that NRNR construction requires a multi-dominance analysis and that both the across-the-board approach and the ellipsis approach encounter difficulty accounting for the NRNR patterns. Furthermore, NRNR does not only serve as an argument for the multi-dominance approach, it also sheds light on what constraints the operation of multi-dominance is subject to.

Nominal concord and agreement

Discussion of phi feature dependency in the literature has been focused on two types of phenomena: the dependency between the nominal and other elements in the DP e.g. adjectives, demonstratives, determiners, possessives, etc., and the dependency between arguments and predicates shown in (2). The former is traditionally labeled as *nominal concord* and the latter labeled as *agreement*. A longstanding debate is whether nominal concord and agreement involve the same operation or different processes (see ?? for an overview). Approaches arguing for different processes put nominal concord in the post-syntactic level while keeping predicate-argument agreement in the syntax. In nominal concord, the number feature stems on the NUM head and percolates up the phrase level of the DP. In PF, an Agr head is inserted to every element that shows nom-

inal concord. The feature on the DP is spread to each Agr head. See [Norris \(2014\)](#) for a recent analysis along this line. Approaches that unify nominal concord and predicate-argument agreement assume that the syntactic Agree operation is behind both of these phenomena.

In the analysis of NRNR, I argue that the singular pivot is the result of the multi-dominance structure and that multi-dominance is subject to an Agree requirement where the pivot must undergo Agree with the sharing elements. The effect of this requirement is observed across languages. Take (3) for an example: the demonstratives show agreement with the head noun and the singular pivot is allowed in NRNR in (4a); meanwhile, the possessor DPs in English do not agree with the possessee and the singular pivot is disallowed in (4c). Given that multi-dominance is a syntactic operation and is sensitive to agreement, this requirement puts agreement also in syntax, thus indirectly arguing against the post-syntactic approach to nominal concord.

Multi-valuation on Ns and Ts

NRNR involves multi-valued Ns. In Chapter 2, I argue that the singular pivot noun in English and other languages results from multi-valuation. In Chapter 4, I show that there are languages where the multi-valued N is spelled out as plural (e.g. Russian). Thus, multi-valued Ns show two patterns: the distributive agreement (singular) and the summative agreement (plural).

Apart from Ns, multi-valuation is also observed on Ts. [Grosz \(2015\)](#) and [Gluckman \(2016\)](#) make important observations regarding T' RNR and local portmanteau. In both constructions, the T is valued by multiple arguments. In Chapter 4 of the dissertation, I take a detailed look into the T' RNR construction in (4). Following [Grosz \(2009, 2015\); Kluck \(2009\)](#), I assume that the plural verb involves a multi-valued T in (4b). I draw from literature on Stripping to argue that the singular verb in (4a) is also a result of multi-valuation. In English, both singular and plural multi-valued Ts are allowed, i.e. both distributive and summative agreement patterns are observed on multi-valued Ts.

- (4) a. John's glad that Mary, and Bill's proud that Sue, **has** been to Cameroon.
- b. John's glad that Mary, and Bill's proud that Sue, **have** been to Cameroon.

I conduct a cross-linguistic survey on number marking on multi-valued Ns and Ts. It is discovered that although some languages show the same agreement pattern on the two multi-valued targets (both distributive or summative), multi-valued Ns can show different number marking from multi-valued Ts. In English, for example, Ns with two singular values must be spelled out as singular while Ts with two singular values can be spelled out as plural, as is in (5). Curiously, mismatch in the opposite order is not attested among the 20 languages in the survey; no language shows plural marking on multi-valued Ns and singular marking on multi-valued Ts. I propose the generalization in (6). Treating multi-valuation on different agreement targets has revealed a typologi-

cal pattern that requires an explanation.

- (5) a. This tall and that short student are a couple. (distributive agreement)
 - b. John's proud that Sue and Bill's glad that Mary have been to China. (summative agreement)
- (6) Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also distributive agreement and not summative agreement.

The Agreement Hierarchy

The generalization on multi-valuation in (6) is similar to a generalization that at least goes back to [Corbett \(1979\)](#): the Agreement Hierarchy. Hybrid nouns that can show either semantic agreement or syntactic agreement have been widely observed. In (7), for example the hybrid noun *committee* can control either singular (morphological) agreement or plural (semantic) agreement on the verb. Demonstratives, on the other hand, can only show singular agreement.

- (7) a. This committee has gathered.
- b. This committee have gathered.

[Corbett \(1979, 2000, 2006\)](#) proposes the hierarchy in (9). Positions on the right hand

side of the scale are more likely to show semantic agreement whereas the positions on the left hand side of the scale are more likely to show morphological agreement. As is illustrated in (8), the demonstrative *this* can only show morphological agreement, whereas the predicate *has/have* can show semantic agreement. This implication relation is monotonic; there is no such language where a position shows semantic agreement and the position to its right can only show morphological agreement.

$$(8) \quad \begin{array}{ccccccccc} \text{attributive} & - & \text{predicate} & - & \text{relative pronoun} & - & \text{personal pronoun} \\ & \leftarrow \text{morphological/singular agreement} & & & & & \text{semantic/plural agreement} \rightarrow \end{array}$$

I propose that multi-valuation is also compatible with the hierarchy if we treat the summative agreement in multi-valuation as semantic agreement and the distributive Agreement as morphological agreement. Toward the end of Chapter 4, I provide conceptual and empirical evidence for the link between summative agreement and semantic agreement, as well as that between distributive agreement and morphological agreement.

Structure of the dissertation

Chapter 2 focuses on the nominal right node raising constructions. A detailed cross-linguistic survey reveals a cross-linguistic generalization regarding number marking on the pivot noun in NRNR in (9). I argue for a multi-dominance analysis for the singular pivot and propose two requirements on the process of multi-dominance. This analysis

presents a challenge for the morphological theory of nominal concord and argues for the syntactic agree theory of nominal concord.

- (9) Generalization on NRNR: The singular pattern appears when the sources show morphological agreement with the pivot.

Chapter 3 reports six experiments conducted with a 7 point Likert scale task and a forced choice task. The experiments largely confirmed the observations made based on informal surveys. At the same time, I propose potential explanations for the surprising patterns observed from the experiments.

Chapter 4 goes beyond the nominal domain and treats multi-valued Ts on the par with multi-valued Ns. Two agreement patterns have been observed on multi-valued Ns and Ts: distributive agreement and summative agreement. A typological generalization is proposed regarding the number marking of elements that are valued by multiple singular goals in (10). This generalization poses a challenge for previous approaches to multi-valuation. I draw a connection between multi-valuation and the Agreement Hierarchy and propose that the generalization regarding multi-valued Ns and Ts can be treated as an Agreement Hierarchy effect.

- (10) Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also dis-tributive agreement and not summative agreement.

At the end of Chapter 4 I discuss possible cases of multi-valued adjectives and determiners. I show that although the cross-linguistic patterns pose a challenge for the connection between multi-valuation and the Agreement Hierarchy. This anomaly results from the alternative structures that share the same surface strings, but do not involve multi-valuation.

Chapter 5 summarizes the findings and claims throughout the dissertation and discusses novel questions stemming from the research on multi-valuation.

Chapter 2

Nominal Right Node Raising

2.1 Introduction

This chapter focuses on one type of multi-valuation construction, namely, Nominal Right Node Raising (NRNR). In general, Right Node Raising constructions have been observed and discussed from early days of generative linguistics ([Ross \(1967\)](#); [Hankamer \(1971\)](#); [Postal \(1974\)](#)) and usually involve a conjunction where one element is shared by the two conjuncts. For example in (11), two clauses are conjoined and the object *apples* is shared by the two clauses. I will follow the literature and label the shared element the *pivot*. In all examples, the pivot will be in *italic*.

- (11) John likes and Mary hates *apples*.

In NRNR, the nominal element is shared by two conjoined DPs, as in (12). Note that when both of the DPs are singular, as indicated by the demonstrative *this* and *that*, the pivot noun can only be spelled out as singular; I will label this pattern as the singular pattern. On the other hand, in examples like (13), the pivot must be spelled out as plural;

I will label this pattern as the plural pattern. For the rest of the chapter I will label the sharing elements in each conjunct as *sources*, e.g. *this* and *that* are sources in (12) and *John's* and *Mary's* are sources in (13). Note that the string *John's and Mary's student* itself is not ungrammatical with a singular reference. The relevant reading here is the one where John has one student and Mary has a different student, i.e. the conjunction phrase refers to two individuals. When relevant, I use predicates like *are a couple* to ensure this reading. Unless stated otherwise, judgments throughout the chapter are given based on this reading.

- (12) a. This and that *student* are a couple.
- b. *This and that *students* are a couple.

- (13) a. *John's and Mary's *student* are a couple.
- b. John's and Mary's *students* are a couple.

This chapter takes the contrast between (12) and (13) as the starting point. I present a cross-linguistic survey regarding NRNR and propose a generalization in Section 2.2. Section 2.3 proposes a multi-dominance analysis. Section 2.5 evaluates other potential accounts and shows why they fall short. Section 2.6 discusses the theoretical consequences of the proposed analysis. Section 2.7 will go over previous literature on similar constructions. Section 2.8 concludes the discussion and points out directions for future research.

2.2 A cross-linguistic survey on Nominal Right Node Raising

2.2.1 NRNR is sensitive to the sources: a case study in English

As (12) and (13) show, the availability of the singular and the plural pivot in English is sensitive to the type of sources. As is shown from (14) to (18), the singular pattern emerges when the sources are demonstratives (14), demonstratives+adjectives (15), numerals+adjectives (16), indefinite articles+adjectives (17), definite articles+adjectives (18). On the other hand, the bare possessive DPs (19) allow only the plural pivots. NRNR with bare possessive pronouns in English involves independent complications. The judgments of (20) seem to vary significantly across speakers. I postpone the discussion of these cases to later.

- (14) a. This and that *student* are a couple. Demonstratives

b. *This and that *students* are a couple.¹

(15) a. This tall and that short *student* are a couple. Demonstratives + Adjectives

b. *This tall and that short *students* are a couple.

(16) a. One tall and one short *student* are a couple. Numerals + Adjectives

b. *One tall and one short *students* are a couple.

¹ Note that one might think the sentence in (14) involves a pronominal use of the demonstrative as is *This is tall*. I argue that this is not the case since in English this pronominal use can only refer to inanimate items and the subjects involved in the sentences above are all human.

- (17) a. A tall and a short *student* are a couple. Indefinite articles + Adjectives
 b. *A tall and a short *students* are a couple.
- (18) a. The tall and the short *student* are a couple. Definite articles + Adjectives
 b. *The tall and the short *students* are a couple.
- (19) a. *John's and Mary's *student* are a couple. possessive DPs
 b. John's and Mary's *students* are a couple.
- (20) a. %His and her *student* are a couple. bare possessive pronouns
 b. %His and her *students* are a couple.

The insertion of the adjectives plays a role as well. After the insertion of the adjectives, the singular pivots become acceptable and the plural pivots become ungrammatical for the possessive pronouns and the possessive pronouns+adjectives (21), possessive DPs + adjectives (22). Note however that the insertion of the adjectives in (15) does not reverse the pattern across the board; the pattern for the case of demonstratives remains the same. All the sources with adjectives in them require the singular pivot.

- (21) a. His tall and her short *student* are a couple. possessive pronouns + adj
 b. *His tall and her short *students* are a couple.
- (22) a. John's tall and Mary's short *student* are a couple. possessive DPs + adj
 b. *John's tall and Mary's short *students* are a couple.

2.2.2 A cross-linguistic picture

In the previous section, I have shown with data from English that the number marking on the pivot in NRNR is sensitive to the coordinating DPs. We cannot use only English to decide what sets bare possessive DPs apart from others, i.e. it is not clear what properties of the DPs condition the number marking on the pivot. Table 2.1 presents a survey done with the sentences above in English, German, Dutch, Icelandic, Polish, Serbo-Croatian, and Slovenian.² In the table, SINGULAR means only the singular pivot is accepted and the plural pivot is ruled out (the singular pattern). PLURAL means only the plural pivot is accepted and the singular pivot is ruled out (the plural pattern). N/A means the combination is impossible for independent reasons; for example Polish and Serbo-Croatian lack articles. The cells that contain both singular SG and plural PL allow singular in some cases but plural in other cases among the source variants. Note that the scope of the survey is restricted only to pre-nominal sources. Post-nominal sources will be discussed briefly in Chapter 4.

	English	German	Dutch	Icelandic	Polish	Serbo-Croatian ³	Slovenian
Dem	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR
Dem+Adj	SINGULAR	SINGULAR	SINGULAR	N/A	SINGULAR	SINGULAR	SINGULAR
Num+Adj	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR
Ind+Adj	SINGULAR	SINGULAR	SINGULAR	SINGULAR	N/A	N/A	SINGULAR
Def+Adj	SINGULAR	SINGULAR	SINGULAR	SINGULAR	N/A	N/A	N/A
Poss DP+Adj	SINGULAR	SINGULAR	SINGULAR	N/A	SINGULAR	SINGULAR	SINGULAR
Poss Pron+Adj	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR	SINGULAR
Poss Pron	TO BE DISCUSSED	SINGULAR	PLURAL	SG PL	SG PL	SINGULAR	SINGULAR
Poss DP	PLURAL	PLURAL	PLURAL	PLURAL	SG PL	SINGULAR	SINGULAR

Table 2.1: Cross-Linguistic Distribution

² The survey also includes Italian, Spanish, Brazilian Portuguese, and Cypriot Greek. Except for the post-nominal possessives that fall out of the scope of investigation here, the Romance languages pattern with German and thus are compatible with the generalization to be spelled out. Cypriot Greek patterns with Slovenian.

As is shown in the table, the singular pattern is observed in most of the cases.

In English, German, Dutch, and Icelandic, the bare possessive DP shows the plural pattern. Out of this set of languages, only Dutch shows the plural pattern in the bare possessive pronoun condition. Icelandic bare possessive pronouns as well as Polish bare possessive DPs and possessive pronouns show a split pattern that will now be discussed.

The split cases in Icelandic and Polish provide important evidence for the main factor involved in the distribution of the singular vs. plural patterns. In Icelandic, when the sources are 1st or 2nd person possessive pronouns, the pivot must be singular, as shown in (23). On the other hand, when the sources are 3rd person possessive pronouns, the pivot must be plural as in (24). One distinction between the 1st and 2nd person possessive pronouns and the 3rd person possessive pronouns in Icelandic is agreement: as shown in (25) - (27), only the 1st and 2nd person possessive pronouns show number agreement with the noun, while the 3rd person possessive pronouns do not.

(23) Icelandic agreeing possessive pronouns: Singular Pattern

- a. Minn nemandi og þinn *nemandi* eru sætt par.
my.sg student and your.sg *student.sg* are cute couple
'My student and your student are a cute couple.'
- b. ?Minn og þinn *nemandi* eru sætt par.
my.sg and your.sg *student.sg* are cute couple
'My and your student are a cute couple.'
- c. *Minn og þinn *nemendur* eru sætt par.
My.sg and your.sg *student.pl* are cute couple

‘My and your students are a cute couple.’

(24) Icelandic non-agreeing possessive pronouns: Plural Pattern

- a. Hans nemandi og hennar *nemandi* eru sætt par.
he.gen student and she.gen *student* are cute couple
‘His student and her student are a cute couple.’
- b. *Hans og hennar *nemandi* eru sætt par.
he.gen and she.gen *student* are cute couple
‘His and her student are a cute couple.’
- c. Hans og hennar *nemendur* eru sætt par.
he.gen and she.gen students are cute couple
‘His and her students are a cute couple.’

- (25) a. minn nemandi
my.sg student.sg
‘my student’

- (26) a. þinn nemandi
your.sg student.sg
‘your student’

- b. mírir nemendur
my.pl student.pl
‘my students’

- b. þírir nemendur
your.pl student.pl
‘your students’

- (27) a. hans/hennar nemandi
his/her student.sg
‘his/her student’

- b. hans/hennar nemendur
his/her student.pl
‘his/her students’

A case to consider is when one source agrees and the other one does not. In (28), the first source is a 3rd person possessive pronoun in Icelandic which shows agreement and the second source is a 2nd person possessive pronoun which does not. Only the singular pivot is allowed. (29) shows that when the first source shows agreement and the second does not, only the singular pivot is allowed.

- (28) a. Hennar nemandi og þinn nemandi eru sætt par.
Her student and your.sg student are cute couple.

b. ?Hennar og þinn *nemandi* eru sætt par.
Her and your.sg student are cute couple.

c. *Hennar og þinn nemendur eru sætt par.
Her and your.sg students.pl are cute couple.
'Her student and your student are a cute couple.'

Icelandic

(29) a. þinn nemandi og hennar nemandi eru sætt par.
Your.sg student and her student are cute couple

b. ?þinn og hennar nemandi eru sætt par.
Your.sg and her student are cute couple

c. *þinn og hennar nemendur eru sætt par.
Your.sg and her students are cute couple
'Your student and her student are a couple.'

Icelandic

The second split pattern involves two possessive constructions in Polish: the adjectival possessives that agree with the possesum and the genitive possessives that do not show agreement. The agreeing possessive shows the singular pattern in (30) and the non-agreeing genitive shows the plural pattern in (31).

- (30) Polish agreeing adjectival possessive: Singular Pattern

 - a. Janowy i Marysiny *student* *są* para.
John's.sg and Mary's.sg student are couple
'John's student and Mary's student are a couple.'
 - b. ??Janowy i Marysiny *studenci* *są* para.
John's.sg and Mary's.sg students are couple
'John's student and Mary's student are a couple.'

(31) Polish non-agreeing genitives: Plural Pattern

- a. *Jana i Marii *student* są para.
John.gen and Mary.gen *student* are couple
'John's student and Mary's student are a couple.'
- b. Jana i Marii *studenci* są para.
John.gen and Mary.gen *students* are couple
'John's student and Mary's student are a couple.'

These split cases in Polish and Icelandic provide important clues regarding the conditioning factors in the distribution of singular vs. plural agreement in NRNR; agreement between the sources and the pivot correlates with the availability of the singular pattern. Polish adjectival possessives and Icelandic 1st and 2nd person possessive pronouns show agreement with their possessums. As sources in NRNR, they only allow the singular pattern. In all the languages in Table 2.1, the demonstratives only allow the singular pivot and all the demonstratives show agreement with the nouns, e.g.: *this student* and **this students*. The sources containing adjectives allow only singular pivots in all the surveyed languages. In almost all the languages, the adjectives show agreement with the pivot nouns. As for the sources that license the plural patterns, the possessive DPs in English, German, Dutch, and Icelandic do not show agreement with the possessums e.g. *John's student* vs. *John's students*, nor do Dutch possessive pronouns. In precisely these cases, the singular pivot is unavailable. The possessive DPs and the possessive pronouns in other languages show agreement with the possessums and the pivot under these sources in NRNR must be singular.

Based on these cross-linguistic observations, I propose the generalization in (32).

- (32) **Generalization on NRNR:** The singular pattern appears when the sources show agreement with the pivot.

Given that adjectives agree with the nouns they modify and allow only the singular pivot in NRNR in almost all the languages surveyed, the adjectives in English presents a special case in that there is no overt morphological agreement between adjectives and nouns they modify, as in *tall student* vs. *tall students*, but at the same time, it is clear that the adjectives as sources allow only singular pivots as shown in cases like (21) repeated here as (33). Thus I assume that English adjectives do agree with the head noun, however, this agreement relation is not realized in morphology.

- (33) Possessive pronouns + Adjectives

- a. His tall and her short *student* are a couple.
- b. *His tall and her short *students* are a couple.

I provide one piece of evidence: in contrast to possessive DPs, demonstratives and adjectives behave identically in the distribution of anaphoric *one*: *this one*, *this nice one* vs. **Peter's one*. If we assume that *one* must occur in the presence of agreement features, this contrast shows that such features are present in adjectives despite the lack of a visible morphological exponent, but not in possessive DPs. Note that this is not a

common assumption in the literature on *one* substitution, but one needs to distinguish possessors and adjectives one way or the other. For analyses on licensing conditions of *one* and its relation with NP ellipsis, see [Llombart-Huesca \(2002\)](#); [Lobeck \(1995\)](#); [Kester \(1996\)](#); [Elbourne \(2001\)](#); [Harley \(2007\)](#).

The cross-linguistic survey reveals a generalization regarding agreement in NRNR and the next section proposes an analysis for NRNR to derive the Generalization on NRNR.

2.3 Deriving the generalization on NRNR

This section proposes an analysis of NRNR that can account for the distribution of the singular and the plural pattern.

2.3.1 Assumptions

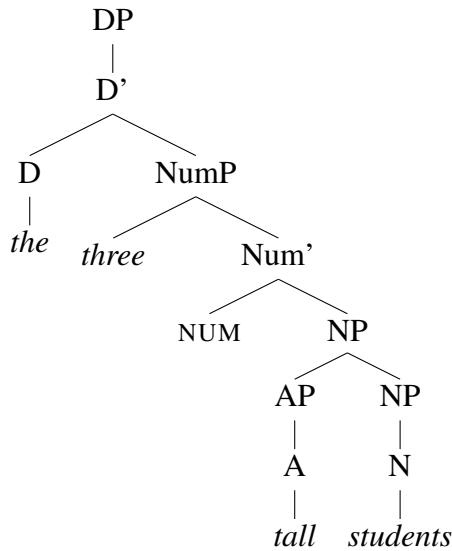
Before specifying my proposal to account for the Generalization on NRNR, I spell out the assumptions I take in this section.

2.3.1.1 Structure of nominal phrases

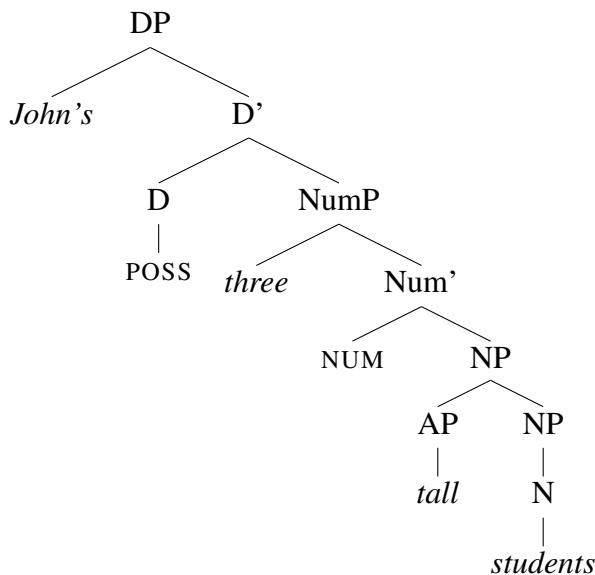
Based on the linear order of determiners, numerals, adjectives, and nouns, I assume the structure in (34a) for *the three tall students* (see [Longobardi \(2001\)](#) for an overview of the DP structure) and (34b) for *John's three tall students* where *John's* sits in the SpecDP and the D is the POSS head. As shown, I follow [Ritter \(1991\)](#); [Heycock \(2005\)](#);

[Landau \(2015\)](#) in assuming a number projection NumP headed by NUM above the NP and that the numerals are base generated in the SpecNumP position.

- (34) a. the three tall students



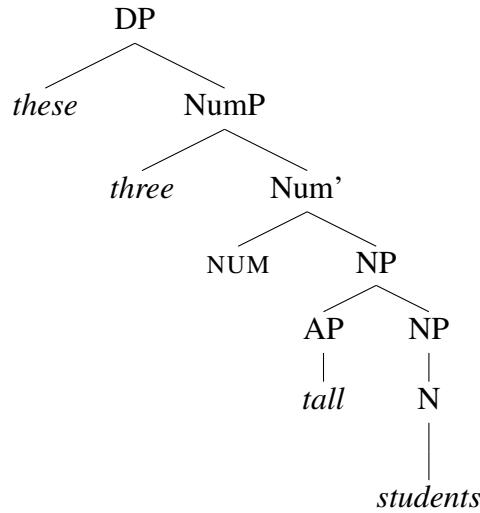
- b. John's three students



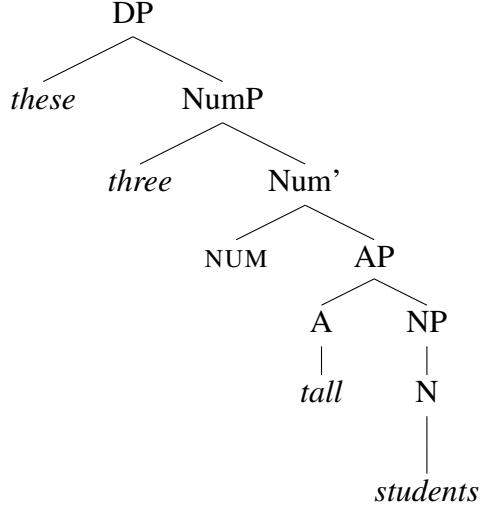
Regarding the position of adjectives, there are at least three existing proposals: 1. the adjective phrase adjoins to the the NP as is shown in (35) (see [Delsing \(1993\); Alex-](#)

iadou and Wilder (1998); Bošković (2013)); 2. adjectives head their own projection AP which takes NP as complement as is in (36) (see Abney (1987); Androutsopoulou (1995); Despić (2011)); 3. the adjective phrases occupy in the specifier positions of a variety of functional heads between N and D as is shown in (37) (see Cinque (1993)). I will not further discuss the arguments for and against each of these analyses, as the analysis I will propose for NRNR is compatible with all three analyses. For the remainder of the chapter I will assume the adjunction analysis illustrated in (35).

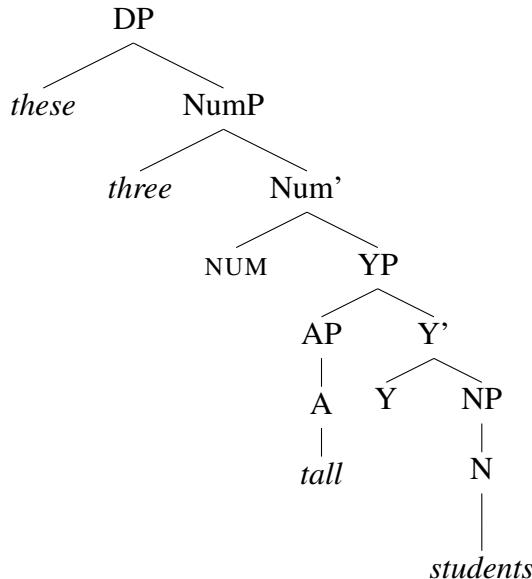
(35) [DP *these* [NumP *three* NUM [NP [AP *tall*] [NP *students*]]]]



- (36) [DP *these* [NumP *three* NUM [AP [A *tall*] [NP *students*]]]]]



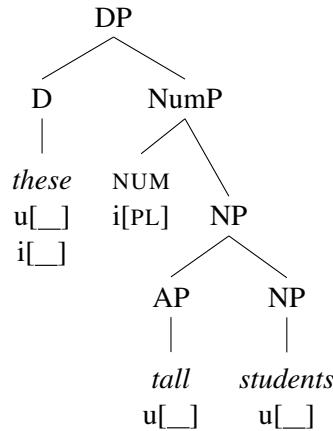
- (37) [DP *these* [NumP *three* NUM [YP [AP *tall*] [Y [NP *students*]]]]]



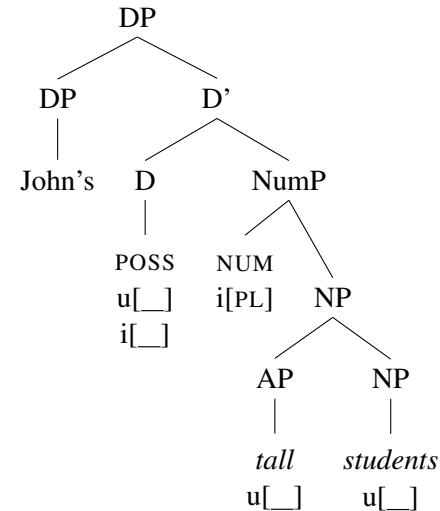
As for the number feature configurations within the DP, I assume that the interpretable features are relevant to interpretation whereas the uninterpretable features are spelled out in morphology (see Wurmbrand (2012a, 2017a); Preminger (2014)). In DPs, a valued interpretable number feature originates on the NUM head and the mor-

phological number markings on nouns, adjectives, demonstratives, and articles indicate uninterpretable features on these elements which are eventually valued by NUM. Although the interpretable number feature starts on NUM, it is also present at the top projection of the nominal domain, i.e. the phase head, since it is necessary for the semantic information to be visible to the DP-external elements e.g. in cases where a verb requires a semantically plural argument. (38) and (39) illustrate the DP structure that I assume. Note that the determiner *these* in (38) has two number features: one uninterpretable and one interpretable. The former is indicated by the morphological marking and the latter is due to the phase head status of D.

(38) these tall students



(39) John's tall students



2.3.1.2 DP internal agreement

The morphological dependency among phi-features within the nominal domain has traditionally been labelled as *nominal concord*. One ongoing debate involves whether a unified mechanism can be maintained that accounts for both predicate-argument agreement and nominal concord. Despite the different traditional labels, a body of literature argues that Agree is behind both predicate-argument agreement and nominal concord (Carstens (1991); Baker (2008); Schoorlemmer (2009); Danon (2011); Bošković (2013); Toosarvandani and van Urk (2013) a.o.). On the other hand, Norris (2012, 2014); Polinsky (2016); Bejar et al. (2015); Baier (to appear) argue for a non-Agree-based analysis for nominal concord. At this point, I will simply assume that nominal concord involves Agree without further discussion. Later in this chapter it will be clear that NRNR provides evidence for the Agree based approach to nominal concord and against the non-Agree based approach. There are many ways Agree can be implemented; for the sake of concreteness, I make the following assumptions. The readers are reminded that the general insight of the account will remain even if a different set of assumptions are adopted.

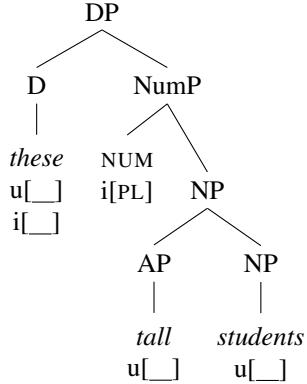
I follow Chomsky (2000) and Chomsky (2001); Bhatt and Walkow (2013) in assuming a two-step Agree process: Match and Value (*Agree* in Bhatt and Walkow (2013)). Match establishes a dependency relation between two features to ensure feature value identity, and occurs in syntax; it is therefore subject to syntactic locality

restrictions e.g., c-command.⁴ Value involves copying the feature value of a node to another node that it matches with. Value occurs in syntax when possible. When there is a reason for Value not to occur in syntax, it is postponed to PF. Like Match, Value in syntax is sensitive to syntactic locality conditions. Value postponed to PF is sensitive to the linear order. I follow [Pesetsky \(2000\)](#); [Pesetsky and Torrego \(2001, 2002, 2006\)](#) in assuming that two unvalued features can establish a matching relation which will be valued as the same when the value is available. I assume that Agree can proceed both upward and downward. For recent discussion on the directionality of agree, see [Baker \(2008\)](#); [Wurmbrand \(2012a,b, 2014\)](#); [Preminger \(2014\)](#); [Bjorkman and Zeijlstra \(2014\)](#); [Preminger and Polinsky \(2015\)](#) among others.

Combining the assumptions above, the DP *these three tall students* starts as (40). The unvalued uninterpretable number feature on N matches with that on A, which in turn matches with the valued, interpretable feature on the NUM head. The unvalued uninterpretable and interpretable features on D match with the NUM head as well in (41). In (42), the [PL] value on NUM head gets copied onto D, A, and N.

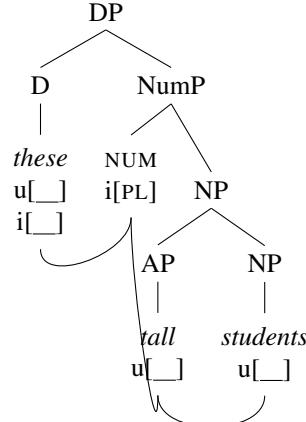
⁴ I assume that feature value identity can be established between two features even before valuation. This can be established, for instance, through a feature sharing mechanism as in [Pesetsky and Torrego \(2006\)](#).

(40)



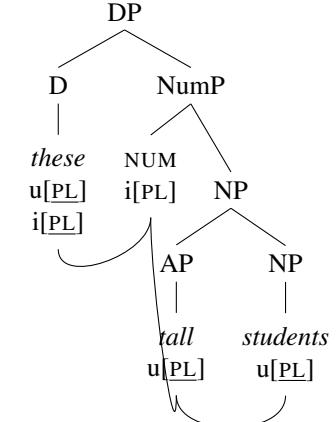
(41)

match



(42)

value



Note that a consequence of my assumption is that one DP could have multiple interpretable number features as in (42). This might not be the most natural feature configuration in terms of the interpretation of number features, but I will now show that semantic theories of number are compatible with the multiple number feature stacking configuration in (42).

[Sauerland \(2003\)](#) proposes that the plural does not have semantic content while the singular expresses the presupposition of the denotation of an atom or a mass. In this account, multiple plural features remain vacuous. Multiple singular features involve multiple instances of the same presupposition, which amounts to a single presupposition. The multiple interpretable number features within a DP are therefore not problematic. [Dowty and Jacobson \(1989\)](#) argues that the plural denotes a non-atomicity presupposition whereas the singular involves either an atomicity presupposition or is vacuous. Similar to Sauerland's account, Dowty and Jacobson's account also allows

multiple number features on a single DP, since both the singular and the plural feature are presuppositions. The DP structure and feature setup I assume in (42) are compatible with the presuppositional theory of number features in general, regardless of the specific implementation. [Verkuyl \(1981\)](#) and [Link \(1983\)](#) consider the plural feature to be a * operator with the denotation in (43a). Having two * operators in one DP is not different from having one * operator as is shown in (43b).

- (43) a. $*P(X) = 1$ iff there is a cover C of X with $P(x) = 1$ for every x in C.
- b. $*(*P)(X) = 1$ iff there is a cover C of X s.t. for all x in C, $*P(x) = 1$, iff
 there is a cover C of x s.t. for all y in C, $P(y) = 1$.

In sum, multiple semantic accounts for number features allow multiple number features on one DP and are thus compatible with the structure in (42).⁵ Despite the semantic accounts that allow multiple feature stacking without making a semantic difference, one might wonder whether there are languages with multiple number markings. Recognizing that this case is rare, [Corbett \(2000\)](#) notes that Breton, an endangered Celtic language in France, allows two plural markings in one DP. [De Belder \(2010\)](#) notes that ‘when a second plural morpheme is added, the agreement facts and the interpretation remain unaltered.’ See also [Kramer \(2016\)](#).

⁵ There are accounts of number features where iteration of the same features does make a difference, for example [Harbour \(2011\)](#).

2.3.2 Deriving the possible and the impossible singular pivot

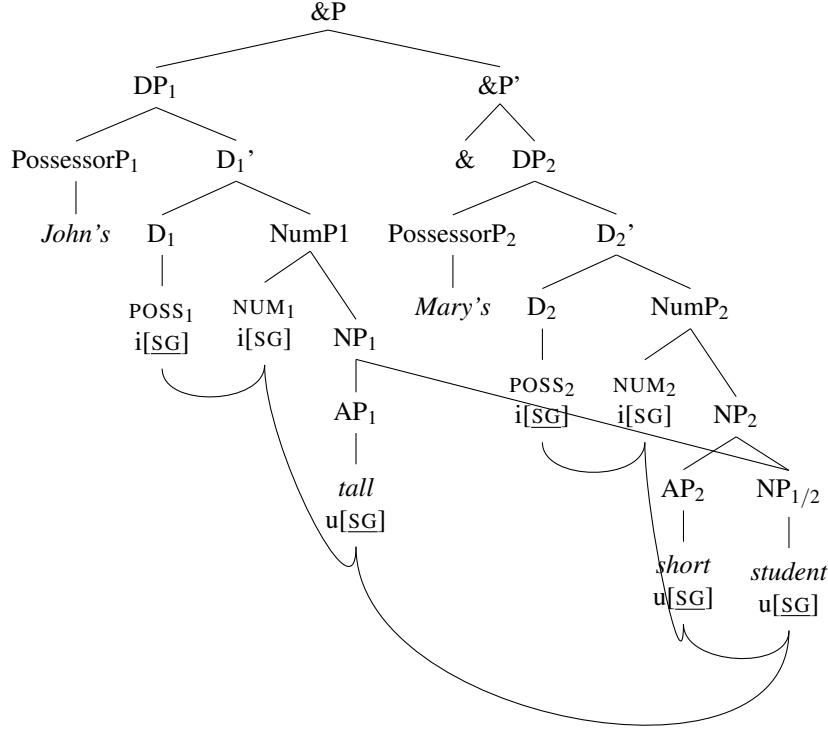
Having dealt with the assumptions involved in the agreement processes in a simple DP, this subsection will layout the account for the singular pivot in NRNR.

2.3.2.1 Deriving the possible singular pivot in NRNR

I propose a multi-dominance analysis for NRNR following [Moltmann \(1992\)](#); [Wilder \(1999\)](#); [Citko \(2005\)](#); [Gračanin-Yuksek \(2007\)](#) among many others. Multi-dominance has also been proposed for other phenomena such as gapping ([Citko \(2006\)](#)), Across-the-Board questions ([Vries \(2009\)](#)), parasitic gaps ([Kasai \(2007\)](#)), coordinated wh-pronouns ([Citko \(2013\)](#); [Zanon \(2015\)](#)), and summative agreement ([Grosz \(2015\)](#)). I follow the parallel merge analysis of [Citko \(2005\)](#). For now I assume the MD analysis, in [2.5](#) I will layout detailed arguments against alternative analyses for NRNR.

As illustrated in [\(44\)](#), the singular pivot in NRNR involves the structural sharing of the pivot (the NP *student*). The agreement proceeds in the same manner as in a simple DP except that now both the adjectives match with the noun simultaneously. The feature values on the NUM heads, which are SG in both DPs, are copied onto the determiners (POSS), adjectives, and the noun. The noun will carry two instances of the SG value which are spelled out as singular (*cf.* [Grosz \(2015\)](#), see more discussion in Chapter 4). Other cases where the singular pivot is possible undergo the same process.

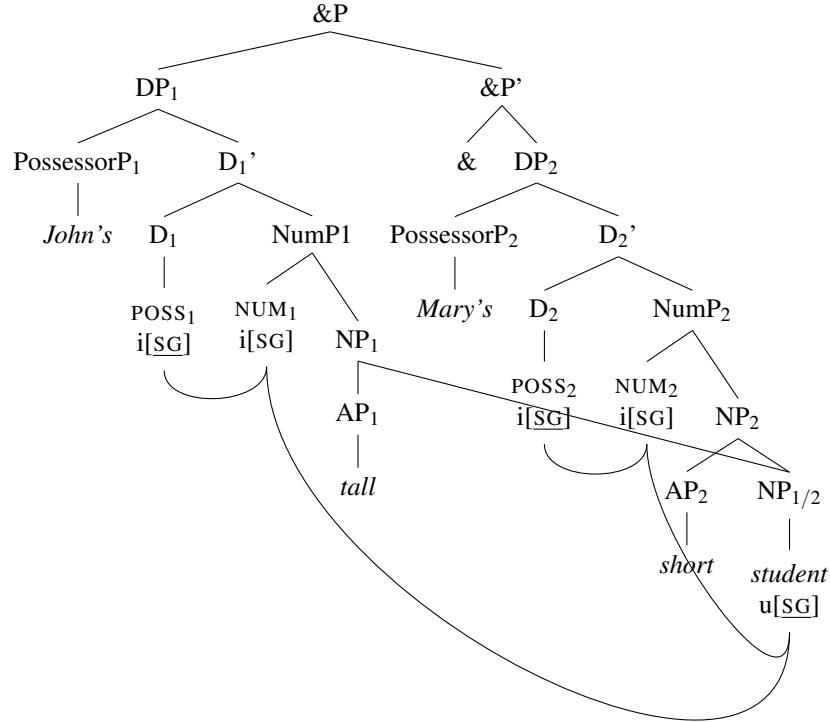
- (44) John's tall and Mary's short *student* are a couple.



The general insight of the account will remain even if agreement is handled technically in different ways. For example, the AP and the N both can Agree with the NUM head separately, rather than N agreeing with the AP as the middleman in (44). Another implementation in (45) assumes that the AP and the N do not Agree. The NUM heads in each source Agree with the noun directly. Note that with this implementation, adjectives in English do not Agree with the head noun. One can assume even in languages where the adjectives do show number dependency, this dependency is not done via Agree but a different concord process. Thus the Agree operation within the DP can be restricted to a head-head relation. For the sake of concreteness, I will continue using the implementation in (44) for the rest of the chapter and keep the assumption that the

phi feature on AP and NP are both valued via Agree.

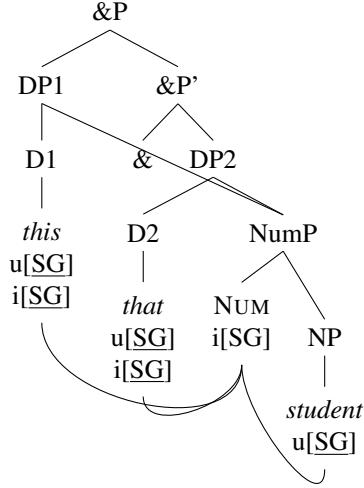
- (45) John's tall and Mary's short *student* are a couple.



In the bare demonstrative case in (46), the NumP is shared by the two D heads.

The NP gets its [SG] value from the NUM head. The two D heads also Agree with the NUM head and get the [SG] value. Note that the structure in (46) differs from that in (45) in that it is the NumP that is shared in (46) but not the NP. This is due to a constraint which is crucial to account for the impossible singular pivot under bare possessive DPs. I will introduce this constraint in the next subsection.

- (46) This and that *student* are a couple.



2.3.2.2 Deriving the impossible singular pivot in NRNR

I argue that the multi-dominance structure in (44) is unavailable in the cases where the singular pivot is impossible as in (47).

- (47) *John's and Mary's *student* are a couple.

I propose two constraints on multi-dominance in (48). The Agree constraint is motivated by the fact that the availability of the singular pivot is sensitive to the morphological agreement shown in the previous section. In the definition in (48a), the Agree constraint rules out the NRNR where the sources do not Agree with the pivot.

The MaxShare constraint is an economy condition on multi-dominance. The effect of this constraint is to maximize the size of the shared constituent, which can be understood as ‘reducing nodes when possible’. This constraint has been independently

proposed by [Citko \(2006\)](#) as ‘maximizing structure sharing constraint’ to account for Left Branch Extraction in Across-the-Board movement in Slavic languages.

(48) Constraints on Multi-Dominance

- a. Agree constraint: A node Z is shareable by X and Y if there is an Agree relation between X and Z and Y and Z.
- b. MaxShare: XP can be shared only if there is no YP such that YP dominates XP and YP is shareable, if the XP sharing structure and the YP sharing structure have identical interpretations.

One immediate question regarding the Agree constraint is whether this constraint extends to other cases of Right Node Raising, esp. in VP and CP domains in (49). According to the constraint, the grammaticality of sharing the DP *apples* and the CP *that Mike is here* indicates there is an Agree relation between these pivots and their sources. Thus the Agree relation needs to be extended beyond phi-agreement. If one assumes Case is assigned via Agree and that the CP argument in (49b) gets assigned a Case, RNR in (49) would meet the Agree constraint.

- (49) a. John likes and Mary hates apples.
 b. John thinks and Mary believes that Mike is here.

Although it is not clear whether the Agree constraint can be extended to all the RNR

cases, this is not necessarily a problem for the constraint. Note that the constraint is on multi-dominance, rather than RNR itself. A generalized Agree constraint on multi-dominance only predicts that the RNR cases that are derived from multi-dominance are subject to this constraint. Given that RNR has been argued to involve multiple derivations, multi-dominance, PF deletion, etc, ([Barros and Vicente \(2011\)](#)), cases of RNR that seemingly exempt from the constraint might be derived via other mechanisms e.g. PF deletion.

A note on MaxShare: Here I define *shareable* as non-distinct. In (50a), the non-distinct element between the two conjunctions is the DP *apples*, thus the DP is shareable as in (50b). Whereas in (51a), the non-distinct element between the two conjuncts is the VP *love apples*, thus the VP is shareable as in (51b). In (52a), the DP *apples* and the T *will* are both non-distinct. However, only the DP can be shared in (52b) because a distinct element, namely the verbs *love* or *hate*, intervene between the two non-distinct elements.

- (50) a. John loves apples and Mary hates apples.

- b. John loves and Mary hates *apples*.

- (51) a. John will love apples and Mary won't love apples.

- b. John will and Mary won't love *apples*.

- (52) a. John will love apples and Mary will hate apples.

- b. John will love and Mary will hate *apples*.

The contrast in (53) further supports MaxShare in NRNR.⁶ In (53a), the adjectives *tall* in both conjuncts are non-distinct and as a result, the NP containing the AP and the lower NP should be shared. On the other hand, given the distinct adjectives in (53b), sharing just the lower NP is acceptable. For now I will show how these two constraints on multi-dominance can derive the cross-linguistic generalization of NRNR. The motivation and theoretical consequences of these constraints will be discussed in more detail in Section 2.6.

- (53) a. ??John's tall and Mary's tall *student* are a couple.
- b. John's tall and Mary's short *student* are a couple.

To illustrate the impossibility of the singular pivot with non-agreeing sources, two derivations are presented in (54) and (55). In (54), the NP is shared by the two NumPs. The Agree constraint is met given that the i[SG] features on the NUM heads Agree with the uninterpretable feature on the noun. However the MaxShare constraint is not met since there are non-distinct constituents up along the structure. In (55), the MaxShare is met given that D' is the largest shareable node. But since there is no Agree relation between the PossessorPs and the POSS head, the Agree constraint is violated.⁷ As a result of the two constraints, none of the derivations involving non-agreement sources in NRNR are grammatical, thus the singular pivot is not possible in these cases. The

⁶ It's worth noting that although agreeing on the existence of the contrast in (53), native speakers show individual variations regarding how strong the contrast is.

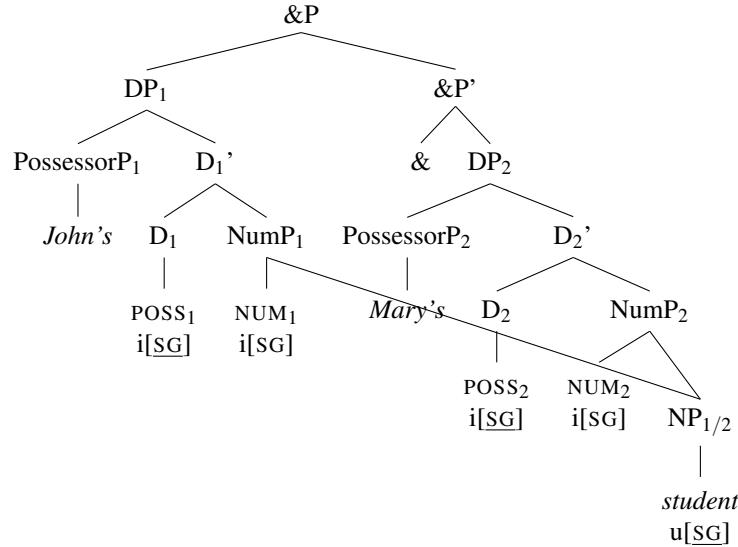
⁷ I do not assume a Spec head agreement relation between the possessive DP and the POSS head.

generalization in (32) is accounted for.

- (54) * John's and Mary's *student* are a couple.

MaxShare constraint: ✗

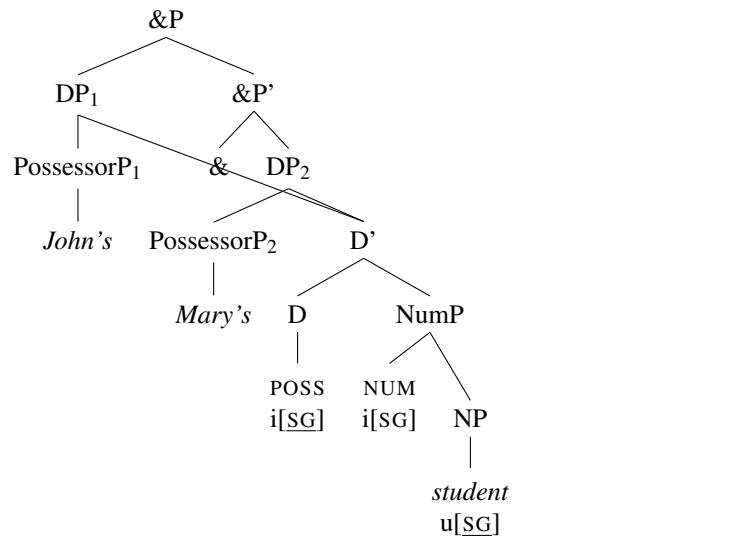
Agree constraint: ✓



- (55) * John's and Mary's *student* are a couple.

MaxShare constraint: ✓

Agree constraint: ✗



Now the question is *why* possessive DPs in English do not show agreement with the D head. There are at least two potential approaches. First, it could be that possessive DPs in English simply do not have the unvalued number features to be valued in the first place. It is possible that possessive DPs vary regarding their feature setup, given that in languages like Polish, possessive DPs do show number agreement with the possessums as we see above. Another approach involves the assumption that possessive DPs in the SpecDP have more structures which block external elements from agreeing into the possessive DPs. If the possessive DP is the complement of a functional head F (similar to a P head) as is shown in (56), then it follows that the PossessorP cannot get the phi feature values from the D head.

- (56) [DP [FP F [PossessorP John's]] [D [NumP]]]

The lack of Agree on possessive DPs can also be found in other cases. In Estonian, demonstratives can co-occur with possessive DPs. The possessive DP sits in between the demonstrative and the head noun. As is shown in (57), the demonstrative requires a phi feature and it always shows the same value as the head noun. The possessive DP, which sits below the demonstrative and above the noun, do not participate in this Agree relation with its own phi features. In other words, possessive DPs in Estonian do not agree. The data is taken from (225/226) [Norris \(2014\)](#).

- (57) a. see andme-te hulk
 this.SG.NOM data-PL.GEN amount.SG.NOM
 ‘this amount of data’ (Possessor = andme-te)
- b. nee-d Riigikogu saadiku-d
 this-PL.NOM parliament.SG.GEN ambassador-PL.NOM
 ‘these ambassadors of the parliament’

Assuming the DP structure in Estonian in (58) (combining (56) and the proposal in [Norris \(2014\)](#)), the demonstrative heads the DP and the possessive DPs is hosted by a functional head F. If the FP makes the phi features of the possessive DP inaccessible, the agreement pattern in (57) is accounted for.

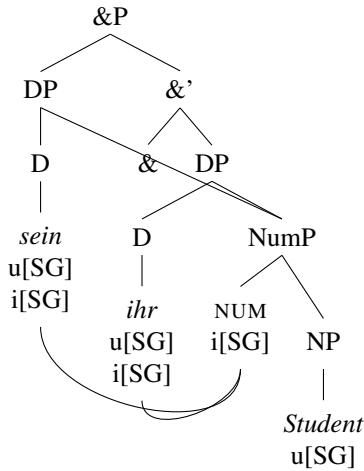
- (58) [Dem_{val1} [[FP F [PossessorP_{val2}]] [NUM [NP_{val1}]]]

Note that possessives are not ruled out as a category in NRNR. German pronominal possessives do show number agreement with the possessum, and are thus assumed to have an uninterpretable number feature u[] in addition to the i[].⁸ In the case of (59), only the singular pivot is allowed. Both the NP and the NumP can be shared. MaxShare requires that the largest shareable constituent, i.e. the NumP, to be shared. The D head agrees with the i[SG] on the NUM head and receives its [SG] value, satisfying the Agree requirement. The noun matches with and gets its value from the NUM head with i[SG].

⁸ Note that I only discuss the unvalued phi features on the possessive pronouns to be valued by the possessum. The possessive pronouns also come with the valued phi features of the possessors, e.g. *my*: 1st person singular. While I do not go into the details, the two sets of features need to be separated on the same node, since as far as I know, the two sets of features do not interact.

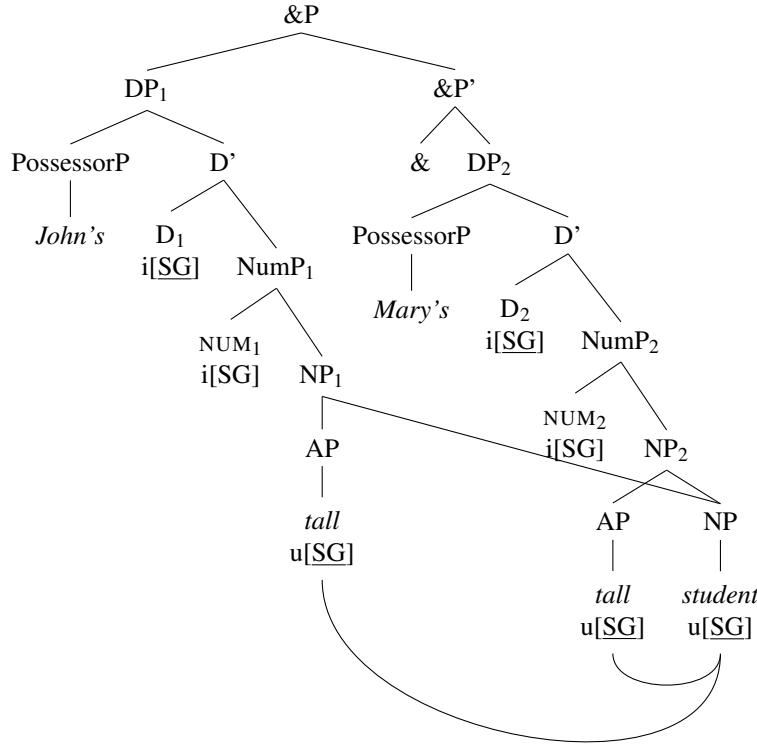
- (59) German agreeing possessive pronoun (possessive pronouns are D heads with u[_])

- a. Sein und ihr *Student* sind ein
His.masc.sg.nom and her.masc.sg.nom student.masc.sg.nom are a
Paar.
'His and her student are a couple.'
- b. MaxShare: ✓NumP
Agree: ✓- D(u[_, i[_]) ← NUM(i[SG])



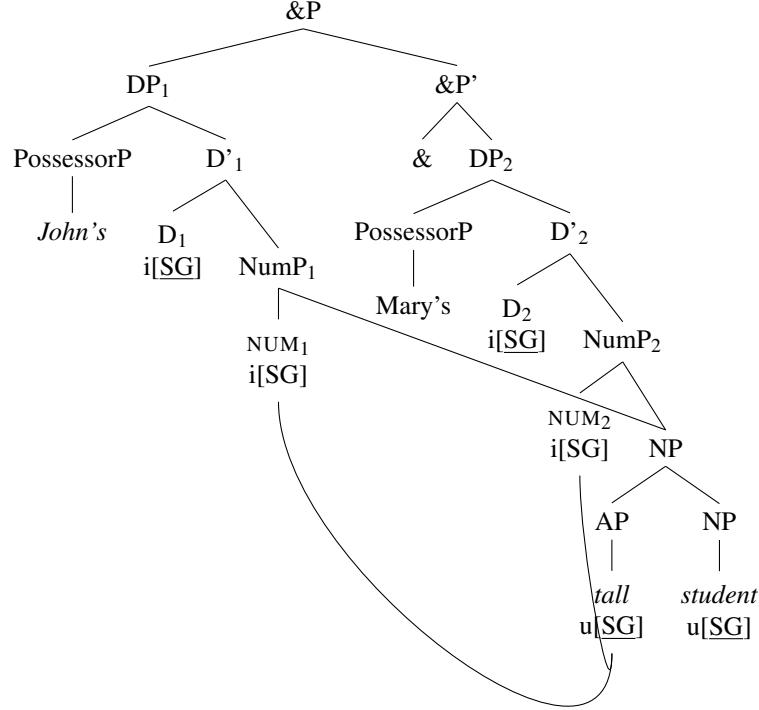
Another MaxShare effect The MaxShare requirement on sharing can be supported in cases such as (60). Possessive DP + adjective cases in English do not always successfully show the singular pattern. When the adjectives in the two DPs are identical, the sentence is not accepted, which is predicted by the MaxShare requirement. In the structure in (60), either the smaller NP, or the NP containing AP, or the NumP can be shared, given that the adjectives and the NUM heads in both conjuncts are identical. When it is the smaller NP that is shared, the Agree requirement is met since both the noun and the adjective have u[_] features. However, the sentence is ungrammatical, as the small NP is not the largest shareable constituent.

- (60) *John's tall and Mary's tall *student* (MaxShare not met)
 MaxShare: **X**- NP is not the highest shareable XP.



Similarly to (60), in (61), the candidates for sharing are the smaller NP, the NP containing the AP, and the NumP. In the structure in (61), the larger NP is shared by two NUM heads. They establish an Agree relation given that the adjectives have uninterpretable unvalued features *u[]*. The larger NP, however, is not the largest shareable constituent, since NumP could be shared as well.

- (61) *John's and Mary's *tall student* are a couple. (MaxShare not met)
 'John's tall student and Mary's tall student are a couple.'
 MaxShare: X- the NP containing the AP is not the highest shareable XP.

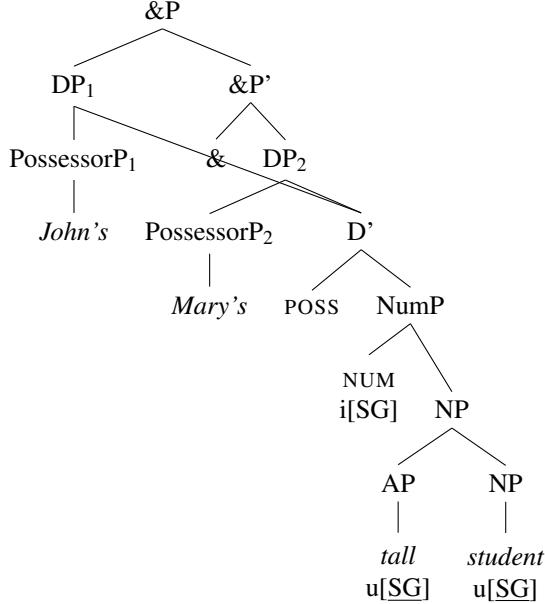


In (62), MaxShare is met since the D' is the largest shareable constituent.⁹ The Agree requirement, however, is not met. since there is no Agree relation between the possessive DPs and the D head. The NRNR construction is not possible.¹⁰

⁹ Note that I assume that D' can be shared. This is compatible with the bare phrase structure where the bar level and the phrase level are essentially the same. It is not compatible with theories where the bar level is invisible to the syntactic operations, see Bošković (2016) for relevant discussion.

¹⁰ Note here I follow Barker (1995) in assuming that the 's in English is not on D, see also Myler (2016).

- (62) *John's and Mary's *tall student*
 MaxShare: ✓ - D' is the largest shareable constituent.
 Agree: ✗ - no Agree between possessors and the D head.



In sum, assuming the MaxShare requirement, we correctly predict the ungrammaticality of (60) - (61). The combination of the Agree and the MaxShare requirement can account for the absence of singular pivots when non-agreeing PossessorPs are the sources in NRNR.

2.3.3 Deriving the possible and the impossible plural pivot

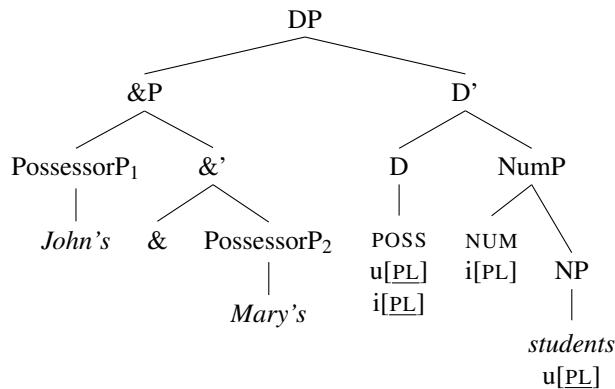
The previous section accounted for the correlation between the singular pivot in NRNR and the agreeing sources, as well as why the non-agreeing sources like English possessive DPs are not compatible with the singular pivot in (63a). The same constraints rule out other cases where the singular pivot is unavailable, e.g. the Icelandic 3rd person possessive pronouns in (24), the Polish non-agreeing genitives in (31), and the bare

possessive DP in German, Dutch, Icelandic.

- (63) a. *John's and Mary's *student* are a couple.
 b. John's and Mary's *students* are a couple.

The question arises why the non-agreeing sources allow the plural pivot as in (63b). I argue that the cases of plural pivots do not involve multi-dominance but a conjunction construction. Take the English bare possessive DPs in (63b) for example, the sentence with the plural pivot involves conjoined possessive DPs including *John's and Mary's* as is shown in (64). Note instead of two DPs that share an NP, (64) only involves one DP with one NUM head. Since the whole DP refers to two individuals, the NUM head carries the valued interpretable feature *i[PL]* which gets copied onto the D head and the noun *students*.

- (64) John's and Mary's *students* are a couple.



The relevant interpretation where John's student and Mary's student are a couple

is possible in (64). Note (64) also allows an interpretation where John and Mary share two students who are a couple. Below I show that the proposed structure in (64) coupled with the standard semantics of possessives can generate the right interpretations.

Following Partee (1983/1997) (see also Barker (1995); Partee and Borschev (2000); Vikner and Jensen (2002)), I assume the denotation of the POSS head in (65a). The POSS head takes a predicate and two individual arguments which stand in a possession relation¹¹. The denotation of *John's student* is shown in (65b).

- (65) a. $\llbracket \text{Poss} \rrbracket = \lambda P_{\langle e, t \rangle}. \lambda X. \text{Iota}(\lambda Y. P(Y) = 1 \text{ and } R(x)(y) = 1)$
 b. $\llbracket \text{John's student} \rrbracket = \llbracket \text{Poss} \rrbracket (\text{student})(\text{John}) = \text{there is a unique } y \text{ such that}$
 $y \text{ is a student and } R(\text{John})(y) = 1$ ¹².

To be compatible with the plural possessor and possessum, I assume that the R relation in the POSS head always comes with a double star operator (Beck (2000)). The denotation of the double star operator is in (66): A relation (R) between two individuals is true iff for all x in X there is a y in Y such that R holds of x,y and for all y in Y there is an x in X such that R holds of x, y. The denotation of *John's and Mary's students* is in (67).¹³

¹¹ For Partee, the relation R is a contextual variable that gets its value from the salient relation in the context. I will restrict the R relation as a possession relation here.

¹² Following Partee, I assume an iota operator derives the definiteness.

¹³ Assuming that the relation R always comes with the double star operator would not affect the interpretations of possessive phrases where one or both of the arguments of R are singular: 1) John's student; 2) John's students; 3) John's and Mary's student.

(66) $\llbracket \text{**R} \rrbracket(X)(Y) = 1$ if and only if $\forall x \in X \exists y \in Y R(x)(y)=1$ and $\forall y \in Y \exists x \in X R(x)(y)=1$

(67) $\llbracket [\text{John's and Mary's} [\text{Poss} [\text{students}]]] \rrbracket$ = a unique set of students such that each student has either John or Mary as their teacher, and John and Mary each have at least one student.

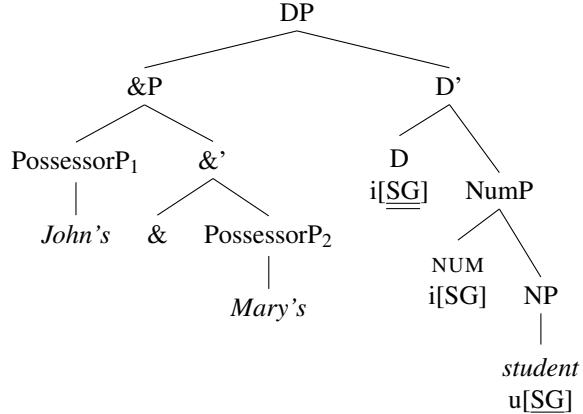
Assuming the denotation in (67), *John's and Mary's students* can either refer to a situation where John and Mary share multiple students or one where John has one or more students and Mary has one or more students. This prediction is correct. (68a) is judged true in the scenarios in (68b-c). Thus the structure in (64) can receive the target interpretation. The plural pivot in the possessive DP case is accounted for.

- (68)
- a. John's and Mary's students are a couple.
 - b. John and Mary share two students who are a couple.
 - c. John has one student and Mary has one student. The two students are a couple.

While (69) is grammatical, it can only have one interpretation, namely that John and Mary share a student who is tall. A possible paraphrase of the sentence is ‘John and Mary stand in a possession relation with one singular student, who is tall’. Since there is only one student, the only possible distribution is that the possessors share him/her. Crucially, the sentence in (70) cannot mean that John and Mary stand in a possession

relation with multiple students.

- (69) John's and Mary's student is tall.



- (70) *John's and Mary's student are tall.

As a result, sentences with the singular pivot in NRNR and those with the plural pivot involve two different structures; the former involve a multi-dominance construction and the latter involve a conjunction construction.¹⁴

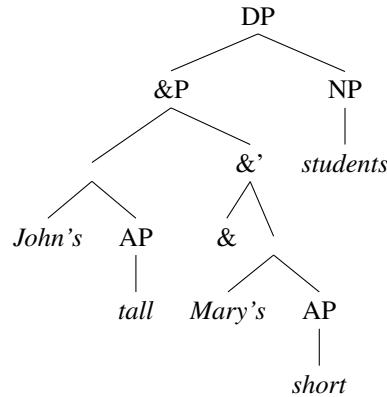
The next question then is why the cases where only the singular pivot is possible cannot have a conjunction structure and allow the plural pivot as well. There are two subcases that fall into this category. The first subcase involves sources with multiple elements as in (71). Since the conjunction requires the two conjuncts to be constituents

¹⁴ A related question involves the sentence in **i** where only one 's is used. There is no observed difference between **i** and **ii** regarding the agreement pattern under the relevant interpretation. One can argue that **i** also involves a conjunction structure as **ii**.

- i** John and Mary's students/*student are a couple.
- ii** John's and Mary's students/*student are a couple.

and the complex sources like *John's tall* do not form a constituent, the structure in (71) is ruled out.

- (71) * John's tall and Mary's short *students* are a couple.



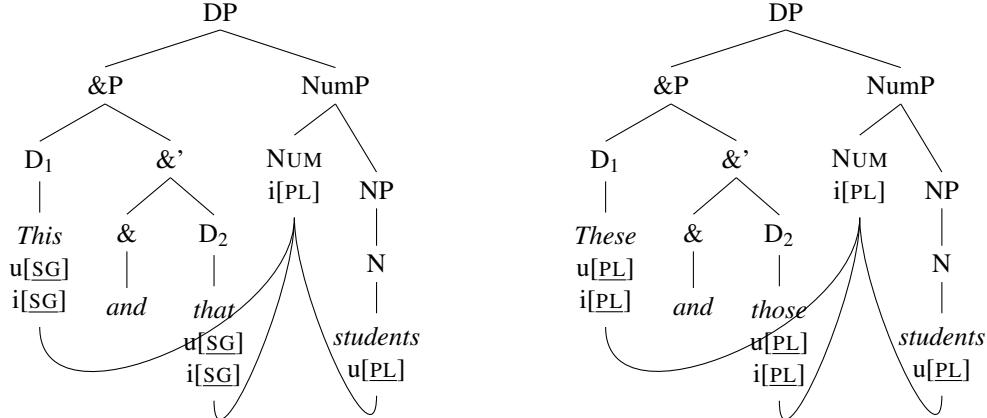
The second subcase involves sources that only contain one constituent, like bare demonstratives in English. In these cases, the sources involve constituents that, in principle, could be conjoined; however, the agreement process rules the conjunction structure out. In (72), the determiners *this* and *that* indicate the number features to be u[SG]. At the same time, the feature on the NUM head is i[PL] as indicated by the noun *students*. Since both the features on the demonstratives and on the noun are valued by the NUM, it is impossible under the current account to generate the feature configurations in (72). The feature configurations generated in the conjunction structure are in (73) where the PL value on the NUM head is copied onto the demonstratives and the noun. However the sentence generated would be **These and those students are a couple* as in (72). Note that *these and those students* can refer to more than 4 students

in *These and those students are tall*, but not two students.

The question is why (73) is ungrammatical, i.e. why can *these and those students* in (73) not refer to two individuals. The reason lies in the interpretable features on the demonstratives as phase heads. Since demonstratives are D heads, they have both interpretable and uninterpretable features. As a result of the Agree process, both of the demonstratives in (73) carry i[PL], thus each conjunct must refer to at least two individuals. The conjoined phrase *these and those* must refer to at least four individuals, which is not compatible with the predicate *are a couple*.¹⁵ This analysis provides further evidence for the interpretable number feature on the phase head. Thus it is shown that neither the sources with multiple elements (*John's tall and Mary's short*) nor the sources with morphological agreement (*this and that*) can generate the plural pivot in a conjoined structure. An alternative way to rule the structure in (72) and (73) out is to assume that the conjunction head & blocks the Agree operation between the D head and the NUM head the same way that F head blocks agreement with the possessive DPs. The ungrammaticality results then from the unvalued features on the D heads.

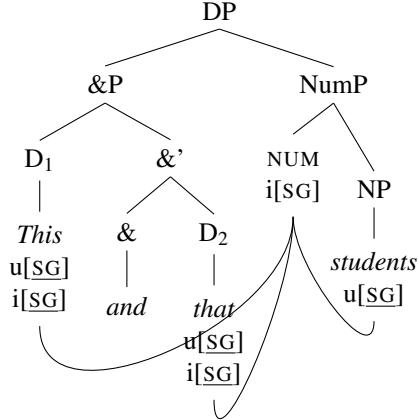
¹⁵ Note that this setup is compatible with the presuppositional theories of plural features like Dowty (1989). It is, however, less clear whether it's compatible with analyses where the plural feature is default and vacuous like Sauerland (2003).

- (72) * This and that *students* are a couple.
- (73) * These and those *students* are a couple.



Lastly, (74) could be a potential structure for the singular pivot under bare demonstratives. The NUM head carries a singular feature and the D heads as well as the noun get the singular feature via Agree. Since the two Ds in the conjunction are singular, the conjunction as a whole should be plural, thus the interpretation of the whole phrase is the one where there are two students. If we assume that the conjunction head blocks the Agree operation between the D heads and the NUM, the structure in (74) is also ruled out. Furthermore it is important to note that the structure in (74), even if possible, does not affect any proposal I have raised so far. The multi-dominance analysis is still required for all other NRNR cases with sources containing adjectives.

- (74) This and that student are a couple.



This section spelled out the derivation of the possible and impossible number markings on the pivots in NRNR. In particular, I proposed that the singular and plural pivots are in general generated through two structures. The singular pivot is generated via multi-dominance and the plural pivot is generated via conjunction. I have shown that with two constraints on multi-dominance, the cross-linguistic generalization on NRNR (75) can be accounted for.

- (75) **Generalization on NRNR:** The singular pattern appears when the sources show agreement with the pivot.

So far, the discussion has been restricted to NRNR cases where both the DPs are singular. In Section 2.4, I will discuss mismatch cases in NRNR. However, before moving on, I will close this section with a discussion of possessive pronouns in English and their behavior in English.

2.3.4 English possessive pronouns in NRNR

As is noted above, bare English possessive DPs in NRNR cannot license multi-dominance and thus only allow plural pivots, whereas possessive DPs + adjectives do license multi-dominance and thus allow singular pivots. Possessive pronouns + adjectives pattern with DPs + adjectives in licensing singular pivots in (76).

- (76) a. His tall and her short student are a couple.
- b. *His tall and her short students are a couple.

Possessive pronouns in English without adjectives involve more complications. Note that in German, possessive pronouns show agreement with the possesum. As is predicted by the analysis I laid out in the previous sections, they license singular pivots as is in (77).

- (77) Mein und dein *Student* sind ein Paar. (NRNR)
 my and your student are a couple
 'My and your student are a couple.'

English possessive pronouns do not show agreement with the possesum, as is shown in (78). According to the proposed analysis, it might be intuitive to expect that bare possessive pronouns pattern with bare possessive DPs in English in not licensing singular pivots in (79). [Shen et al. \(2017\)](#) reports a more complex pattern.

- (78) a. my/our/your/his/her/their book
 b. my/our/your/his/her/his/their books

- (79) a. *John's and Mary's *student* are a couple.
 b. John's and Mary's *students* are a couple.

[Shen et al. \(2017\)](#) observes that for some cases of NRNR with bare possessive pronouns, neither singular nor plural pivot is available as in (80). Sentences in (80) indicate that neither the multi-dominance structure that generates singular pivots nor the conjunction structure that generates plural pivots are available for these possessive pronouns.¹⁶

- (80) a. *My and your *student* are a couple.
 b. *My and your *students* are a couple.
 c. *Her and his *student* are a couple.
 d. *Her and his *students* are a couple.

Possessive pronouns in English have another nominal form: *mine*, *yours*, and *hers*. Nominal possessive pronouns in the first conjunct do not make NRNR available in (81).

- (81) a. *Mine and your *student* are a couple.

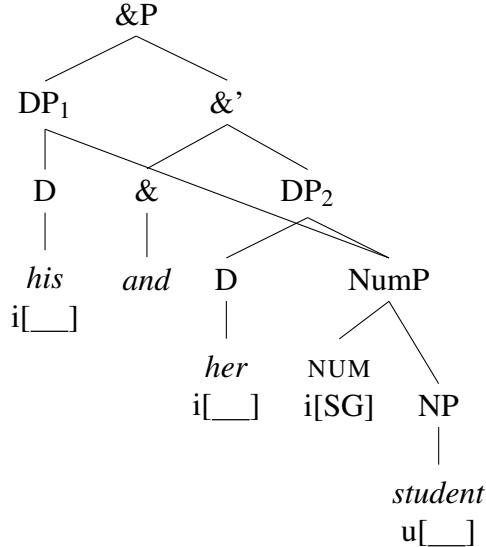
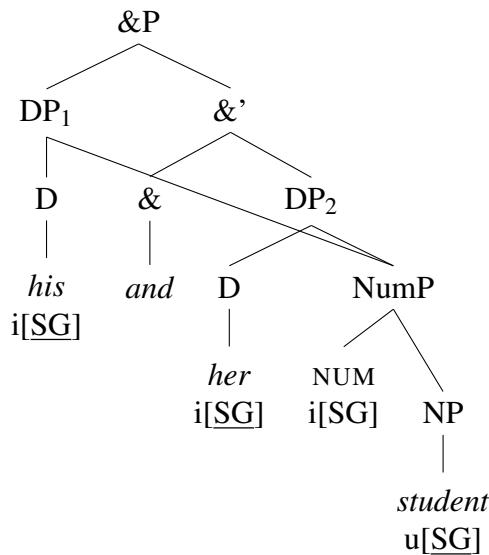
¹⁶ The judgments in (80) and (81) are subject to speaker variations. For the discussion here I will use judgments reported in [Shen et al. \(2017\)](#). See Chapter 3 for experimental data of these constructions.

- b. *Hers and his *student* are a couple.

Importantly, when the order of *her* and *his* is inverse, the singular pivot becomes available as in (82).¹⁷ The availability of the singular pivot in (82) indicates that *his* and *her* (in that order) license multi-dominance, which in turn suggests that both the Agree and the MaxShare requirement are met. Given that *his* and *her* do not show morphological agreement in English, I follow Alexiadou et al. (2007) among others in assuming that possessive pronouns in English are D heads like the definite article *the*. The derivation of the singular pivots is illustrated in (82) and (84); the NumP, being the largest shareable element, is shared by the two Ds. The NUM head agrees with the two determiners, which are valued by [SG].

- (82) a. His and her *student* are a couple.
 b. *His and her *students* are a couple.

¹⁷ Part of the difference in (82) can be explained by markedness possibly caused by frequency: *his and her* is less marked than *her and his*, however, Shen et al. (2017) assume that the difference is rooted in grammar.

(83) his and her *student*(84) his and her *student*

Now the question is that why is NRNR only licensed when the sources are *his* and *her*, but not *her and his* or other combinations. Shen et al. (2017) proposes the

constraint in (85).¹⁸ In English, nominal possessive pronouns can only license covert NP complements (overt complements are banned as is shown in (86)), whereas adjectival possessive pronouns can only license overt NPs complements; ellipsis is banned, as shown in (87).

- (85) The first possessive pronoun source in NRNR must simultaneously license both overt and covert NP complements.

- | | |
|--|---|
| (86) a. *John's book is more expensive than mine book. | (87) a. John's book is more expensive than my book. |
| b. John's book is more expensive than mine. | b. *John's book is more expensive than my book . |

His, on the other hand, is an English possessive pronoun that can license both overt and covert NPs in (88). The constraint in (85) is thus met.

- | | |
|--|--|
| (88) a. My book is more expensive than his book. | |
| b. My book is more expensive than his. | |
| (89) a. *Mine student and your student are a couple. | |
| b. *My and your student are a couple. | |

To derive the constraint in (85), if we assume that the nominal forms of posses-

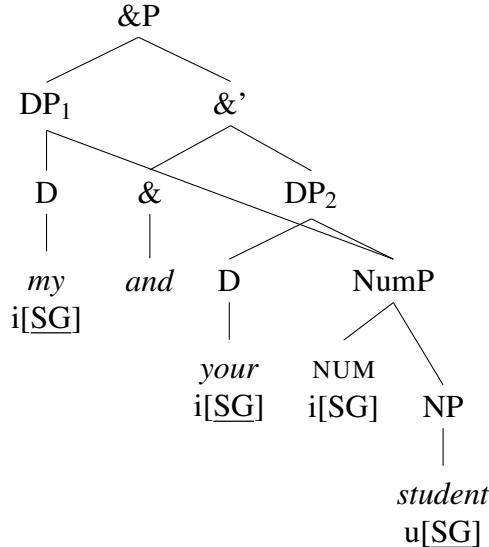
¹⁸ This constraint is proposed for English and has not been checked against data across languages.

sive pronouns are used when the possessums are elided, the ungrammaticality of (89a) can be accounted for with the Backward Anaphora Constraint in (90) from [Langacker \(1969\)](#); [Hankamer and Sag \(1976\)](#) a.o. BAC rules out the ellipsis of *student* under *mine* since the ellipsis site would both command and precede its antecedent, the *student* in the second conjunct.

- (90) Backwards Anaphora Constraint (BAC): An anaphor cannot be interpreted as being in anaphoric relation to a segment that it precedes and commands in surface structure.

On the other hand, the structure of (89b) can, in principle, be generated in (91). [Shen et al. \(2017\)](#) proposes that the ungrammaticality of (89b) is due to the ‘weakness’ of the possessive pronoun. The possessive pronouns *her*, *my*, *your*, *our*, *their* cannot be separated linearly from the possessum NP, in other words, these possessive pronouns are not strong enough to stand alone. Note that the nature of this ‘weakness’ is unclear. It must not be prosodic, but sensitive to grammatical category. The form *her* as an accusative pronoun can stand alone. The ‘weakness’ is possibly related to ‘defectivity’ discussed by [Cardinaletti \(1994\)](#); [Cardinaletti and Starke \(1999\)](#). Thus only the possessive pronouns that do not necessarily involve ellipsis and are strong enough to be detached from the possessums can be the first source in NRNR; *his* fits the bill.

(91) *my and your *student*



So far in this subsection, I examined the NRNR cases with English possessive pronouns as sources and laid out an analysis proposed by [Shen et al. \(2017\)](#). However the judgments on sentences in question are not as clear as one hopes them to be. My experiment on these sentences shows that there is no significant different between *her and his students* and *his and her students*. One possibility is that a subset of the native speakers treat possessive pronouns as SpecDPs while others treat possessive pronouns as D heads.

The next section investigates cases of NRNR where the two conjoined DPs involve different number specification, i.e. mismatch. I will show that with the current account, the mismatch cases of NRNR can be explained.

2.4 Mismatch in NRNR

This section discusses the number agreement pattern in NRNR where the two sources show different number marking. In (92a,b), the first DP is singular while the second DP is plural. As indicated by the numerals in the sources, only the plural pivot *boys* is allowed. Similarly in (92c,d), the first DP is plural and the second DP is singular, and only the singular pivot *boy* is allowed. One immediate generalization can be drawn, namely that in (93).

(92) English Mismatch¹⁹

- a. One tall and ten short *boys* are in the team.
- b. *One tall and ten short *boy* are in the team.
- c. ?Ten tall and one short *boy* are in the team.
- d. *Ten tall and one short *boys* are in the team.

(93) Generalization on mismatched NRNR: When two sources in an NRNR construction have different feature values, the pivot shows closest conjunct agreement (CCA).²⁰

The same pattern is observed in other languages as is shown in (94)- (96).

¹⁹ The data of mismatched NRNR involves speaker variation. In Chapter 3 I report results from two experiments regarding mismatch. See Chapter 3 for details.

²⁰ Here CCA is used as a purely descriptive, theory-neutral term.

(94) Icelandic Mismatch

- a. *Þessi og þessir *nemandi* hittust.
This and these student met
- b. Þessi og Þessir *nemendur* hittust.
This and these students met.
- c. Þessir og Þessi *nemandi* hittust
These and this student met.
- d. *Þessir og Þessi *nemendur* hittust.
These and this students met.

(95) Brazilian Portuguese mismatch

- a. *esse e aqueles *aluno* se encontraram
This and these student SE met
- b. esse e aqueles *alunos* se encontraram
This and these students SE met.
- c. ?esses e esse *aluno* se encontraram
These and this student SE met.
- d. *esses e esse *alunos* se encontraram
These and this students SE met.

(96) German Mismatch

- a. *Dieser große und jene kleinen *Student* haben sich getroffen
This tall and those short student have SELF met
- b. Dieser große und jene kleinen *Studenten* haben sich getroffen
This tall and those short students have SELF met
- c. Diese großen und jener kleine *Student* haben sich getroffen
These tall and that short student have SELF met
- d. *Diese großen und jener kleine *Studenten* habe sich getroffen
These tall and that short students have SELF met

2.4.1 CCA in Hindi Urdu (Bhatt and Walkow 2013)

In accounting for (93), I draw inspiration from Bhatt and Walkow (2013)'s treatment of CCA in Hindi-Urdu conjunctions. In Hindi-Urdu, T agrees with the subject or the object. The conjoined subject shows resolved agreement where two conjoined singular DPs trigger plural marking on T. When the subject contains two conjoined feminine singular DPs, as in (97), the T shows plural marking.

(97) resolved agreement: F.SG + F.SG = F.PL/M.PL

- a. Mona aur Sita gaa rahii / rahe hā?
 Mona.F and Sita.F sing PROG.F / PROG.M.PL be.PRS.PL
 'Ram and Sita are singing.'

However, when agreeing with the object, T shows CCA. In (98), when the object contains two conjoined feminine singular DPs, the T shows singular feminine agreement. When the first conjunct in the object is plural and the second conjunct is singular as in (99), the T still bears singular agreement.

(98) a. . . [F.SG + F.SG]. . . V.PART.F AUX[F.SG]

- a. Ram-ne ek thailii aur ek pe.tii (aaj) u.thaa-yii thii
 Ram-ERG a bag.F and a box.F (today) lift-PFV.F be.PST.F.SG
 'Ram had lifted a small bag and a box (today).'

(99) . . . [F.PL + F.SG]. . . V.PART.F AUX[F.SG]

- a. Ram-ne kai thailiyā: aur ek pe.tii (aaJ) u.thaa-yii thi Ram-ERG many bags.F and a box.F (today) lift-PFV.F be.PST.F.SG
‘Ram had lifted many bags and a box (today).’

[Bhatt and Walkow \(2013\)](#) account for this asymmetry by assuming a two-step Agree mechanism that the current paper shares: Step 1: Match establishes the dependency relation between the two elements; Step 2: Value (Agree in their paper) copies the value from one element to the other. Match is a syntactic process. Value can be syntactic as well; however, if Value cannot be carried out in the Syntax for some reason, it can occur in PF. The precedence relation is relevant for Agree in PF.

[Bhatt and Walkow \(2013\)](#) further assume an activity condition on agree: probes and goals that have unvalued features are active. Activity of a goal is a condition on Value only. Inactive goals are still visible for the locality constraints on Match, and can block successful Match with lower active goals. T and v are active due to their unvalued ϕ features. DPs are active due to their unvalued case features. Case licensing is implemented as valuation of the case feature of the goal and the ϕ -features of the probe, making the case and the ϕ -features on both the probe and goal inactive.

In subject agreement in a sentence with a simple subject, the T matches with the subject DP and values the case feature, while the DP values T with the ϕ feature. In object agreement in a sentence with a simple object, the v matches with the object DP and values the case feature. The object DP becomes deactivated. When the T matches

with the object, it cannot get ϕ value from the object DP in syntax. The valuation is postponed to the PF.

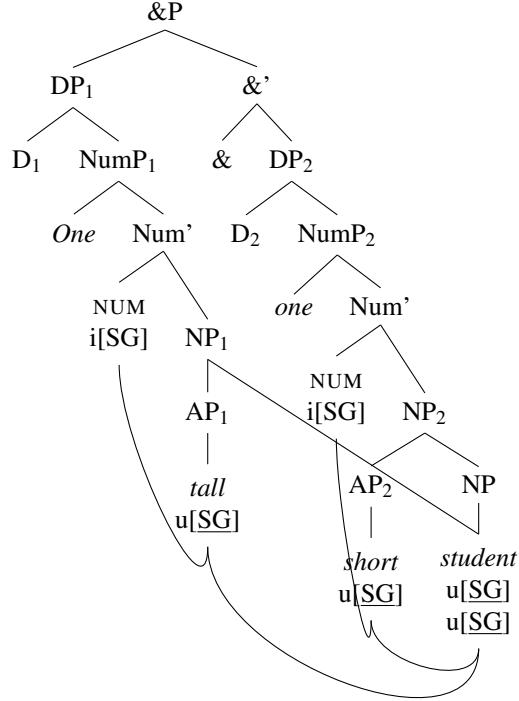
In object agreement in a sentence with a conjoined object, the v matches with and values the case feature of the object, deactivating the object. The T matches with the deactivated object and fails to value the its ϕ feature in the syntax. In the PF, the valuation will pick the linearly closest possible goal to the probe to value the feature of the probe, and that boils down to the DP in the closest conjunct. The conjoined object agreement thus shows CCA. I take the division of Value in syntax and that in PF to account for the CCA in NRNR.

2.4.2 Analysis

I will follow the assumption that when Value is impossible in the Syntax, it can be postponed to PF, where the linear order is relevant. This will provide an account for CCA in NRNR mismatch cases.

In the non-mismatch cases where both the sources are singular, e.g., (100), the NP is shared below two APs. Both the adjectives match with the NP to ensure feature identity. The NUM heads later merge with the NPs containing the APs, match with the APs, and value the features on the adjectives as u[SG]. The values on the adjectives get copied onto the noun. The noun will end up with two u[SG] values, which will be spelled out as the singular form.

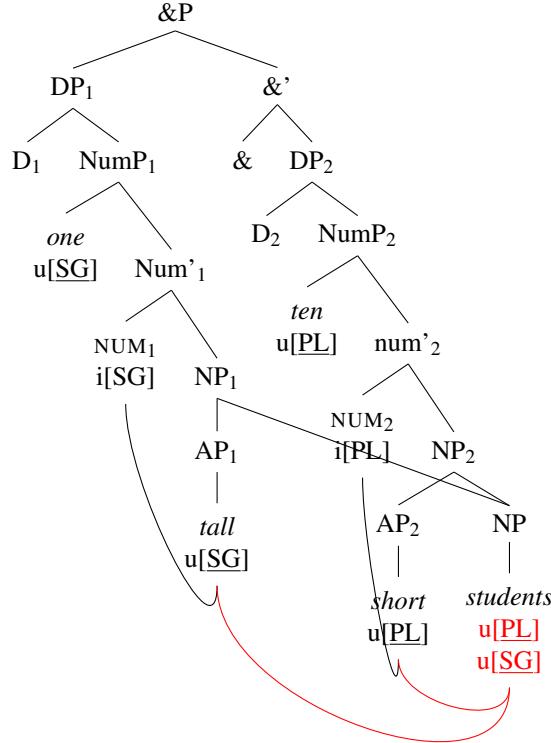
- (100) One tall and one short *student* are a couple.



In mismatch cases where the sources have different or conflicting values as in (101), the NP is also shared by two APs. Both the APs match with the NP to ensure feature identity. The NUM heads later merge with the NPs containing the APs. Both NUM heads Agree with the adjectives. The adjective in the first conjunct is valued as u[SG] and the adjective in the second conjunct is valued as u[PL]. When the values on the adjectives get copied onto the noun, the noun ends up with one instance of u[PL] and one instance of u[SG]. I assume the conflicting values will postpone Value to PF according to [Bhatt and Walkow \(2013\)](#)'s assumption.²¹

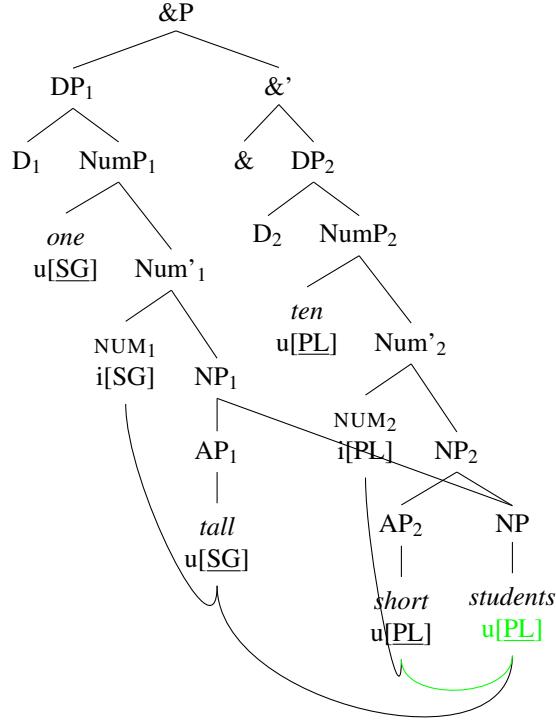
²¹ Here I assume that in the languages surveyed, only one value can be spelled out on N. Two conflicting values thus postpone the Value operation to PF. It is failed Value that is rescued by CCA, not failed Match.

- (101) One tall and ten short *students* know each other.



Since Match has already established the feature dependency between the noun and the two adjectives, in PF the Value operation will choose the linearly closer value to be copied to the pivot as in (102). Note that I assume that the dependency between the probe and the goal established in syntactic Agree is still visible in the PF. Even after linearization, the ‘candidacy’ of the goals remains. I assume that the syntactic structure is visible in the PF before it is converted to prosodic structure.

- (102) One tall and ten short *students* are in the team.



Similar mechanisms are at work in mismatch cases in other languages. I use the Icelandic bare demonstrative case as an illustration. As one can see in (103), the sentence is grammatical when the pivot shows agreement with the demonstrative in the last conjunct. This is the same pattern as the English mismatch cases.

- (103) Icelandic Bare Demonstrative Mismatch

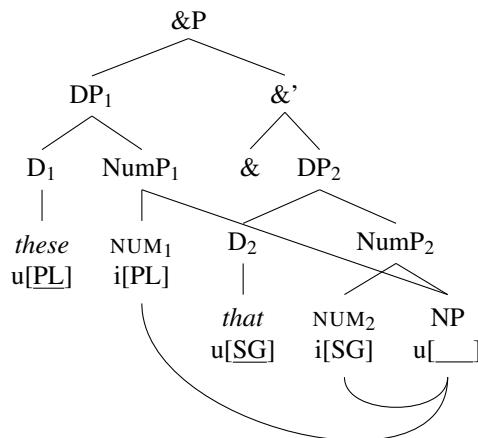
- a. *Þessi og þessir *nemandi* hittust.
This and these student met.
- b. ✓Þessi og Þessir *nemendur* hittust.
This and these students met.

- c. ✓Pessir og Pessi *nemandi* hittust
These and this student met.
- d. *Pessir og Pessi *nemendur* hittust.
These and this students met.

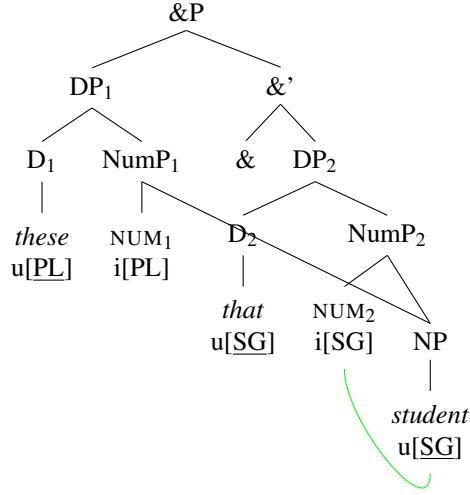
In (104), the NP is shared by two NUM heads. Both the Agree and the MaxShare requirement are met. In (104a), two Match relations have been established: one between num₁ (i[PL]) and the noun, the other between the noun and NUM₂ (i[SG]). If both the [PL] and [SG] are copied to the NP, the NP cannot be spelled out. As a result, Value is postponed. At PF in (104b), Value chooses the Match relation with the closest source: num₂ (i[SG]). The NP is valued as [SG].

- (104) Mismatch with the singular pivot
Pessir og Pessi *nemandi* hittust
These and this student met each other.

a. Match



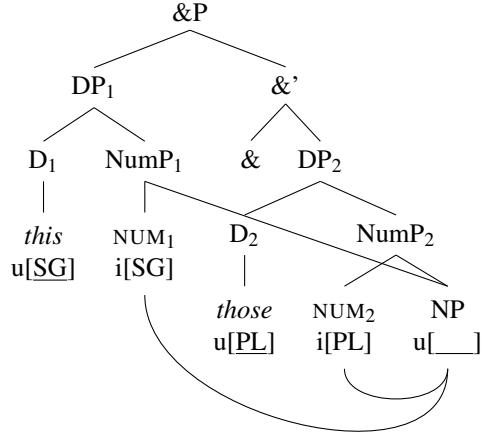
b. Value



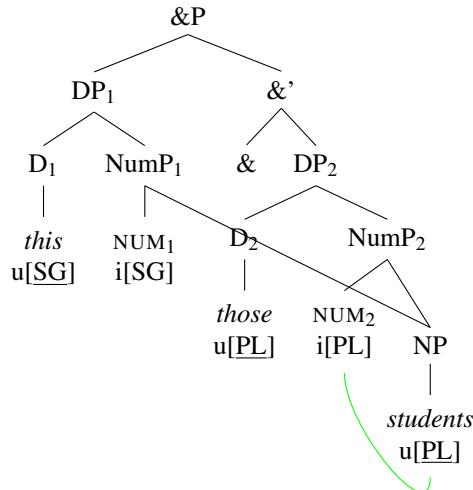
A similar process occurs in (105). In (105a), two match relations have been established: one between $\text{num}_1(\text{i}[SG])$ and the noun, the other between the noun and $\text{num}_2(\text{i}[PL])$. If both the [PL] and [SG] are copied to the NP, the NP cannot be spelled out. As a result, Value is postponed. At PF (105b), Value chooses the Match relation with the closest source: $\text{num}_2(\text{i}[PL])$. The NP is valued as [PL].

- (105) Mismatch with the plural pivot
 Þessi og þessir *nemendur* hittust.
 This and those students met each other.

a. Match

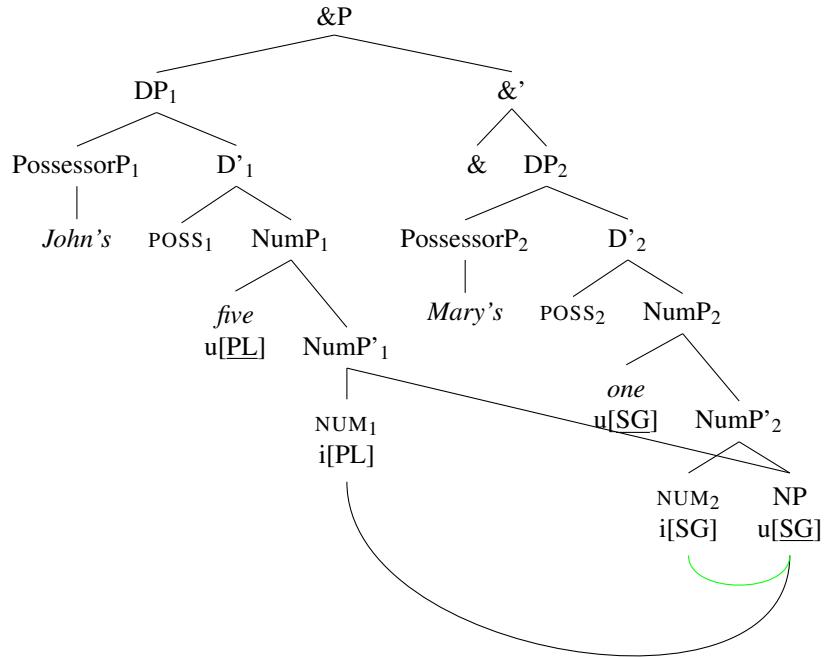


b. Value

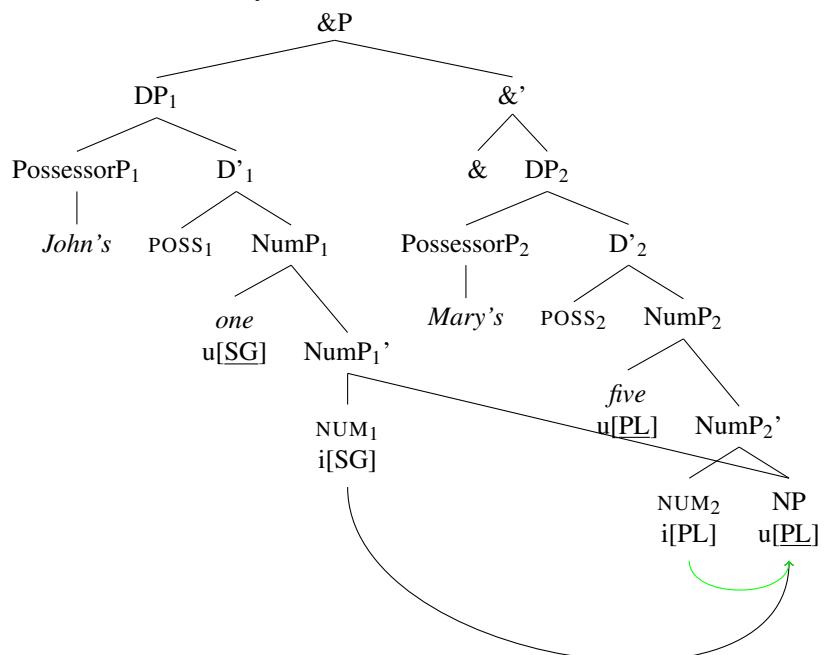


(106)-(107) exhibit the same process and the CCA is established in both sentences.

- (106) John's five and Mary's one *student* are all tall.



- (107) John's one and Mary's five *students* are all tall.

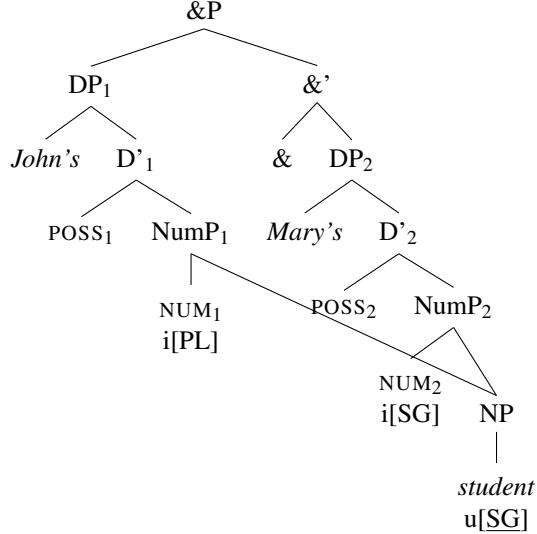


2.4.3 Mismatch under possessives

One apparent counterexample for the proposal made here is in (108). The sentence in (108a) is judged unacceptable in the scenario in (108b). In (108b), the number interpretation of the two conjuncts are different, thus the NUM heads in the two conjuncts are distinct. Since the largest non-distinct element is the NP and the NP agrees with the NUM heads, both the Agree and the MaxShare requirement are met. Multi-dominance structure is predicted to be possible in (108c).

As Agree proceeds, the NP matches with both the NUM heads. Since the number specifications on the NUM heads conflict, the valuation of the uninterpretable feature on the noun is delayed until the PF, where the closest conjunct agreement occurs, valuing the noun as [singular], contrary to the fact.

- (108) a. #John's and Mary's *student* are tall.
 b. John has three students and Mary has one student.
 c.



The failure of CCA in (108a) does not follow from the Agree and valuation mechanisms proposed here so far, however, it indicates an additional requirement for the mismatch interpretation. The mismatch interpretation seems to require overt cues to indicate the number difference. Compare mismatch sentences with overt number cues in (109) and the ones with no overt cues in (110). Overt cues facilitate the availability of the mismatch interpretation; while the interpretation is reported to be harder without the cues.²²

²² Alternatively, the additional requirement could be related to focus, I thank Magdalena Kaufmann for this suggestion and leave the detailed analysis to future investigation.

(109) Context: multiple tall students and one short student

- a. Ten tall and one short student know each other.
- b. These tall and that short student know each other.

(110) Context: multiple tall students and one short student

- a. John's tall and Mary's short student know each other.
- b. His tall and her short student know each other.
- c. The tall and the short student know each other.

It is also worth pointing out that CCA in NRNR is not available in all the cases *with* overt number cues. For example when the sources are bare demonstratives in English as in (111), mismatch is not allowed for some reason. Note (111) contrasts with demonstrative+adjective cases in (112) and bare demonstratives in Icelandic in (103), both of which show CCA. It is currently not clear what conditions the availability of CCA, especially when demonstratives behave differently in English and Icelandic.

(111) a. *This and those *students* are tall.

- b. *This and those *student* are tall.
- c. *These and this *students* are tall.
- d. *These and this *student* are tall.

(112) a. This tall and those short *students* know each other.

- b. These tall and that short student know each other.

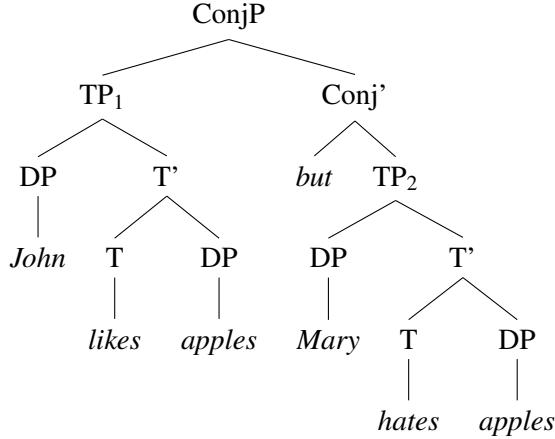
2.5 Alternative accounts for NRNR

This section evaluates potential alternative accounts for the generalization regarding NRNR agreement. Apart from multi-dominance, two major analyses have been proposed for right node raising constructions, namely the Across-the-Board (ATB) movement analysis ([Sabbagh \(2007\)](#) among others) and the ellipsis analysis ([Hartmann \(2000\)](#) among others).

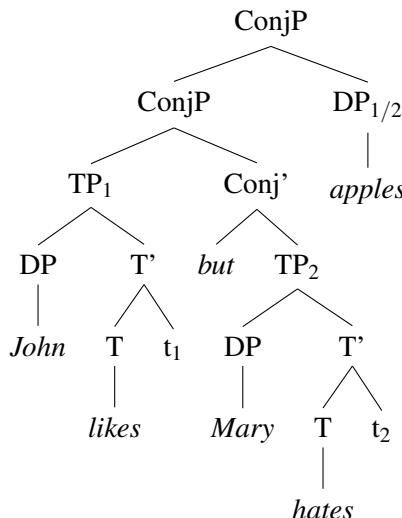
2.5.1 ATB movement

The ATB movement analysis was the traditional analysis to right node raising. For early implementations see [Abbott \(1976\)](#); [Bresnan \(1974\)](#); [Hankamer \(1971\)](#); [Maling \(1972\)](#); [Postal \(1974\)](#); [Ross \(1967\)](#). For recent work on this approach, see [Postal \(1998, 2004\)](#); [Sabbagh \(2007, 2008\)](#); [Harizanov and Gribanova \(2015\)](#). According to the ATB analysis, RNR sentences start with two full sentences with identical objects (e.g.: *apples*) as in (113). Then the object DPs move from their base-generated positions to a ConjP adjoined position in (114).

- (113) John likes apples but Mary hates *apples*.



- (114) John likes but Mary hates *apples*.



Arguments for and against the ATB movement analysis have been discussed in much research. The main argument against it involves the distinct targets of RNR and movement as well as the different constraints on RNR and movement.

The possible pivot elements of RNR are more inclusive than the possible target of movement. For example, the pivot of RNR can be part of a complex word, which

cannot be moved in general. In (115), a subpart of the compounds are RNRed, while moving the subpart is banned in general.

- (115) Your theory over- __, and mine under- __, *generates*. (Booij (1985))

If RNR involves movement, it should be subject to the same constraints that regulates movement, e.g. islands. However it has been shown that RNR is not subject to islands.

In (116) for example, the DP *a new movie by Woody Allen* is in an adjunct island and cannot be moved, and yet the DP can be RNRed.

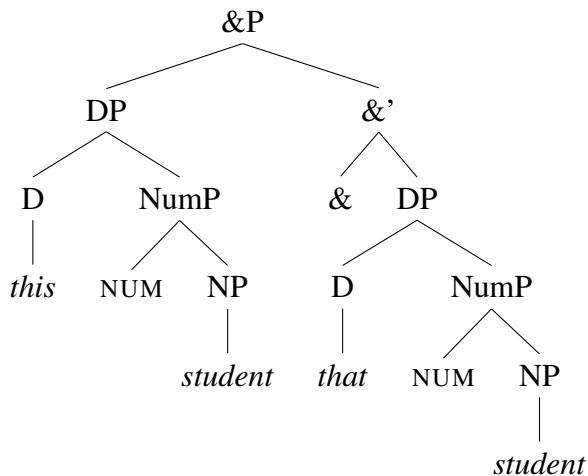
If RNR involves movement, it should be ruled out when the pivot is inside islands, contrary to the fact in (116).([Wexler and Culicover \(1980\)](#)).

- (116) a. Mary cried after the car hit t; but Sue was relieved after the doctor treated t, the little boy on the bicycle. (Jonathan Bobaljik p.c.)
- b. *Who did Mary cry after John hit t? ([Truswell \(2007\)](#), originally from [Huang \(1982\)](#):503)

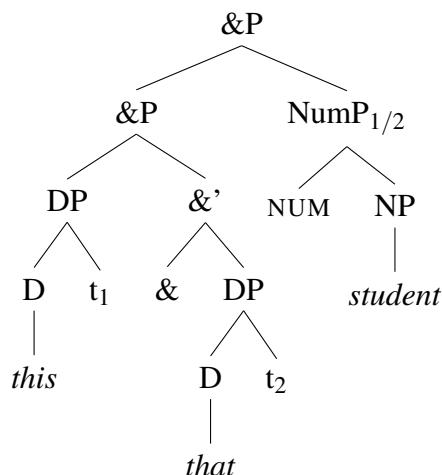
Although there are arguments against the ATB analysis of RNR in English, German, Polish, and Irish among other languages, ATB movement has been argued for Tagalog by [Sabbagh \(2008\)](#). The constraints on RNR seems to be parallel with the ones on movement in Tagalog. It is possible that the availability of ATB movement in RNR is subject to cross-linguistic variation.

The ATB movement analysis can be applied to NRNR. Similarly to RNR cases above, an ATB analysis of NRNR would assume a structure in (117) and (118) where two full DPs are conjoined and the singular nominals are moved to the ConjP adjoined position.

- (117) a. this student and that student



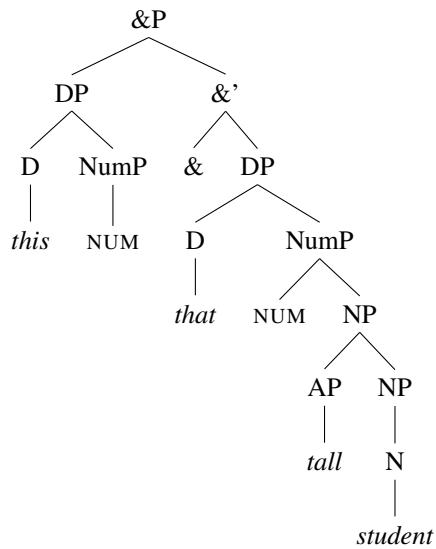
- (118) this and that *student*



Although this analysis can generate the NRNR string, it suffers from several

problems. First, the argument against ATB movement analysis mentioned above for RNR can be extended to NRNR. Elements that cannot undergo movement in general can still be a pivot in NRNR. For example in (119), the pivot *tall student* is the pivot. However NP in languages like English cannot undergo movement as is shown in (119).

- (119) This and that *tall student* are a couple.



- (120) *It was *tall student*₁ that I met this t₁.

Second, if the ATB movement analysis is on the right track, we would expect the constraints that other movements are subject to also have effects on NRNR (See [McCloskey \(1986\)](#); [Sabbagh \(2008\)](#)). One such constraint is syntactic islands. [McCloskey \(1986\)](#) shows that in Irish, RNR can strand prepositions while P stranding is banned for other movements, which is used against the ATB movement analysis. On the other hand, [Sabbagh \(2008\)](#) shows that in Tagalog, RNR is subject to island constraints, thus is

compatible with the ATB movement analysis. In (121), the sources contain complex NP islands. According to the ATB movement analysis, the pivot *student* in (121) would move out of islands and render the sentence ungrammatical, contrary to the fact.

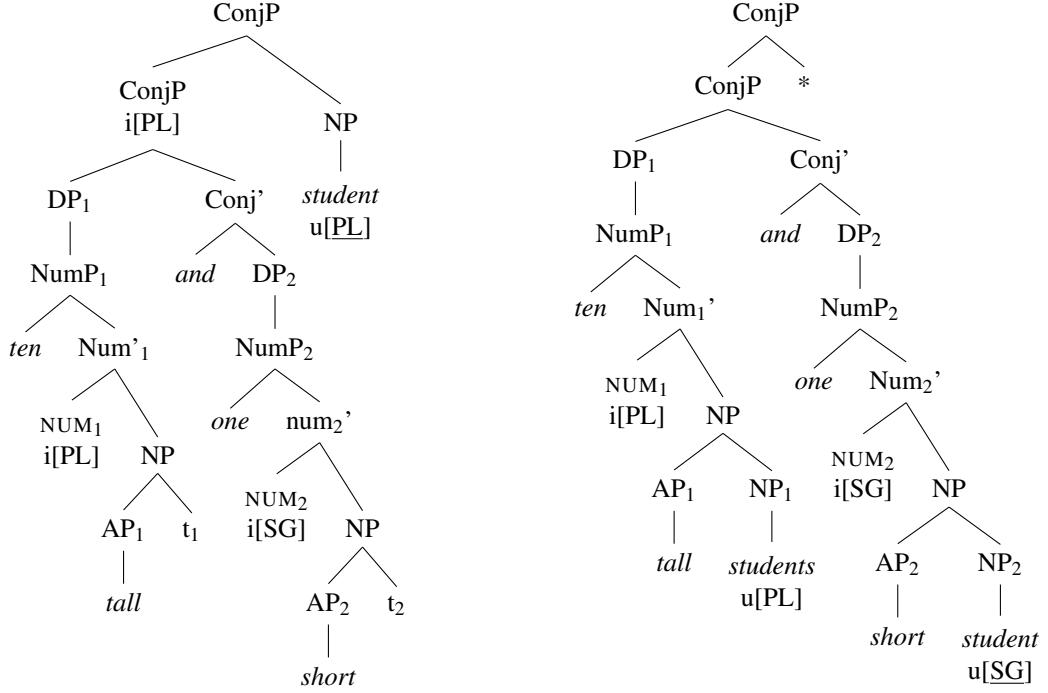
- (121) [The professor who advised the tallest *t*] and [the one who advised the shortest *t*] *student* are a couple.

Last but not the least, the ATB analysis also has difficulty capturing the mismatch cases in NRNR without additional assumptions. As is noted in the previous section, 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 (122), 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 noun head gets copied to the nominal in the PF.

- (122)
- 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 cannot 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 follows the ATB movement, as shown in (123), 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 (122) show that this is not borne out. If the feature valuation precedes the ATB movement, as shown in (124), 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 mismatches 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. However, it is worth noting that the NRNR 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. I will postpone the discussion of a unified account for English and Bulgarian NRNR to Chapter 4.

- (123) ten tall and one short *student* (124) ten tall and one short *student*
know each other know each other



In summary, the ATB movement analysis for NRNR would have to deal with the many issues listed above. While it is not impossible, additional assumptions would have to be stipulated and it is not clear to me at the moment what those assumptions might be.

2.5.2 Ellipsis

Ellipsis is another predominant analyses of RNR, see [Hartmann \(2000\)](#); [Bošković \(2004\)](#); [Féry and Truckenbrodt \(2005\)](#); [Ha \(2008a\)](#); [An \(2007a\)](#). In principle, NP ellipsis (NPE) can straightforwardly generate the singular noun in NRNR. In (125a), the subject begins as the conjunction of two full singular DPs. The first head noun is elided and the

singular head noun in NRNR is generated. The closest conjunct agreement pattern in mismatch NRNR can also be accounted for by ellipsis as is shown in (125b).

- (125) a. This tall student and that short student are a couple.
- b. These tall students and that short student are a couple.

In what follows, I present two challenges for this analysis of NRNR: 1) there are elements that do not license ellipsis, but do license singular pivots in NRNR and 2) there are elements that do license ellipsis, but do not license singular pivots in NRNR.

2.5.2.1 Elements that do not license ellipsis, but do license singular nouns in NRNR

The first argument against the ellipsis analysis for NRNR involves cases where ellipsis is banned, but the singular pivot in NRNR is possible. Cases like this occur widely across languages. In English, it is well known that adjectives do not license ellipsis of the head noun in (126a,b).²³ However as we have already seen, singular nouns in NRNR are licensed under adjectives as shown in (126c,d). The ellipsis analysis needs to explain why the banned ellipsis becomes available in NRNR.²⁴ The same occurs in German. German possessive pronouns cannot license ellipsis of the possesum NPs as shown in (127a); however, the singular noun in NRNR under possessive pronouns is

²³ I leave out the discussion of *one*-substitution in English.

²⁴ Alternatively, if one takes one-substitution as ellipsis, the ellipsis account needs to explain why ‘one’ is required in contexts in (126) but not in the NRNR cases.

OK in (127b).²⁵

(126) English (adjectives)

- a. *John likes this tall student and Mary likes that short student. (*NPE)
- b. *I like Mary's tall student and he likes John's short student (*NPE)
- c. This tall and that short *student* are a couple. (NRNR)
- d. I like Mary's tall and John's short *student*. (NRNR)

(127) German (possessive pronouns)

- a. *Dein Student und mein Student sind ein Paar. (*NPE)
your student and my student are a couple
'Your student and my student are a couple.'
- b. Mein und dein *Student* sind ein Paar. (NRNR)
my and your student are a couple
'My and your student are a couple.'

In Spanish and Italian, only post-nominal adjectives can license ellipsis and pre-nominal ones cannot ([Ticio \(2005\)](#) among many others). In (128a) *supuesta* 'alleged' is obligatorily prenominal in Spanish; ellipsis is ruled out. On the other hand, In (128b), *supuesta* can be used in NRNR with a singular head noun.

²⁵ An alternative perspective is that ellipsis *is* available under elements like adjectives, but the insertion of *one* is required in English: *John likes this tall student and Mary likes that short one*. Then the challenge for the ellipsis account would be why is *one* required in the ellipsis under adjectives but not in NRNR constructions.

(128) Spanish and Italian (prenominal adjectives)

- a. *Ayer vi a la verdadera terrorista y a la supuesta (*NPE)
yesterday saw to the true terrorist and to the alleged
'Yesterday I saw the true terrorist and the alleged one.'
- b. La supuesta y la verdadera *terrorista* son pareja. (NRNR)
the alleged and the true terrorist are couple.
'The alleged terrorist and the true terrorist are a couple.'

Lastly in Bosnian-Croatian-Serbian, non-agreeing adjectives like *braon* ‘brown’ and *bež* ‘beige’ do not license ellipsis ([Bošković \(2012\)](#)), however singular nouns can be naturally licensed under these non-agreeing adjectives in NRNR.²⁶

(129) BCS (non-agreeing adjectives)

- a. ?*Ivan je izgubio braon čarap, a Marko je izgubio bež. (*NPE)
Ivan is lost brown sock, and Marko is lost beige
'Ivan lost a brown sock and Marko lost a beige one.'
- b. braon i bež čarap su par. (NRNR)
brown and beige sock are pair.
'The brown sock and the beige sock are a pair.'

The cross-linguistic data presented above shows discrepancy in the distribution of NRNR and ellipsis in a variety of environments and languages. Accounts that attempt to reduce NRNR to ellipsis would have to account for why the same licensors behave differently in an NRNR environment and in other environments. In the next section, I present another argument and show that NP ellipsis is banned in general in the NRNR environ-

²⁶ In all the cases above, neither the ban on ellipsis nor the available singular nouns in NRNR involve subject-object asymmetry.

ment.

2.5.2.2 Elements that do license ellipsis, but do not license singular nouns in NRNR

The second argument against an ellipsis analysis involves cases where NPE is possible in general but singular nouns in NRNR is not. As we have already seen, possessive DPs in English do license ellipsis in (130a). (130b) shows that backward NPE is possible in English. However when *John's and Mary's* is used in NRNR, the singular possessum noun is not possible, as shown in (130c). This shows that the singular nouns in NRNR do not involve ellipsis; moreover, it indicates that NP ellipsis is *banned* in the NRNR environment.

(130) English (bare possessive DPs)

- a. I like John's student and Bill likes Mary's student. (NPE)
- b. Surpass Donald Trump's fortune, Bill Gates's fortune certainly does.
(Backward NPE; example (4a) from Barros and Vicente (2009))²⁷
- c. *John's student and Mary's student are a couple.

In Spanish, ellipsis is only licensed under the strong version of the singular masculine indefinite article *uno*, the weak version *un* does not license the ellipsis of the head

²⁷ Here are two other examples of backward ellipsis taken from Barros and Vicente (2009):

iBecause Steve told me not to drink wine, I didn't drink wine.

iiAlthough I don't know who Andrea is dating, I know that Andrea is dating someone.

noun, as shown in (131). The distribution of the singular noun in NRNR shows a complementary distribution with ellipsis; the singular noun is licensed under the weak version but not under the strong version as shown in (132).

- (131) un libro rojo y uno/*un libro negro
 a book read and a bœk black
 ‘a red book and one black book’

- (132) *uno* is forbidden in NRNR

- a. Un verdadero y un supuesto *terrorista* se encontraron.
 A true and an alleged terrorist SE met
- b. *Uno verdadero y un supuesto *terrorista* se encontraron.
 One true and an alleged terrorist SE met
 ‘A true and an alleged terrorist met.’

In Dutch, when the singular neuter noun is elided under an adjective within an indefinite DP, the inflectional marker *-e* on the adjective is obligatory as is shown in (133). (134) shows that when the noun is overtly present, the *-e* marker is banned. (135) shows that NRNR patterns with the non-elliptical environment and not the elliptical environment; the *-e* marker is banned. For more discussion on NP ellipsis in Dutch, see Corver and van Koppen (2011) and references therein.

- (133) een rood boek en een groen*(-e) boek
 a red book and a green-e bœk
 ‘a red book and a green one’

- (134) een groen(*-e) boek
 a green-e book
 'a green book'

- (135) The inflectional ending is forbidden in NRNR → no NPE in NRNR.

- a. een groen en een rood *boek* zijn allebei duur
 a green and a red book are both expensive.
- b. *een groen-e *boek* en een rood boek zijn allebei duur
 a green-e book and a red book are both expensive.
 'a green book and a red book are both expensive.'

Like the first argument in the previous section, these cross-linguistic discrepancies between the distribution of ellipsis and that of singular pivots in NRNR argue against any analysis that tries to reduce NRNR to ellipsis of the head noun. Furthermore, the cases shown here indicate that even the common ellipsis licenser failed to license ellipsis in the NRNR construction. While ellipsis is licensed in other cases by licensers like English possessive DPs, it is ruled out in NRNR. The same holds at least for German, Dutch, and Spanish. This ban of ellipsis in NRNR can be subsumed under the well-known Backward Anaphora Constraint (BAC) in (136) ([Langacker \(1969\); Hankamer and Sag \(1976\)](#) a.o.). *Command* is defined as in (137).

- (136) Backwards Anaphora Constraint (BAC): An anaphor cannot be interpreted as being in anaphoric relation to a segment that it precedes and commands in surface structure.

- (137) A commands B if B is dominated by the first S node up the tree from A, and if neither node dominates the other. (from [Ross \(1967\)](#) and [Langacker \(1969\)](#))

An example of BAC that does not involve NRNR is (138).

- (138) examples from [Barros and Vicente \(2009\)](#)
- a. Bill Gates's fortune surpasses Donald Trump's **fortune**.
 - b. *Bill Gates's **fortune** surpasses Donald Trump's fortune.

Now let's look at how BAC works for NRNR. In (139), the elided noun (a type of anaphora) in the first conjunct both precedes and commands its 'antecedent', *student* in the second conjunct. According to the BAC, ellipsis is banned. This explains why in English, Dutch, Spanish, and German, the elements that would license NPE do not license it in NRNR.

- (139) *John's **student** and Mary's student are a couple.

The analysis predicts that when the ellipsis site does not command its antecedent, NPE is possible. This prediction is borne out in (140). *First album* in the first conjunct can be elided since it does not command the *first album* in the second conjunct (two conjuncts involve different S nodes). Note crucially that (140) is not a case of multi-dominance of *first album*. As we have shown before, the possessive DPs in English do not license multi-dominance due to the combination of MaxShare and Agree requirements.

- (140) You like John's first album, but I like Mary's first album.

So far I have shown that the ellipsis account for NRNR cannot explain cases where NPE is allowed in the NRNR construction, but is not allowed in general, as in (141a). I have also discussed cases that indicate a ban on backward ellipsis in the NRNR construction, as in (141b). If NP ellipsis is banned in NRNR, then the good case of NRNR cannot be derived from ellipsis. Some other mechanism must be at play. The multi-dominance account detailed above can account for the construction.

- (141) a. This tall and that short student are a couple.
 b. *John's and Mary's student are a couple.

In this section, I considered two potential alternative analyses of NRNR, one involving ATB movement and one involving ellipsis. I discussed the difficulties each analysis encounters when the full set of data of NRNR is considered; additional assumptions are needed for either analysis. For the remainder of the dissertation, I will assume the multi-dominance analysis for NRNR.

2.6 Theoretical consequences

Having laid out my analysis of NRNR, I discuss what the analysis contributes to theoretical debates.

2.6.1 NRRN and the morphological theory of nominal concord

The phi feature dependency within the nominal domain has been traditionally labeled as *nominal concord*. Whether a unified analysis covering both nominal concord and predicate-argument agreement can be maintained is currently under debate. A body of literature argues that Agree is behind both predicate-argument agreement and nominal concord (Carstens (1991); Baker (2008); Schoorlemmer (2009); Danon (2011); Toosarvandani and van Urk (2013) a.o.). Danon builds on the assumption that person, number, and gender features originate at different functional heads in DP and argues that the highest D head gets number and gender values via feature sharing, an Agree operation. Baker argues that while verbal agreement involves upward Agree in most cases while adjectives involve downward Agree. Toosarvandani and van Urk (2013) argues that predicate-argument and nominal concord show the same restrictions in Zazaki.

Alternatively, nominal concord has been argued to be a morphological phenomenon in recent works. Norris (2012, 2014) proposes a non-Agree-based analysis for nominal concord. He observes several differences between predicate-argument agreement and nominal concord. 1. Nominal concord is shown in multiple loci in the NP, usually including nouns, adjectives, numerals, demonstratives, etc., while predicate-argument agreement usually shows on one location; 2. loci of nominal concord elements vary among heads, specifiers, and adjuncts while predicate-argument agreement occurs only on heads; 3. nominal concord is a dependency inside the nominal extended projection while predicate-argument agreement is a dependency between the clausal domain and

the nominal domain; 4. it is often argued that predicate-argument agreement is related to case assignment, but no such correlation is observed in nominal concord. Based on these differences, Norris proposes a morphological theory of nominal concord where domination rather than c-command defines the dependency. Following [Norris \(2014\)](#), a number of researchers embrace the division between agreement and nominal concord to account for various phenomena cross-linguistically: see [Polinsky \(2016\)](#) for a reduced relative clause analysis for derived attributive adjectives in Archi, [Bejar et al. \(2015\)](#) for Merge Concord in English and Spanish, and [Baier \(to appear\)](#) for definite marking in Noon licensed under domination but not c-command.

In this subsection, I look at the proposed morphological nature of nominal concord in the light of data from NRNR. Since multi-valuation in NRNR is shown to be sensitive to whether the elements c-commanding the pivot show nominal concord or not, concord needs to involve syntax in some way. This falls naturally from the Agree approach to nominal concord. On the other hand, it is unclear how the morphological approach to concord would deal with it without complicating the theory.

Regarding the morphological theory of nominal concord, I take a recent implement in [Norris \(2014\)](#) as an example, but the logic goes to the general approach that assumes a morphological nature of nominal concord.

As discussed before, based on the differences between nominal concord and Agree, Norris pursues a non-Agree analysis for nominal concord. In the narrow syntax, he proposes a set of feature percolation principles in (142) with the results in (143).

Note that one of the outcomes of the principles is that it is impossible for the specifier to percolate its features.

(142) Feature Percolation Principles:

- a. All projections of a head X^0 have the feature-value pairs that X^0 has.
- b. Let [F:val] be a valued feature on XP.

Let Z^0 be a head lacking the feature [F].

Let X^0 and Z^0 be members of the same extended projection (i.e., both [+N]).

When Z^0 merges with XP, projecting ZP, ZP also has the valued feature [F:val].

(143) Result:

- a. Merge X and YP, if X has F and YP doesn't, XP gets F;
- b. if X doesn't have F and YP does, XP gets F;
- c. if X has F_1 and YP has F_2 , XP gets F_1 .

On the morphology side, [Norris \(2014\)](#) follows [Embick \(1997\)](#) and assumes that nominal concord involves a dissociated morpheme Agr^0 which is inserted to the concord elements after syntax is complete and has no syntactic effects. See (144) for the original definition of dissociation from [Embick \(1997\)](#). The Agr^0 insertion rule is in (145) (see also [Kramer \(2010\)](#)).

(144) Dissociation: A morpheme will be called dissociated when the morphosyntactic position/features it instantiates are not features figuring in the syntactic computation, but are instead added in the Morphological component under particular structural conditions.

(145) Agr^0 Node Insertion: $X^0 \rightarrow [X^0 \text{Agr}^0]_X$

After the Agr^0 s are inserted, an operation called Feature Copying in (146) takes place. In effect, Feature Copying spreads the features from the closest projection to the Agr heads in the head, the specifier, and the adjunct positions. The intra-/inter-language variations in nominal concord lie in the morphology component. Whether an element in NP shows concord and what kind of features are realized in nominal concord have to be specified for each lexical item in a certain language. The elements that show concord are assumed by Norris to require the Agr head to be a well-formed word.

(146) Feature Copying: For every unvalued feature $[F:]$ on an Agr node Z_{AGR} , copy the value from a projection XP iff...

- a. XP has a value for $[F:] ([F:\alpha])$
- b. XP includes Z_{AGR} ,
- c. There is no YP such that YP has a value for $[F:]$, YP dominates Z_{AGR} , and XP dominates YP (i.e., copy the closest value)

If Agr^0 heads are dissociated morphemes, then it is predicted that the presence

and absence of the Agr^0 will not have syntactic consequences. However, as I have shown above, multi-dominance in NRRN is sensitive to whether an element shows nominal concord or not. As a consequence, nominal concord needs to be more syntactic. In particular, one key component in deriving the right agreement patterns of NRRN is the constraints I proposed for multi-dominance in the nominal domain, repeated here in (147).

(147) Constraints on Multi-Dominance

- a. Agree constraint: Z is shareable by X and Y if there is an Agree relation between X and Z and Y and Z.
- b. MaxShare: XP can be shared only if there is no YP such that YP dominates XP and YP is shareable, if the XP sharing structure and the YP sharing structure have identical interpretations.

I focus on the Agree constraint in (147a). As I have shown using both cross-linguistic and cross-construction facts, the availability of singular pivots is sensitive to whether the sources show nominal concord or not. In other words, whether an element shows nominal concord or not has a certain syntactic consequence, namely, the availability of multi-dominance.

As far as I can tell, the morphological approach to concord predicts a different pattern. According to Norris who follows Kramer (2010) and Embick (1997), nominal concord is shown on an element because of two post-syntactic operations: Agr^0

insertion and feature copying. After syntax is complete, Agr^0 is inserted to elements that will show nominal concord, then phi-features spread from the closest projection to these Agr^0 heads. In other words, there is no relevant differences in syntax between (148a) and (148b) (except that the sources in (148) occupy the D head positions and those in (148b) occupy the SpecDP positions).

- (148) a. This and that *student* are a couple.
- b. *John's and Mary's *student* are a couple.

Then the difference between the two sentences in (148) and the cross-linguistic correlation between the singular pivot and the number marking on the sources in NRNR should be accounted for in morphology. To do that, one can imagine a reformulation of (147a) that involves morphological agreement rather than syntactic Agree like in (149).

- (149) The agreement constraint: Z is shareable by X and Y if there is morphological agreement relation between X and Z and Y and Z.

Theoretically, the constraint in (149) involves looking ahead in the derivation: the syntactic operation, multi-dominance, would have to be sensitive to morphological agreement, a post-syntactic operation. Meanwhile one can also assume a constraint-based model where the derivation violating (149) is filtered out at a late point of the derivation. This constraint needs to take effect late enough for the insertion of the Agr heads

in morphology and early enough for the multi-dominance structure to be accessible. Whether this is feasible is an empirical question; however, the theoretical concern can be reconciled in principle.

Empirically, it remains to be seen how (149) can account for sources that license singular pivots, but do not show morphological agreement themselves. For example, in English, possessive DP + adjectives allow only the singular pivots, as in (150); however, neither the possessive DPs nor the adjectives show morphological agreement.

- (150) John's tall and Mary's short student are a couple.

At this point it is not clear to me how these cases are handled by this approach. One can posit that in cases like (150), the Agr head is inserted and a zero morpheme is used. It can also be posited that another syntactic factor conditions both multi-dominance in narrow syntax and nominal concord in morphology. This can, in principle, capture the link between concord and multi-dominance as well as cases where morphological agreement is not overt. The nature of this factor is unknown at this point and this also indicates that the morphological agreement is conditioned by some component in the syntax.

The syntactic Agree based constraint in (147a), on the other hand, can account for these cases naturally, assuming that the syntactic Agree does not necessarily have morphological realization. In other words, the Agree based approach captures the correlation between number marking and multi-dominance licensing and is flexible enough

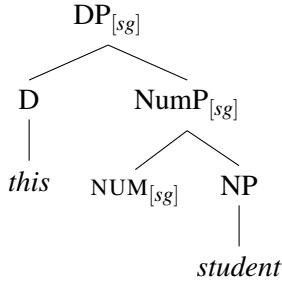
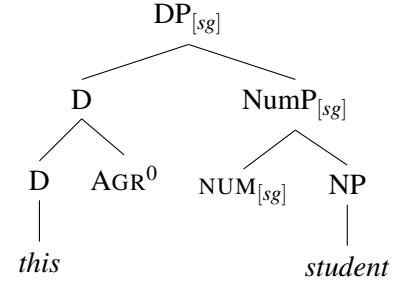
to account for the apparent lack of agreement in (150).

Another feature of the morphological approach to nominal concord is that the dependency that is labeled concord is between a projection and its daughters. Trees in (152) - (154) illustrate the derivation of the nominal concord in this approach. NumP gets its singular value from the NUM head through feature percolation in (152) and the Agr⁰ head gets its singular value from the DP in (154). Thus there is no intrinsic relation between D and the NumP or the NUM head. As a result, it is curious how the phi-feature on D will restrict the syntactic behavior of the NumP, which is what we see in generalization in (151).

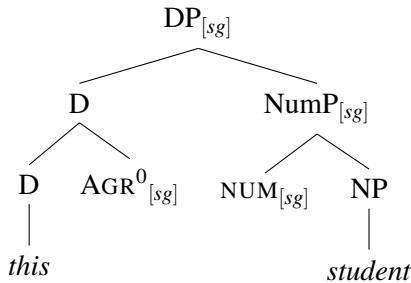
(151) **Generalization:** In NRNR the singular pattern appears when the sources show agreement with the pivot.

In other words, even if one assumes that the Agr⁰ insertion is in the narrow syntax, the setup of the nominal concord theory needs to be enriched to establish a dependency between the Agr⁰ and the NUMP to capture (151). On the other hand, the Agree based analysis of nominal concord I adopt can handle the generalization rather straightforwardly.

(152) feature percolation

(153) AGR^0 insertion

(154) feature copying



In this section I gave a brief sketch of the morphological approach to nominal concord and evaluated the approach with the data from NRNR. The cross-linguistic generalization showing connection between number marking and multi-dominance licensing can be accounted for by the syntactic Agree approach in a natural way. A pure morphological approach to nominal concord needs to complicate the syntax in order to derive the NRNR facts. Of course this is not to say that it is impossible for the morphological approach to handle NRNR. A morphological based account for NRNR remains an empirical issue. I will tentatively continue assuming that both NP internal agreement and subject-verb agreement are results from the Agree operation in the syntax.

2.6.2 Notes on MaxShare

In this section I discuss in some detail the nature of the MaxShare requirement I proposed for multi-dominance repeated in (155).

- (155) MaxShare: XP can be shared only if there is no YP such that YP dominates XP and YP can be shared.

2.6.2.1 MaxShare and *Maximizing Shared Structure* in [Citko \(2006\)](#)

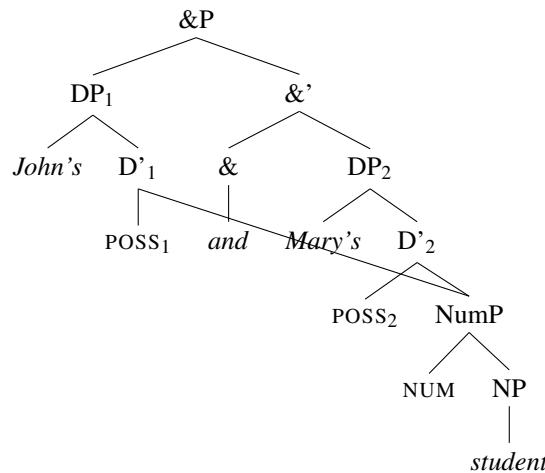
As was mentioned earlier, the MaxShare requirement on multi-dominance is essentially the same as the ‘maximizing shared structure’ argued for by [Citko \(2006\)](#). Citko argues with data from ATB Left Branch Extraction in Polish that any potentially sharable elements must be shared. Citko derives the requirement from an economy principle: assuming selection from the numeration is costly, the fewer times a lexical item is extracted from the numeration, the more economical the derivation is. If the same element appears in both of the conjuncts, it has to be extracted twice. If the element is shared by the conjuncts, it only has to be extracted once. Thus the derivation that involves sharing wins out.

MaxShare in NRNR can be derived in the same fashion. I present the derivation in the bare possessive DP cases in English, where MaxShare rules out the structure in (156b), but not that in (157b). In (156a), the POSS head has been extracted twice, whereas in (157b) it is extracted once and the rest of the numeration is the same. Thus,

(157) wins out. Note that the structure in (157) is (later) ruled out by the Agree requirement as there is no Agree relation between the POSS heads and the possessive DPs.

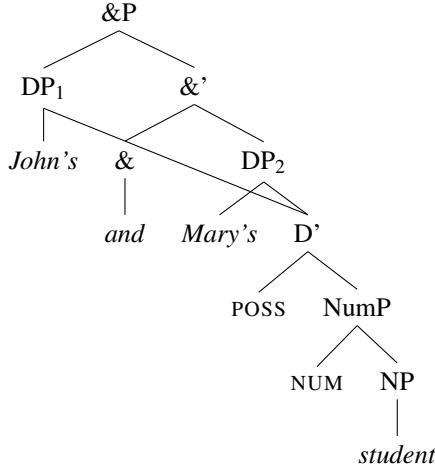
- (156) *John's and Mary's *student* are a couple. (Ruled out by MaxShare)

 - Numeration: [John's $\times 1$ | Mary's $\times 1$ | num $\times 1$ | student $\times 1$ | POSS $\times 2$ | and $\times 1$]
 - NumP sharing: *John's and Mary's student



- (157) *John's and Mary's *student* are a couple. (Ruled out by Agree requirement, OK with MaxShare)

- a. Numeration: [John's $\times 1$ | Mary's $\times 1$ | num $\times 1$ | student $\times 1$ | POSS $\times 1$ | and $\times 1$]
- b. Poss' sharing: *John's and Mary's student



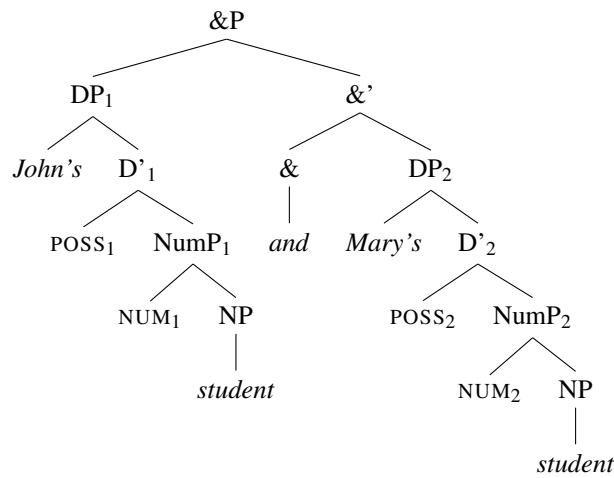
The derivation runs into a problem of potentially blocking (158) where no sharing is involved. In the numeration in (158a), not only is the NUM head extracted twice, the noun *student* is extracted twice as well. The numeration in (158a) is thus more costly than both (157a) and (156a). According to the same economy principle that derived MaxShare, (158) should be blocked as well, contrary to fact.

For this reason, the application of the economy principle needs to be constrained to compare different derivations involving sharing, rather than one derivation with and another derivation without sharing, also noted in [Citko \(2006\)](#). One way to implement this is to assume that the economy principle applies cyclically, i.e. in terms of domain. In the full DP coordination in (158), the economy principle is valued in each DP, thus the sentence is not blocked. Once a shared element/constituent is introduced,

the economy principle applies to the whole &P, and the derivation of MaxShare can be maintained in the same fashion as Maximizing Shared Structure in [Citko \(2006\)](#).

- (158) John's student and Mary's student are a couple.

- a. Numeration: [John's×1 | Mary's×1 | num×2 | student×2 | POSS×2 | and×1]
- b.

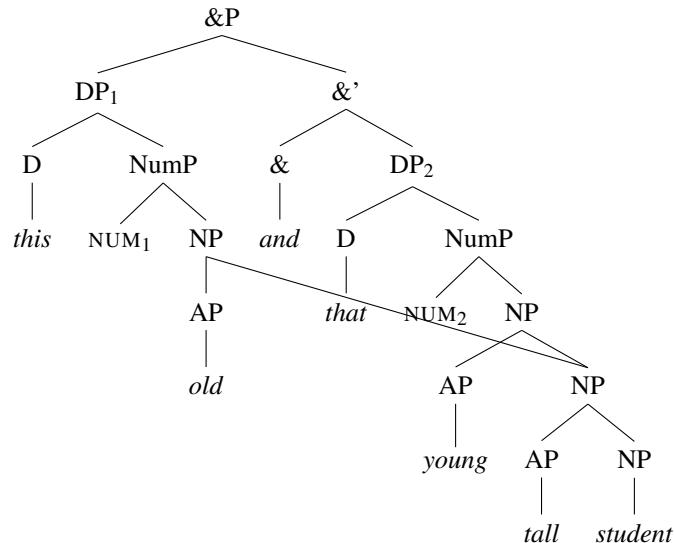


2.6.2.2 MaxShare is relative to the interpretation

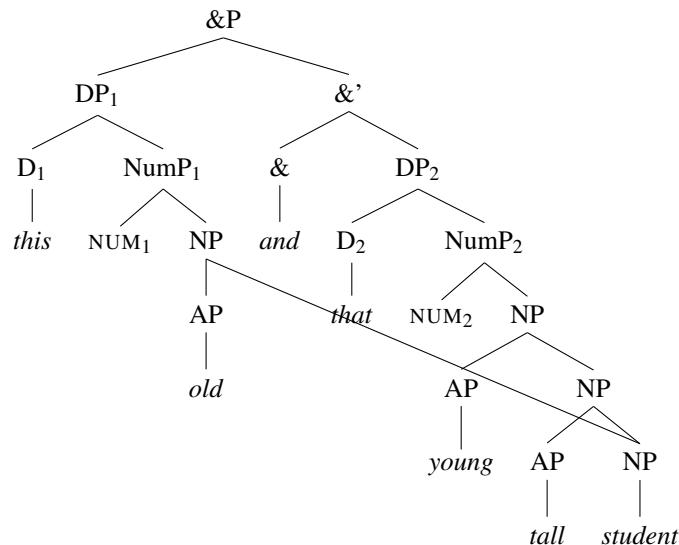
One important aspect of the application of MaxShare is that MaxShare compares structures that have the same interpretation. If structures with different interpretations can be compete regarding MaxShare, the system under-generates. For example, (159a) is ambiguous between interpretations in (159b) and (159c). In the structure for the interpretation in (159b), it is the NP *tall student* that is shared, whereas in the structure for the interpretation in (159c), it is the NP *student*. If MaxShare can compare structures across interpretations, (159c) should be ruled out since the shared NP *student* is

dominated by a sharable NP *tall student*.

- (159) a. This old and that young tall student are a couple.
b. Interpretation: ‘This old tall student and that young tall student are a couple.’



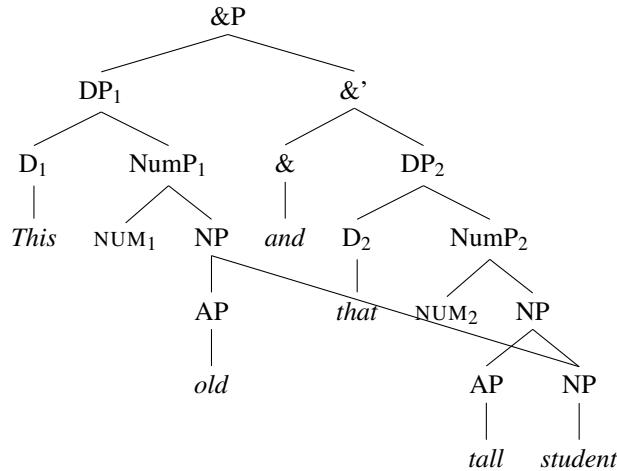
- c. Interpretation: ‘This old student and that young *tall* student are a couple.’



One issue I will leave for future research involves (160). The sentence in (160a)

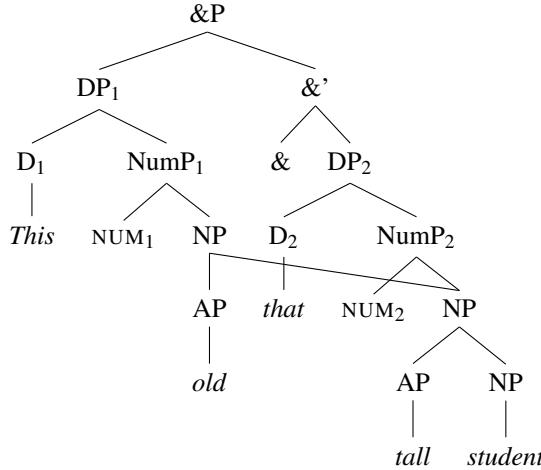
can only have the interpretation in (160b), with a structure where the NP is shared but not in (160c) where the AP is shared. One possible explanation is a requirement on contrasts between the two sources in NRNR. In the structure in (160b), the sources *tall* and *old* are contrastive with each other, whereas in (160c) *old* is not contrastive with any other adjectives in the second conjunct, since *tall* is part of the shard pivot.²⁸ Further implications of this possibility are left for future research.

- (160) a. This old and that tall *student* are a couple.
 b. ‘This old student and that tall student are a couple’



²⁸ Thanks to Susi Wurmbrand for pointing this possibility out.

- c. *‘This old tall and that *tall student* are a couple’



2.6.2.3 A note on MaxShare and MaxElide

On the surface, the MaxShare requirement in (161) is of the same nature as the MaxElide restriction on ellipsis (see [Fox and Lasnik \(2003\)](#); [Shoichi and Fox \(2005\)](#); [Merchant \(2008\)](#); [Hartman \(2011\)](#); [Messick \(2014\)](#) for discussion on MaxElide). Given an ellipsis account, one tempting move would be to unify the two restrictions. However, I suggest that this unification is less straight-forward.

- (161) MaxShare: XP can be shared only if there is no YP such that YP dominates XP and YP can be shared.

The closest version of MaxElide to MaxShare is in (162), which is mentioned in [Messick \(2014\)](#) based on [Fiengo and May \(1994\)](#); [Kennedy \(2002\)](#). It is motivated by the data in (163). The NPE in (163b) is ungrammatical because there is a potentially larger

constituent that can be elided, namely VP in (163a). When the NP is the largest elidable constituent as in (163c), NPE is licensed.

(162) MaxElide (*first attempt*) Elide the largest possible constituent. ((22) in [Messick \(2014\)](#))

- (163) a. Ben likes Abby's boyfriend, but Charlie doesn't like ~~Abby's boyfriend~~.
- b. *Ben likes Abby's boyfriend, but Charlie doesn't like Abby's ~~boyfriend~~.
- c. Ben likes ABBY's boyfriend, and Charlie doesn't like BETH's ~~boyfriend~~.

However, the MaxElide constraint in (162) cannot capture the following sentences where both the large constituent (VP) and the small constituent (NP) can be elided.

- (164) a. Ben bought some apples and Bill did ~~buy some~~ apples too.
- b. Ben bought some apples and Bill bought some apples too. ([Messick \(2014\)](#))

[Merchant \(2008\)](#) proposes a version that restricts MaxElide within ellipsis sites that contain an A'-trace in (165). Note that Merchant's version of MaxElide does not apply to NPE since it is unlikely that NPE sites contain an A' trace. As a result, it is not at all clear how MaxElide in (165) and MaxShare can be unified when the former does not apply to NP while the latter does. Furthermore, it is conceptually desirable to unify two similar economy constraints. There might as well be formulations of the constraints

that makes it possible. I leave this issue for future research.

- (165) Let XP be an elided constituent containing an A' -trace. Let YP be a possible target for deletion. YP must not properly contain XP . (Merchant 2008:141)

2.7 Previous research in NRNR-like constructions

To the best of my knowledge, the contrast in (166) has never been observed; however, constructions that are similar to NRNR have been discussed in the literature. This section summarizes and evaluates the findings of the previous research on NRNR-like constructions.

- (166) a. This and that *student* are a couple.
 b. *This and that *students* are a couple.
 c. *John's and Mary's *student* are a couple.
 d. John's and Mary's *students* are a couple.

2.7.1 Bulgarian nominal coordinate structures

[Harizanov and Gribanova \(2014, 2015\)](#) and [Arregi and Nevins \(2013\)](#) discuss a NRNR-like construction in Bulgarian, which appears to be an exception to the generalizations laid out in the previous sections. [Harizanov and Gribanova \(2014\)](#) observes that, in Bulgarian, two conjoined singular adjectives can modify a plural noun as shown in (167).

(167) Bulgarian Adjectives

- a. bǎlgarsk-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. pǎrv-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) (examples from [Harizanov and Gribanova \(2015\)](#))

A similar pattern is observed in Russian. In (168), when the bare demonstratives show singular marking, the pivot NP can show plural marking. In (169), when both the adjectives show singular marking, the pivot NP can show plural marking as well.

(168) Russian Bare Demonstrative

- a. Etot student i tot student para.
this student.NOM and that student.NOM couple.SG
'This student and that student are a couple.'
- b. Etot i tot student para.
this and that student.NOM couple.SG
'This and that student are a couple.'
- c. Etot i tot studenty para.
this and that student.NOM.PL couple.SG
'This and that students are a couple.'

(169) Russian Adjectives - Plural Pattern

- a. pervaya stranica i poslednyaya stranica krasivye
first.sg page.sg and last.sg page.sg beautiful.pl

- b. pervaya i poslednyaya *stranica* krasivye
first.sg and last.sg page.sg beautiful.pl
- c. pervaya i poslednyaya *stranicy* krasivye
first.sg and last.sg page.pl beautiful.pl
'The first page and the last page are beautiful.'

Note that Polish shows a different pattern from Russian and Bulgarian in (170).

(170) Polish Adjectives - Singular Pattern

- a. ✓Pierwsza strona i ostatnia strona sa piekne
first.sg page and last.sg page.sg are beautiful
- b. ✓pierwsza i ostatnia *strona* sa piekne
first and last page are beautiful
- c. *Pierwsza i ostatnia *strony* sa piekne
first.sg and last.sg page.pl are beautiful
'first and last pages are beautiful.'

The cross-linguistic survey on NRNR summarized earlier in this chapter boils down to the generalization that when the sources show singular morphological number agreement, the pivot must be singular as well. The cases in (168) and (169) seem to be counterexamples to the generalization of NRNR. However, there are reasons to believe that the plural pivot in Bulgarian and the singular pivot in NRNR are two distinct phenomena. First, the singular pivot is also allowed along with the plural pivot. This suggests that the multi-dominance generated NRNR is also available in Bulgarian (although the singular pivot can also be derived from ellipsis without ruling out the ellipsis analysis

in Bulgarian). Furthermore, Harizanov and Gribanova (2015) observes that three additional restrictions on plural pivots in Bulgarian that do not show up in the singular pivot in NRNR: 1. no mismatch is allowed in the plural pivot construction as shown in (171); 2. the noun shared by the two DPs cannot be the suppletive form of the plural as shown in (172); 3. pluralia tantum nouns like *glasses* cannot be the plural pivot as is shown in (173). This indicates that the plural pivot in Bulgarian is likely of a different nature from the NRNR construction discussed earlier.

(171) No Mismatch

- a. *părv-i i posledn-a *stranic-i*
first-PL and last-SG.F page-PL
- b. *părv-a i posledn-i *stranic-i*
first-SG.F and last-PL page-PL

(172) No suppletive plural: *cővek* ‘person’ - *hora* ‘people’

- a. *nisk-ij-a i visok *hora*
short-SG.M-the and tall.SG.M people
‘the short and tall people’
- b. *bulgarsk-ij-a i rusk-i *hora*
bulgarian-SG.M-the and russian-SG.M people
‘the Bulgarian and Russian people’

(173) No pluralia tantum

- a. mrăsn-i i čist-i *očila*
dirty-PL and clean-PL glasses
- b. *mrăsn-a i čist-a *očila*
dirty-SG.F and clean-SG.F glasses

- c. *mrăsn-o i čist-o očila
dirty-SG.N and clean-SG.N glasses
- d. *mrăsen i čist-∅ očila
dirty.SG.M and clean-SG.M glasses

There are two accounts in the literature for the Bulgarian data. [Arregi and Nevins \(2013\)](#) argues for a conjoined AP analysis in (174). The two APs are conjoined and get the plural value from the NP. They stipulate an operation that can divide the plural value on the ConjP to multiple instances of singular values and distribute them to each conjunct. This analysis assumes a non-traditional operation and does not address the three restrictions [Harizanov and Gribanova \(2015\)](#) observes.

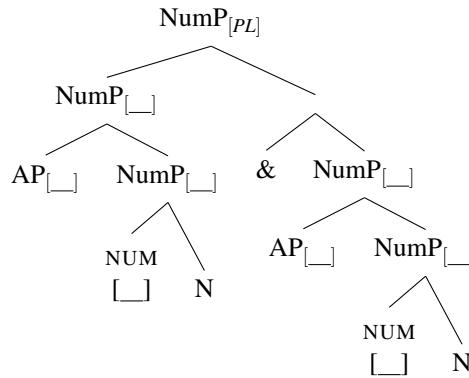
(174)



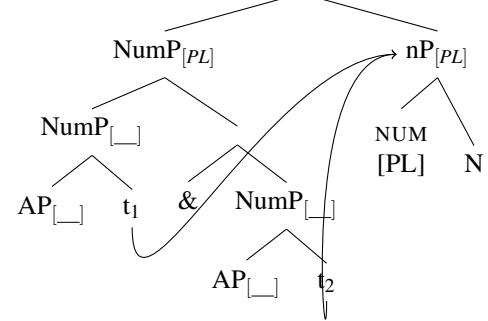
[Harizanov and Gribanova \(2015\)](#) argues for an ATB movement analysis. They derive the plural marking via ATB movement following several assumptions: 1) The singular value is privative. 2) The absence of a NUM feature is spelled out as the non-plural form. 3) The conjoined NumP has a [PL] feature even when both conjuncts lack the NUM feature. The structure of (167) is shown in (175a). The head of the NumP takes an

NP as its complement and agrees with it. Since the number feature of the NUM head in each conjunct is absent, the lowest NumPs and the AP in each conjunct lack the number feature value as well via Agree. As a result the markings on the APs are both singular. The conjoined NumP has a [PL] feature by assumption. In (175b), the lowest NumP in each conjunct ATB-moves to adjoin to the conjoined NumP and gets the [PL] value from the conjoined NumP. Consequently, the pivot NumP shows plural marking while the APs show singular marking. The ATB movement analysis can accommodate the restrictions more easily however, early insertion of the noun root has to be assumed to account for the suppletion restriction.²⁹

(175) before ATB



(176) after ATB



²⁹ One can also take the view that ‘suppletive’ forms like *people* do not involve suppletion but are words that only have the plural form. Under the ATB movement account, such words as pivots are predicted to be bad since the pre-movement ‘singular forms’ are actually different words from the plural form.

2.7.1.1 Bulgarian plural pivot and NRNR

Now I consider whether Bulgarian plural pivots discussed by [Harizanov and Gribanova \(2015\)](#) involve the same phenomenon as NRNR. I layout the constraints on plural pivots in Bulgarian and suggest that despite the different behaviors between plural pivots in Bulgarian and singular pivots in NRNR, there is still room for the two to be accounted for with one mechanism.

As mentioned above, the plural pivots in Bulgarian show three restrictions that are absent in NRNR, which indicates that the Bulgarian construction is different from the NRNR construction discussed in previous sections. However, I show it is possible that these different restrictions are results of confounds and not the construction itself. In other words, despite the restrictions, Bulgarian plural pivots and singular pivots in NRNR could involve the same construction.

Let's take the suppletion restriction first. Plural pivots are not available when the pivot noun has a suppletive plural form. How would this restriction manifest itself if the singular pivot also has this restriction? It would have to be that ‘the singular pivot is not available in NRNR if the singular form is suppletive.’ Since there is no common noun whose singular form is suppletive, the absence of the restriction in NRNR cannot speak to whether the plural pivots in Bulgarian and the singular pivots in NRNR involve the same construction or not. However, the prediction is straight forward; if the constraint is also present in NRNR, the suppletive singular form would not be able to be the

pivot.³⁰

The second restriction involves plurale tantum. Plurale tantum nouns are not allowed as the plural pivot in Bulgarian. Harizanov and Gribanova (2015) accounts for this restriction with the assumption that plurale tantum nouns enter the derivation with plural features. The plural features on the nouns in each conjunct force the adjectives to be plural as well. That's why the string A.sg and A.sg N.pl cannot be generated if the noun is plurale tantum. Since plurale tantum cannot be singular by nature, this restriction cannot be applied to the singular pivots in NRNR. One might suggest that the equivalent restriction on singular pivots would be ‘singulare tantum nouns are not allowed as the pivot in NRNR,’ *Singulare tantum* nouns are nouns that only have singular forms, which refers largely to mass nouns. (177) shows that mass noun can be the pivot in NRNR. However, mass nouns are not considered to be nouns that come with [sg] feature, so mass nouns/singulare tantum nouns are not strict equivalent to the plurale tantum restriction in Bulgarian.

- (177) John’s gray and Mary’s blonde *hair* are of different colors.

The last restriction involves mismatch. Harizanov and Gribanova (2015) reports that mismatch between two conjuncts are not allowed. In Section 2.4, I report that mismatch NRNR cases exhibit closest conjunct agreement. Note that in NRNR cases, CCA is not

³⁰ One can also assume that the plural form is the default and that it is the singular form that is suppletive. This would mean that the singular pivot in NRNR does not ban suppletive singular forms as pivots: *This tall and that short person are a couple*. However, the ban on traditional suppletive plural forms like *hora* ‘people’ in NRNR is left unaccounted for if the plural form is the default one.

available for every source in every language, which led me to suggest that CCA is sensitive to different sources for independent reasons. Consequently, the mismatch restriction in Bulgarian reported by [Harizanov and Gribanova \(2015\)](#) could be accounted for if we stipulate that Bulgarian adjectives do not license CCA. If that is the case, the Bulgarian plural pivot could still be a case of NRNR despite the mismatch restriction.

- (178) a. *These and that *student* know each other.
- b. *This and these *students* know each other.

From a different perspective, two native speakers of Bulgarian that I consulted report that CCA is also available in Bulgarian mismatch cases (Roumyana Pancheva, Vesela Simenova p.c.). (179) and (180) indeed show that when two conjuncts show different number specification, the pivot noun shows the same value as the second conjunct. If we take the CCA to be possible in the plural pivots in Bulgarian, then it shows parallels to NRNR.

- (179) a. parv-a-ta i posledn-i-te *stranits-i*
 first.sg.def and last-pl-def pages-pl
- b. *parv-a-ta i posledn-i-te *stranits-a*
 first.sg.def and last-pl-def pages-sg
- (180) a. Skanirai mi purv-i-te 20 i posledn-a-ta *stranits-a*
 scan me first-pl-def 20 and last-sg.f-def page-sg
- b. *Skanirai mi purv-i-te 20 i posledn-a-ta *stranits-i*
 scan me first-pl-def 20 and last-sg.f-def page-pl

Note that the sentences in (179) and (180) are slightly different from the sentences in (181) discussed by [Harizanov and Gribanova \(2015\)](#). (181) involves only one determiner in the first conjunct, whereas in (179), (180), as well as (182), both conjuncts include a determiner. Both (181) and (182) involve two singular conjuncts and one plural pivot. It is unclear to me how this difference is relevant to the availability of CCA.

- (181) pǎrv-a-ta i posledn-a *stranic-i*
first-sg.f-the and last-sg.f page-pl
'the first and last pages'
- (182) pǎrv-a-ta i posledn-a-ta *stranits-i*
first-sg.f-def and last-sg.f-def page.pl
'the first and the last pages'

In sum, although the three restrictions on plural pivots in Bulgarian could initially indicate that the construction is distinct from NRNR, they could also result from independent reasons. The unification of NRNR and the plural pivots in Bulgarian and Russian remains a possibility. The question is what account can generate singular pivots in NRNR in English among many other language while plural pivots in Bulgarian and Russian. I do not have a clear answer here, but in Chapter 4 I take upon this question.

2.7.2 Number mismatch in coordination: an LFG analysis

[Belyaev et al. \(2015\)](#) observes similar patterns as NRNR in Italian, Russian, and Hindi.

Hindi patterns with the languages like English in that only the singular pivot is allowed, as shown in (183).

- (183) *yah haraa aur yah pilaa jhandaa*
 this.SG green.SG and this.SG yellow.SG flag.SG
 ‘this green and this yellow flag’ [2 flags total] (Hindi)

Italian, on the other hand, is more complicated. Italian allows both prenominal and postnominal adjectives. The number marking on the pivot is sensitive to which type of adjectives are modifying the noun. When the pivot is modified by two singular postnominal adjectives, the pivot must be plural, as shown in (184). When the pivot is modified by two singular prenominal adjectives, the pivot must be singular, as shown in (185).

- (184) Alla partenza saranno ammainate le ***bandiere rossa e bianca*** accompagnate possibilmente da segnale acustico. (Italian)
 to departure will.be.PL lowered.PL **the.PL flag.PL red.SG and white.SG** accompanied.PL possibly by signal acoustic
 ‘At the departure the red and white flags will be lowered, possibly accompanied by an acoustic signal.’ [2 flags total: one red, one white]
- (185) La novità era nel senso che essa cambiava la natura della liquidazione, cosicché vecchio e nuovo regime diventavano non più comparabili...
 the novelty was in.the sense that it changed the nature of.the liquidation so.that **old.SG and new.SG regime.SG** became.PL not anymore comparable
 ‘The novelty was in the sense that it changed the nature of liquidation, so that

the old and new regimes became no longer comparable...' [2 regimes: one old, one new] (Italian, *La Repubblica* corpus)

In (186), the Italian pivot noun with two post-nominal adjectives is spelled out as plural when the two adjectives show different number marking, i.e. the plural pivot nouns in Italian allow mismatches, unlike the plural pivot nouns in Bulgarian.³¹

- (186) *tulipani* rosso e bianchi
 tulips.PL red.SG and white.PL
 'red and white tulips' (Italian, caption of a picture showing one red tulip and two white tulips)

Russian only has prenominal adjectives. When modified by two singular adjectives, the pivot can be either singular or plural as is shown in (187).

- (187) Russian
- a. vysokij i xudoj *mužčina*
 tall.SG and thin.SG man.SG
 - b. vysokij i xudoj *mužčiny*
 tall.SG and thin.SG man.PL
 'one tall and one thin man'

Although plural and singular pivots are in general interchangeable, it is noted that the plural pivots involve 'a kind of natural coordination effect' whereas the singular pivots

³¹ It has been argued for Italian along with other Romance languages that the post-nominal adjectives are derived from reduced relative clause (Cinque (2010) among many others). If that is the case, the post-nominal adjectives are predicate adjectives rather than attributive ones and fall out of the scope of the current research.

do not (see [Walchi \(2005\)](#); [Dalrymple and Nikolaeva \(2006\)](#)). The plural pivot is natural in (188a) but less so in (188b). At the same time, the singular pivot in (188c) is natural.

- (188) a. dobryj i zloj *policejskie*
 good.SG and evil.SG policeman.PL
 ‘good cop and bad cop’ [referring to an interrogation technique]
- b. ??dobryj i zloj *sosedi*
 good.SG and evil.SG neighbour.PL
 intended: ‘good neighbour and evil neighbour’
- c. dobryj i zloj *sosed*
 good.SG and evil.SG neighbour.SG
 ‘a good neighbour and a bad neighbour.’ (Russian)

In Russian, not only adjectives, but also genitive possessives allow plural pivots as is shown in (189).

- (189) Pasportistka 12-go otdelenija milicii dvaždy podyšav na
 passport.officer of.twelfth station of.police twice having.breathed on
 štamp “Propisan postojanno”, ottisnula ego na *pasportax*
 stamp registered permanently imprinted it on passport.PL
 moem i ženy
 my.M.PREP.SG and wife.GEN.SG
 ‘The passport officer, having breathed twice on the stamp “Permanently registered”, imprinted it on me and my wife’s passports.’

[Belyaev et al. \(2015\)](#) accounts for these cross-linguistic patterns within LFG framework of agreement. In LFG, it is assumed that there are two types of features:

CONCORD features and INDEX features. CONCORD features are typically considered to be relevant to the DP internal agreement and related to morphology; INDEX features are typically considered to be relevant to the DP external agreement and related to semantics. Another assumption is that CONCORD feature is distributive – meaning that the feature associated with the conjunction is only associated with the individual conjuncts. On the other hand, INDEX feature is non-distributive, meaning that the feature associated with the conjunction is associated with the conjunction itself, not with individual conjuncts. In (190), the DP internal element *this* carries a distributive CONCORD feature [singular] and each conjunct is singular; the verb *are* carries a non-distributive INDEX feature [plural] so the whole conjunction is plural.

- (190) *this man and woman are a couple.*

To describe the cross-linguistic variation in agreement, [Belyaev et al. \(2015\)](#) diverges from the standard assumption that CONCORD features are distributive and INDEX features are non-distributive. They propose that while INDEX features are always non-distributive, CONCORD features can be distributive or non-distributive in different languages and different constructions. They further propose that Italian postnominal adjectives and Russian adjectives involve non-distributive CONCORD features which results in the plural marking on the pivot noun. At the same time, the Russian adjectives can optionally involve distributive CONCORD features which results in the singular marking on the pivot noun.

This line of research makes important cross-linguistic observations and proposes a novel account that captures the variation. As far as I know, this is the only account in the literature for the range of data. However, the account is not without questions. The LFG analysis assumes a conjunction structure of the sources like *one tall and one thin*, which entails non-constituent conjunction. The optionality of distributivity of the CONCORD feature needs further investigation. In Italian, the distributivity is sensitive to the positions of the adjectives (pre- vs. post-nominal). Russian on the other hand seems to show true optionality. In Chapter 4 of this dissertation, I will discuss the cross-linguistic patterns on the noun pivot in NRNR along with the multi-valued T and propose that the plural pivot involves semantic agreement whereas the singular pivot involves morphological agreement in the sense of [Corbett \(1979\)](#).

2.8 Conclusion

This chapter focus on one construction where a noun stands in phi feature dependency with multiple elements, i.e. the number feature of the noun is valued by multiple goals. Having labeled the phenomena ‘Nominal Right Node Raising (NRNR),’ I draw a generalization based on a cross-linguistic survey repeated in (191). I derive this generalization by assuming an multi-dominance analysis coupled with a set of well-motivated assumptions. The proposed analysis can also account for the mismatch cases in NRNR. I discuss potential alternative analyses and show that they fall short in accounting the full range of data. The multi-dominance analysis also provides empirical support for

the Backward Anaphora Constraint.

- (191) **NRNR Generalization:** In NRNR the singular pattern appears when the sources show agreement with the pivot.

The approach to NRNR in the current chapter poses a challenge to the morphological analysis of nominal concord. The morphological analysis of nominal concord puts the insertion of the Agr head to post-syntax stage of the derivation. NRNR shows that syntactic operations like multi-dominance are sensitive to whether an element shows nominal concord or not. If nominal concord is a post-syntactic operation, this sensitivity is surprising. Moreover, NRNR also provides evidence for the syntactic Agree-based approach to nominal concord and the implicational relation between syntactic and morphological agreement; the morphological agreement implies the syntactic agreement but not necessarily vice versa. The current analysis also argues for an Agree mechanism that allows Agree relation between two uninterpretable features and two unvalued features (similar to, but different from *feature sharing* in [Pesetsky and Torrego \(2001\)](#)).

Another important consequence of the current proposal is that the nominal right node raising like (192) involves multi-valuation, where the noun, as a probe, gets multiple number values. The scheme of multi-valued Ns is shown in (193).

- (192) This tall and that short *student* are a couple.

$$(193) \quad \text{Num}_1 [\text{singular}_1] \text{ Num}_2 [\text{singular}_2] \text{ } \overbrace{\quad \quad}^{\text{N} [\text{singular}]} \quad \quad$$

In the last section, I reviewed two previous investigations on NRNR-like constructions. Apart from the NRNR pattern which is the focus of the current chapter, different agreement patterns have been observed cross-linguistically. There are at least three types of languages regarding multi-valued Ns shown in (194).

- (194) a. Type 1: In English, German, Dutch, Icelandic, Polish, Serbo-Croatian, Slovak, Slovenian nouns valued by two singular prenominal goals are spelled as singular.³²
- b. Type 2: In Russian and Bulgarian, nouns modified by two singular elements are spelled out as singular or plural.
- c. Type 3: In Italian, nouns modified by two singular prenominal adjectives are spelled out as singular, while the ones modified by two singular post-nominal adjectives are spelled out as plural.

It is important to point out that the analysis proposed in this chapter can only cover Type 1. The only previous attempt to account for all three types in [Belyaev et al. \(2015\)](#) renders descriptive rather than explanatory. I come back to this puzzle in Chapter 4.

³² Greek, Hindi, Telugu, Hebrew, Finnish, Hungarian, Armenian also fall into this type. See detailed discussion in Chapter 4.

Chapter 3

Experiments on NRNR

3.1 Introduction

In this chapter I present six experiments investigating the nominal right node raising construction. The last chapter laid out the detailed analysis of number markings on the pivot in nominal right node raising constructions. The empirical scope accounted for by the analysis can be divided into three types in (195).

- (195) a. NRNR with matching values: This tall and that short student are a couple.
- b. NRNR with mismatching values: These tall and that short student are a couple.
- c. NRNR with possessive pronouns: His and her student are a couple.

The core data the analysis is based on were collected via informal consultation with native speakers. This chapter uses experimental methods including the 7 point Likert scale and forced choice tasks to substantiate the generalizations which the analysis in

Chapter 2 is based on. The first three experiments look into the acceptability of singular and plural pivots under different sources. The fourth experiment specifically investigates the acceptability of NRNR under possessive pronouns. The last two experiments investigate NRNR with mismatching values.

Chapter 2 mentioned several investigations into nominals that receive multiple values (Harizanov and Gribanova 2014, 2015; Belyaev et al. 2015; Shen 2016, 2017, 2018). Among the previous research, no one has used experimental methods to probe the number marking of the pivot, making the studies presented in this chapter the first of its kind. Note that a large part of the theoretical research on NRNR involve cross-linguistic variation. The experiments reported here only test English facts. I leave cross-linguistic experimental investigation for future research.

3.2 Experiments on NRNR with matching values

Experiment 1, 2, and 3 have a common goal: to test NRNR cases with matching values in English. Specifically, these three experiments check whether the generalization proposed in Chapter 2 repeated in (196) can be verified.

- (196) Generalization on NRNR: The singular pattern appears when the sources show morphological agreement with the pivot.

The generalization captures different number markings on the pivots in NRNR under different sources. The basic contrasts are shown in (197)- (198). In (197), the sources

this and *that* show number agreement, thus the pivot is marked as singular. In (198), the sources *John's* and *Mary's* do not show agreement, thus only the plural pivot is available. The following three studies aim check whether the contrasts hold in a controlled experiment.

- (197) a. This and that student are a couple.
- b. *This and that students are a couple.

- (198) a. *John's and Mary's student are a couple.
- b. John's and Mary's students are a couple.

3.2.1 Experiment 1: forced choice task 1

3.2.1.1 Materials, participants and procedure

Experiment 1 is a forced choice task. In this task the subjects are presented with two minimally different sentences, and asked to choose the sentence that sounds more acceptable. In this particular experiment, the only factor is the number marking of the pivot noun and the two levels of the factor is singular and plural. Thus, each target item includes two sentences with the NRNR construction; they only differ in terms of the number marking of the pivot noun, as shown in (199).

- (199) a. This and that *student* are a couple.
- b. This and that *students* are a couple.

I test 11 different sources in English in total, listed in Table 3.1. The labels of each source can be found in the parentheses.

condition name	condition code	example
bare demonstratives	dem.non	This and that <i>student(s)</i> are a couple.
demonstrative+adj	dem.adj	This tall and that short <i>student(s)</i> are a couple.
numeral+adj	num.adj	One tall and one short <i>student(s)</i> are a couple.
indefinite article+adj	ind.adj	A tall and a short <i>student(s)</i> are a couple.
definite article+adj	def.adj	The tall and the short <i>student(s)</i> are a couple.
bare possessor DP	pos.non	John's and Mary's <i>student(s)</i> are a couple.
possessor DP+adj	pos.adj	John's tall and Mary's short <i>student(s)</i> are a couple.
bare 1st/2nd person possessive pronoun	pop12.non	My and your <i>student(s)</i> are a couple.
1st/2nd person possessive pronoun+adj	pop12.adj	My tall and your short <i>student(s)</i> are a couple.
bare 3rd person possessive pronoun	pop33.non	Her and his <i>student(s)</i> are a couple.
3rd person possessive pronoun+adj	pop33.adj	Her tall and his short <i>student(s)</i> are a couple.

Table 3.1:

Four lexically matched conditions are created for each of the 11 sources in order to avoid differences across conditions due to lexical content. Examples of the test items are listed below in (200)-(203). The conjoined DPs involving NRNR are the subject of the sentence. The predicates used ensure that the subjects refer to two individuals and thus each conjunct is singular. The order of the singular pivot sentences and the plural pivot sentences were counterbalanced.

- (200) a. This and that student are a couple.
 b. This and that students are a couple.

- (201) a. This and that shoe were originally a pair.
 b. This and that shoes were originally a pair.

- (202) a. This and that kid are two of Emma's favorite teammates.
 b. This and that kids are two of Emma's favorite teammates.

- (203) a. This and that professor were the top two candidates.
 b. This and that professors were the top two candidates.

Each list contains 2 control items ((204) and (205)) and one test item. The control items are taken from [Sprouse et al. 2013](#) and are used to conceal the construction under investigation as well as to identify people who are not paying attention to the content of the survey. Like the test items, each control item consists of two minimally different sentences, one grammatical, the other ungrammatical. The ungrammatical sentence in the first control in (204) is less acceptable than the ungrammatical sentence in the second control in (205). Thus control item 1 is used as a looser criterion while control item 2 is more strict. The control items are the same in every list including the order of the sentences and the order of the items. They come before the test item.

A total of 88 lists were compiled. The experiment was conducted on Amazon Mechanical Turk (AMT). Each list was done by 6 subjects. A total of 528 native speakers participated in the experiment. Each participant was paid 15 cents (5 cents per judgment).

- (204) control item 1
- a. *There might mice seem to be in the cupboard.
b. There might seem to be mice in the cupboard.

(205) control item 2

- a. Into which room walked three men?
- b. *Into which room did walk three men?

3.2.1.2 Results

Out of the 528 subjects who participated. 1 participant did not get control item 1 right and 60 participants did not get control item 2 right. I will present results including all participants, results excluding 1 participant who got control item 1 wrong, and results excluding 61 participants who got any of the two control items wrong.

Results including all participants

A binomial test was ran. Table 3.2 shows results without any exclusion. The *sg* (*count*) column indicates the number of participants who chose the singular pivot over the plural pivot; the *pl* (*count*) column indicates the number of participants who chose the opposite. Each source got 48 data points as indicated in the *total* column. The *sg (%)* column indicates the percentage of participants who chose the singular pivot over the plural pivot; the *pl (%)* column indicates the percentage of participants who chose the opposite. The ‘prediction’ column specifies the preferred pivot according to the theory in Chapter 2 for each condition (*n.s.* = not significant). Conditions that show results as predicted are in blue and conditions that show unpredicted results are

in orange. P-values that are significant ($p\text{-value} < .05$) are in bold.

For sources like dem.non, dem.adj, num.adj, ind.adj, and pop12.adj, singular pivots are significantly preferred over plural pivots. Def.adj and pos.non show a significant preference for plural over singular. Pos.adj, pop12.non, pop33.non, pop33.adj did not show significant preferences between the two pivots.

sources	example	sg (count)	pl (count)	total	sg (%)	pl (%)	prediction	p-value
dem.non	this and that N	44	4	48	91.7%	8.3%	singular	1.514e-09
dem.adj	this tall and that short N	43	5	48	89.6%	10.4%	singular	1.368e-08
num.adj	one tall and one short N	44	4	48	91.7%	8.3%	singular	1.514e-09
ind.adj	a tall and a short N	45	3	48	93.8%	6.2%	singular	1.313e-10
def.adj	the tall and the short N	11	37	48	22.9%	77.1%	singular	.0002
pos.non	John's and Mary's N	4	44	48	8.3%	91.7%	plural	1.514e-09
pos.adj	J's tall and M's short N	18	30	48	37.5%	62.5%	singular	.1114
pop12.non	my and your N	25	23	48	52.1%	47.9%	n.s.	.8854
pop12.adj	my tall and your short N	36	12	48	75%	25%	singular	.0007
pop33.non	her and his N	24	24	48	50%	50%	n.s.	1
pop33.adj	her tall and his short N	23	25	48	47.9%	52.1%	singular	.8854

Table 3.2: Results for Experiment 1 with no subjects excluded

Results excluding 1 participant

This analysis excluded the one participant who didn't get the control item 1 right. Again, a binomial test was run and the results are shown in Table 3.3. The exclusion did not change the pattern of results.

Results excluding 61 participants

Table 3.4 shows the analysis with a more strict criterion. It excludes 61 participants who did not get both of the control items right. The more restricted criterion did

sources	example	sg (count)	pl (count)	total	sg (%)	pl (%)	prediction	p-value
dem.non	this and that N	44	4	48	91.7%	8.3%	singular	1.514e-09
dem.adj	this tall and that short N	42	5	47	89.4%	10.6%	singular	2.458e-08
num.adj	one tall and one short N	44	4	48	91.7%	8.3%	singular	1.514e-09
ind.adj	a tall and a short N	45	3	48	93.8%	6.2%	singular	1.313e-10
def.adj	the tall and the short N	11	37	48	22.9%	77.1%	singular	.0002
pos.non	John's and Mary's N	4	44	48	8.3%	91.7%	plural	1.514e-09
pos.adj	J's tall and M's short N	18	30	48	37.5%	62.5%	singular	.1114
pop12.non	my and your N	25	23	48	52.1%	47.9%	n.s.	.8854
pop12.adj	my tall and your short N	36	12	48	75%	25%	singular	.0007
pop33.non	her and his N	24	24	48	50%	50%	n.s.	1
pop33.adj	her tall and his short N	23	25	48	47.9%	52.1%	singular	.8854

Table 3.3: Results for Experiment 1 with 1 subject excluded

not change the pattern of the results.

sources	example	sg (count)	pl (count)	total	sg (%)	pl (%)	prediction	p-value
dem.non	this and that N	40	4	44	91%	9%	singular	1.71E-08
dem.adj	this tall and that short N	38	4	42	90.5%	9.5%	singular	5.65E-08
num.adj	one tall and one short N	42	4	46	91.3%	8.7%	singular	5.10E-09
ind.adj	a tall and a short N	36	3	39	92.3%	7.7%	singular	3.61E-08
def.adj	the tall and the short N	10	31	41	24.4%	75.6%	singular	.0015
pos.non	John's and Mary's N	3	39	42	7.1%	92.9%	plural	5.63E-09
pos.adj	J's tall and M's short N	17	24	41	41.5%	58.5%	singular	.3489
pop12.non	my and your N	23	18	41	56.1%	43.9%	n.s.	.5327
pop12.adj	my tall and your short N	33	9	42	78.6%	21.4%	singular	.0003
pop33.non	her and his N	20	20	40	50%	50%	n.s.	1
pop33.adj	her tall and his short N	18	24	42	42.9%	51.7%	singular	.4408

Table 3.4: Results for Experiment 1 with 61 subjects excluded

3.2.1.3 Discussion

The significant preference for singular in dem.non (*this and that*), dem.adj (*this tall and that short*), num.adj (*one tall and one short*), and ind.adj (*a tall and a short*) conditions are compatible with the generalization in (196) and are predicted by the analysis laid out in Chapter 2. According to the analysis, the agreement between these sources and the pivot indicates a multi-dominance structure which generates singular pivots. The significant preference for plural pivots in pos.non (*John's and Mary's*) is also predicted.

The absence of agreement between possessor DPs and the possessee NP indicates a complex possessor structure which generates plural pivots. Pos.adj (*John's tall and Mary's short*) shows no significant contrast. Def.adj (*the tall and the short*) shows significant preference for plural pivots. These results are not predicted under the analysis proposed in Chapter 2.

In terms of possessive pronouns, in Chapter 2, I argue that pop12 (*my and your*) and pop33 (*her and his*) with no adjectives are not acceptable regardless of the number marking on the pivot. The forced choice task used in this experiment is sensitive to relative differences between two sentences. The lack of significant contrast between the singular and plural pivots here are expected if neither is acceptable. Further experiments are required to see whether these two cases are indeed unacceptable. Pop12.adj (*my tall and your short*) shows significant preference for singular as is predicted, however, pop33.adj (*her tall and his short*) which is also predicted to prefer singular did not show significant contrast between singular and plural.

Results from three sources are not predicted by the analysis; def.adj, pos.adj, and pop33.adj. These sources share the feature that the sources are not morphologically marked in terms of number. Two reasons are possible in accounting for the unpredicted results. First, participants on AMT might need more cue to ensure the intended interpretation of the DP (e.g. *the tall and the short student(s)*). The intended interpretation for all the sentences in Experiment 1 involves two individuals. Experiment 1 uses predicates like *are a couple*, *are the top two candidates*, etc., to ensure this interpretation;

however, the participants might have ignored the predicates and assume an interpretation where there are more than 2 individuals. Note that if happens, the string in (206a) would be accepted as opposed to (206b).

- (206) a. The tall and the short students are ...
- b. *This and that students are ...

Second, the unpredicted results may involve a processing preference for locally grammatical (but globally ungrammatical) strings over strings that seem to be locally ungrammatical but are actually globally grammatical.¹ Take the def.adj condition as an example where the plural pivot is predicted to be bad but is judged better than the singular pivot. When the pivot is *student* in (207a), the string *student are* form a local string that seems ungrammatical in isolation. In (207b) when the pivot is *students*, the string *students are* form a local string that seems grammatical. Since all the sentences in Experiment 1 involve the plural copula *are*, the reasoning above might have contributed to the unexpected preference for plural over singular in these conditions. This is further supported by the fact that the unpredicted results (def.adj, pos.adj, pop33.adj) share the feature that the sources are not morphologically marked in terms of number.

- (207) a. The tall and the short student are a couple. (dispreferred)²
- b. *The tall and the short students are a couple. (preferred)

¹ For discussion on locally grammatical strings, see Tabor et al. 2004.

² The blue underline indicates locally grammatical strings of the pivot and the copula, the red underline indicates locally ungrammatical strings of the pivot and the copula.

The morphologically marked sources do not suffer from this processing preference. In (208), the local strings involving the pivot and the copula are the same as in (207). However, the local strings involving the second source and the pivot play a role. In (208a) the local string *that student* is grammatical while the local string *that students* is ungrammatical in (208b). I hypothesize that the acceptability of the DP internal local string cancels out the unacceptability of the local string involving the head noun *student* and the verb *are*. (208a) is thus preferred over (208b) despite that the local string *student are* in (208a) is ungrammatical. One possible reason for the local string *that student* to cancel out the *student are* may lie in the fact that *that* and *student* form a constituent whereas *student* and *are* do not. Thus one can hypothesize that the local mismatch between two elements within a constituent is not tolerated while that between two elements across different constituents can not be.

- (208) a. This and that student are a couple. (preferred)
- b. *This and that students are a couple. (dispreferred)

To eliminate these potential confounds, the materials used in the next experiment have been modified accordingly.

3.2.2 Experiment 2: forced choice task 2

3.2.2.1 Materials, participants, and procedure

Experiment 2 is also a forced choice task. Like Experiment 1, the participants were asked to choose the more natural sounding one out of two minimally different sentences. To address the possible confounds that result in the unpredicted results in Experiment 1, two modifications have been made to Experiment 2. First, to make sure that the participants judge the sentences based on the intended interpretation where the subject phrase refers to two individuals, a context sentence setting the scenario up and a picture depicting the scenario are added to each pair of sentences. The participants can see directly that the intended interpretation of the DPs involving NRNR is two individuals. Second, the predicates of the test sentences have been replaced with predicates with verbs that are not morphologically number marked (e.g. *came*), unlike *are* in Experiment 1. This is to eliminate the possible effect of locally grammatical but globally ungrammatical strings mentioned above.

Experiment 2 included 8 out of the 11 sources from Experiment 1. Dem.non (*this and that*), dem.adj (*this tall and that short*), num.adj (*one tall and one short*), ind.adj (*a tall and a short*) have, as predicted, shown clear preference for singular pivots in Experiment 1, so Experiment 2 only included ind.adj to ensure that the changes made do not effect the results for these sources. The rest of the sources are all included in Experiment 2: def.adj (*the tall and the short*), pos.non (*John's and Mary's*), pos.adj (*John's tall and Mary's short*), pop12.non (*my and your*), pop12.adj (*my tall and your*

short), pop33.non (her and his), pop33.adj (her tall and his short).

The only factor is the number marking on the pivot noun and the two levels are singular and plural. Two lexically matched conditions are created for each source in order to avoid differences across conditions due to lexical content, as shown in (209). Within each item, the order of the singular pivot sentences and the plural pivot sentences are counterbalanced.

- (209) a. A tall and a short student(s) came from the U.S.
 b. A blue and a green book(s) fell on the table

Each list contains 2 control items ((210) and (211)) and one test item (212). The control items come before the test item. The control items are the same in every list including the order of the sentences and the order of the items. Each item consists of a context sentence, a minimal pair of sentences, along with one picture that depicts the scenario, in that order. I would like to thank Yimei Xiang for allowing me to use her illustrations in the stimuli.

(210) Control item 1

The animals are having snacks.

- a. A bunny and two dogs are having ice cream.
- b. A bunny and two dogs are having ice cream.

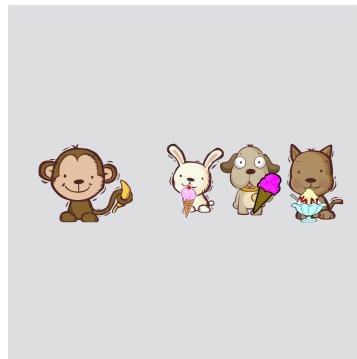


Fig. 3.1: Exp 2: control item 1

(211) Control item 2

Bill, John, and Mary each have one child.

- a. Bill's child is wearing a red hat.
- b. John's child is wearing a red hat.

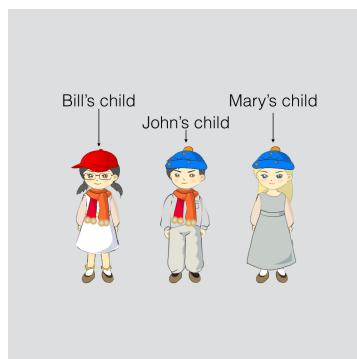


Fig. 3.2: Exp 2: control item 2

(212) Sample test item

Mary and John advised two students each. The students have travelled here for an international conference.

- a. Mary's tall and John's short student came from the U.S.
- b. Mary's tall and John's short students came from the U.S.

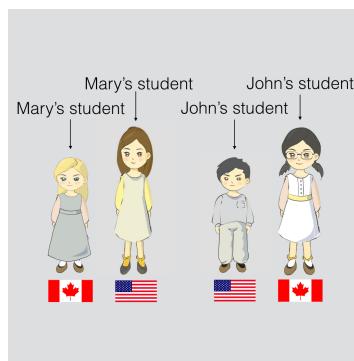


Fig. 3.3: Exp 2: sample test item

With 8 sources, 2 sentence orders, and 2 lexically matched conditions, a total of 32 lists were compiled. This experiment was conducted via Google Drive and the participants are recruited via the UConn Linguistics Subject Pool. 339 native speakers of English completed the experiment. The participants received extra credit for their participation.

The design of Experiment 2 differs from that of Experiment 1 in the following ways:

1. the choice of number neutral predicates,
2. using images to depict scenarios,
3. two lexically matched conditions instead of four in Experiment 1,

4. eight sources instead of eleven in Experiment 1.

3.2.2.2 Results

Out of the 339 native speakers that participated Experiment 2, four participants failed the second control item and no participant failed the first control item. A binomial test was run and Table 3.5 summarizes the results from all 339 participants.

The *sg (count)* column indicates the number of participants who chose the singular pivot over the plural pivot; the *pl (count)* column indicates the number of participants who chose the opposite. The *total* column shows the total number of participants who completed each condition. Given the nature of the recruitment process, the number of participants of each source, range from 35 to 46. The *sg (%)* column indicates the percentage of participants who chose the singular pivot over the plural pivot; the *pl (%)* column indicates the percentage of participants who chose the opposite. The *prediction* column shows the predicted preferred pivot given the theory. Conditions that show results as predicted are in blue and conditions that show unpredicted results are in orange. P-values that are significant are in bold.

The table includes results from Experiment 1. Pos.adj shows a significant preference for singular (cf. no preference in Exp. 1). Def.adj shows no significant difference (cf. preference for plural in Exp. 1). Pop33.non shows significant preference for plural (cf. no preference in Exp. 1). Pop33.adj shows significant preference for singular (cf. no preference in Exp. 1). The non-significant results remain for the pop12.non

condition.

sources	example	sg (count)	pl (count)	total	sg (%)	pl (%)	prediction	p-value	Exp 1
ind.adj	a tall and a short N	45	1	46	97.8%	2.2%	singular	1.336e-12	singular
def.adj	the tall and the short N	22	19	41	53.7%	46.3%	singular	.7552	plural
pos.non	John's and Mary's N	9	36	45	20%	80%	plural	6.575e-05	plural
pos.adj	John's tall and Mary's short N	32	11	43	74.4%	25.6%	singular	.0019	neither
pop12.non	my and your N	23	20	43	53.5%	46.1%	n.s.	0.7608	neither
pop12.adj	my tall and your short N	28	7	35	80%	20%	singular	.0005	singular
pop33.non	her and his N	15	30	45	33.3%	66.7%	n.s.	0.0357	neither
pop33.adj	her tall and his short N	32	9	41	78%	22%	singular	0.0004	neither

Table 3.5: Results for Experiment 2: no exclusion

Table 3.6 summarizes the results of Experiment 2 excluding the four participants who failed the second control item. 335 are included in the analysis. A comparison between Table 3.5 and Table 3.6 shows that excluding the four participants did not change the results.

sources	examples	sg (count)	pl (count)	total	sg (%)	pl (%)	prediction	p-value	Exp 1
ind.adj	a tall and a short N	45	1	46	97.8%	2.2%	singular	1.336e-12	singular
def.adj	the tall and the short N	22	19	41	53.7%	46.3%	singular	.7552	plural
pos.non	John's and Mary's N	9	36	45	20%	80%	plural	6.575e-05	plural
pos.adj	John's tall and Mary's short N	32	11	43	74.4%	25.6%	singular	.0019	neither
pop12.non	my and your N	22	18	40	55%	45%	n.s.	0.6358	neither
pop12.adj	my tall and your short N	28	7	35	80%	20%	singular	.0005	singular
pop33.non	her and his N	14	30	44	31.8%	68.2%	n.s.	0.02263	neither
pop33.adj	her tall and his short N	32	9	41	78%	22%	singular	0.0004	neither

Table 3.6: Results for Experiment 2 with 4 subjects excluded

To summarize, in Experiment 2, ind.adj (*a tall and a short*), pos.adj (*John's tall and Mary's short*), pop12.adj (*my tall and your short*), pop33.adj (*her tall and his short*) reveal a significant preference for singular over plural. Pos.non shows a significant preference for plural over singular as Experiment 1. Pop33.non shows significant preference for plural over singular, unlike the non-significant results in Experiment 1. Def.adj and pop12.non did not show significant contrast.

3.2.2.3 Discussion

Let us now look at how the changes made to the design of Experiment 1 have affected the results. The use of images to depict scenarios is to make sure the participants judge the sentences with the intended meaning: two individuals. Switching to number neutral predicates is to make sure that the participants judge the acceptability of the sentences without the possible local string effects.

For the number marked ind.adj condition, the preference toward the singular pivot remains significant. This is expected since the local string effect is cancelled out in conditions with number marked sources as discussed above.

For the pos.non condition, the preference toward the plural pivot remains significant. This indicates that the plural pivot preference in this condition is not due to the local string effect.

For the pos.adj condition, the results changed from no preference in Experiment 1 to significant singular preference in Experiment 2. This shows that the modification works as intended: the non significant results from Experiment 1 was confounded by either the local string effect or the fact that some participants were not paying attention to the intended interpretation or both. Removing those confounds results in a clear preference toward the singular pivot. The same effect is found on the pop33.adj condition, which also switched from a non-significant result to a significant preference toward singular pivots.

The pop12.adj condition shows significant singular preference in both Experi-

ment 1 and 2. Somehow the confounds in Experiment 1 did not materialize on this condition. Thus the modifications in Experiment 2 to fix the confounds did not have an effect.

The pop12.non shows no preference, as in Experiment 1. This indicates that this result is not confounded like pos.adj in Experiment 1.

The pop33.non condition shows a significant preference toward the plural pivot. The same condition shows no significant preference in Experiment 1. This is rather surprising given that the modifications in Experiment 2 were to eliminate the confounds that drove up the acceptance of the plural pivots. The result is compatible with a hypothesis that possessive pronouns are treated as possessor DPs by the participants. In that case, the pop33.non sentences would have a conjoined specifier structure like *John's and Mary's students*

Finally, the def.adj condition changed from significant plural preference in Experiment 1 to no preference in Experiment 2. Consistent with the pos.adj and pop33.adj, this change shows that some of the plural preference shown in Experiment 1 is due to the confounds mentioned above. At the same time, the non significant result puts the def.adj condition in a somewhat unique position. Unlike the pos.adj and pop33.adj conditions, the def.adj condition did not show significant preference toward the singular pivot. This surprising result could mean multiple things. One possibility is that the confounds mentioned above somehow persisted in this condition. This is unlikely given the results for the pos.adj and pop33.adj conditions.

A second possibility is that the non-significant result reflects the genuine judgments of this condition. It is possible that under definite articles and adjectives, both the singular and the plural pivot are accepted.

The third possible explanation is that the def.adj condition involves a confound that is different from the ones mentioned above and is unique to this condition. One potential candidate is that the participants ignore the determiner *the* in the second conjunct (possibly due to inattention or attempting to finish the task quickly). If that is what happens, the intended sentences in (213) are coerced to sentences in (214). I propose that sentences in (214) involve a conjoined adjective structure rather than multi-dominance. Note that both (213a) and (214b) are grammatical and felicitous in the scenario where there is one tall and one short student. Furthermore, (214b) does not involve NRNR and is possibly more frequent³. If this is the case, the acceptance of the plural pivots in this condition would be driven higher for a reason that's irrelevant to the purpose of the experiment.

- (213) a. The tall and the short student came from the U.S.

- b. #The tall and the short students came from the U.S.

- (214) a. #The tall and short student came from the U.S.

- b. The tall and short students came from the U.S.

What is important about this potential confound is that it is uniquely possible for the

³ Jonathan Bobaljik (p.c.) points out that the NRNR in (213a) may be of a higher register.

def.adj condition. The def.adj condition involves the same lexical item in both sources, namely the definite article *the*, which makes ignoring it possible.⁴

No overlap is found in other conditions that do not show number agreement. Take the pos.adj condition in (215) for example. It would not be possible to coerce (215a) into (215b) since they would involve different interpretations.

- (215) a. John's tall and Mary's short students came from the U.S.
 b. John's tall and short students came from the U.S.

It is not clear how to tease apart the possibility that the non-significant result of the def.adj condition reflects the true acceptance and the possibility that the result is driven by this unique confound. One direction to go is to add the sentences in (214) in the experiment so that the participants can see their difference from the intended sentence in (213); or to ask the participants to recall the sentences they just judged at a later stage of the experiment to see whether they have judged the right sentences. I leave teasing apart these possibilities for future research.

⁴ The ind.adj condition also involves the same lexical item in both sources: *a tall and a short student*; however, the confound in (214) does not apply to the ind.adj condition. This is because ignoring the second *a* would create the strings below. The string with a singular pivot in (i) involves a contradictory interpretation, while the string with a plural pivot in (ii) is ungrammatical given the singular nature of the indefinite article.

- i #a tall and a short student
- ii *a tall and a short students

3.2.2.4 From results to theories

Having looked at how the results in Experiment 2 have changed in light of the modifications to the design. Let us now look at what these changes say about the theory I proposed in Chapter 2.

The results from Experiment 2 are more in line with the predictions made by the analysis in Chapter 2. The pos.adj (*John's tall and Mary's short*) and pop33.adj (*her tall and his short*) conditions show significant preference for the singular pivots just like conditions with number marked sources like ind.adj (*a tall and a short*). Other conditions like pos.non, pop12.non remain the same as Experiment 1. This indicates that the part of Experiment 1 that accorded well with the predictions was not due to any possible confounds.

The def.adj changes from significant preference for plural to non-significant contrast. Although this is still not predicted in the theory, it is a move to the direction of the prediction. However it remains puzzling why def.adj is not significant when the analysis in Chapter 2 predicts a preference of singular over plural. I listed some possible causes above to test in future research.

Another surprising result is found with pop33.non. This condition shows no significant difference between singular and plural pivots in Experiment 1, as is predicted by the analysis. In Experience 2, the plural pivot is significantly preferred; however, this is not necessarily a problem for the analysis, which predicts that neither singular nor plural pivot is acceptable. Even if one sentence is significantly preferred over an-

other in a forced choice task, they can still both be unacceptable in a 7 point judgement task. The next experiment uses 7 point judgment task to probe the acceptability of the pivots in NRNR.

3.2.3 Experiment 3: 7 point judgment task 1

3.2.3.1 Materials, participants, and procedure

In Experiments 1-2, the forced choice task was used to reveal the preference between singular and plural pivots under different sources. The forced choice task is the most sensitive task to differences between conditions; however the forced choice task does not tell us where the individual sentences are on the scale of acceptability. We only know if they are the same or different. If they are the same, they could be the same anywhere on the scale. If they are different, the two items could be anywhere on the scale (in the right order). For example, difference between singular and plural pivots has been shown to be not significant under sources like pop12 (*my and your*) in Experiment 2. However, this does not speak to whether they are both acceptable or unacceptable. The analysis proposed in 2.3.4 in Chapter 2 predicts that both are unacceptable. To verify predictions regarding the absolute acceptance of the sentences, Experiment 3 uses a 7 point Likert scale task. In this task, the participants were given pairs of minimally different sentences and asked to rate the naturalness of each sentence by a rating between 1-7.

In Experiment 3, the only factor is the number marking on the pivots and the two

levels are singular and plural. Two lexically matched conditions have been created and the order of the two sentences in the test items are counter-balanced. All 11 sources are included.

Each list consists of two control items and one test item. Each item consists of one contextual sentence, one image depicting the scenario, and two minimally different sentences to judge, in that order. The image is moved from after the minimal pair of sentences to between the context sentence and the minimal pair of sentences. This is to ensure that the participants pay attention to the scenario depicted in the image. I would also like to thank Dorothy Ahn and Yimei Xiang for allowing me to use their illustrations in the stimuli. The control items are the same across lists, shown in (216) and (217).

- (216) Control item 1
 The animals are having snacks.

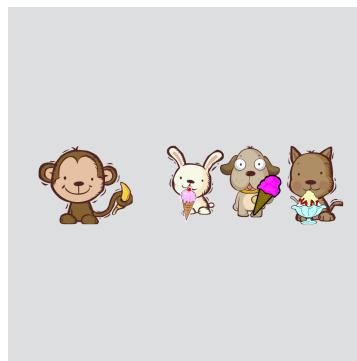


Fig. 3.4: Exp 3: control 1

- a. A bunny and two dogs is having ice cream.
- b. A bunny and two dogs are having ice cream.

(217) Control 2

John is trying on his new red shorts.



Fig. 3.5: Exp 3: control 2

- a. John is looking at himself in the mirror.
- b. John is looking at him in the mirror.

(218) Sample test item

Someone put several books on the table. The blue book belongs to Emily and the orange book belongs to Sarah.



Fig. 3.6: Exp 3: test item

- a. Emily's blue and Sarah's orange book fell off the table.
- b. Emily's blue and Sarah's orange books fell off the table.

With 2 orders, 2 lexically matched conditions, and 11 sources, a total of 44 lists were compiled. The experiment was conducted on Amazon Mechanical Turk. Each

list was done by 6 subjects and a total of 264 subjects finished the experiment. Each participant was paid 30 cents (5 cents per judgment).

3.2.3.2 Results

For the 7 point scale task, I show the results in two ways: statistical results from a linear mixed effects modal and a plot of the responses and the mean judgments. All 264 participants were included in the analyses.

A linear mixed effects model was created with the singular/plural pivot as the fixed factor. The results are summarized in Table 3.7. Four pieces of results are provided: the mean rating (out of 7) for the sentences with singular pivots under the source (*singular mean*), the mean rating (out of 7) with plural pivots under the source (*plural mean*), the F value, and the p-value. Linking the mean ratings and grammaticality is a complex issue. I will follow the simple assumption that ratings above 4 are accepted and ratings below 4 are not accepted. I also included the predicted preferred pivots in each condition, as well as the results from the previous two experiments. Conditions that show predicted results are in blue and the ones that show unpredicted results are in orange. P-values that are statistically significant are in bold.

conditions	example	singular mean	plural mean	F value	p-value	prediction	Exp 1	Exp 2
dem.non	this and that N	4.96	1.83	58.4	<.0001	singular	singular	n/a
dem.adj	this tall and that short N	4.79	2.21	27.5	<.0001	singular	singular	n/a
num.adj	one tall and one short N	5.83	2.21	71.6	<.0001	singular	singular	n/a
ind.adj	a tall and a short N	6.33	2.1	148.2	<.0001	singular	singular	singular
def.adj	the tall and the short N	4.25	5.25	3.2	.0815	singular	plural	neither
pos.non	John's and Mary's N	2.33	6.46	135.6	<.0001	plural	plural	plural
pos.adj	John's tall and Mary's short N	4.21	3.8	0.5	.4642	singular	neither	singular
pop12.non	my and your N	3.04	2.83	0.16	.6931	neither	neither	neither
pop12.adj	my tall and your short N	4.92	2.92	14.4	.0004	singular	singular	singular
pop33.non	her and his N	3.29	3.21	0.03	.8649	neither	neither	plural
pop33.adj	her tall and his short N	4.88	3.33	9.2	.0058	singular	neither	singular

Table 3.7: Results for Experiment 3

For the number marked conditions including dem.non, dem.adj, num.adj, and ind.adj, the singular pivots receive mean ratings from high 4s to 6.33 while the plural pivots range from 1.83 to 2.21. The singular pivots are significantly preferred over the plural ones. These results are compatible with the previous two experiments. The means show that the singular pivots are acceptable while the plural pivots are not.

For the def.adj condition, the singular mean is 4.25 and the plural is 5.25; no significant difference is detected, which is the same as the results from Experiment 2. The means seem to show that both the singular and the plural pivot are accepted. Nevertheless, see the discussion in Experiment 2 for some possible reasons why this might not be the case.

The singular pivots in the pos.non condition have a mean of 2.33 while the plural pivots have 6.46. The plural pivot in this condition is significantly preferred than the singular one, as is in the previous two experiments. The means show that the plural pivot is accepted in this condition while the singular pivot is not.

For the pos.adj condition, the singular mean is 4.21 and the plural mean is 3.8. No significant difference between the two is detected. This result is compatible with

that from Experiment 1 but not from Experiment 2. The mean ratings show that the singular pivot is accepted and the plural is the same.

In both the pop12.non and the pop33.non conditions, the singular and the plural means are at low 3s (pop12.non singular: 3.04, pop12.non plural: 2.83, pop33.non singular: 3.29, pop33.non plural: 3.21). The differences between the singular mean and the plural mean are not significant in these conditions. This indicates that neither the singular pivot nor the plural pivot is acceptable in these two conditions.

In the pop12.adj condition, the singular mean is 4.92 and the plural mean is 2.92. In the pop33.adj condition, the singular mean is 4.88 and the plural mean is 3.33. In both conditions, the singular pivots are significantly preferred over the plural pivots. These results are the same as in Experiment 2. The means indicate that the singular pivots in these conditions are acceptable while the plural ones are not.

In addition to the means, the F values, and the P values, the results for each condition are plotted in Figure 3.7. The white diamond indicates the mean judgment of that condition. The black dots indicates the individual judgments of that condition. The width of the colored bars (blue = singular, orange = plural) indicates the distribution of the judgments in each condition.

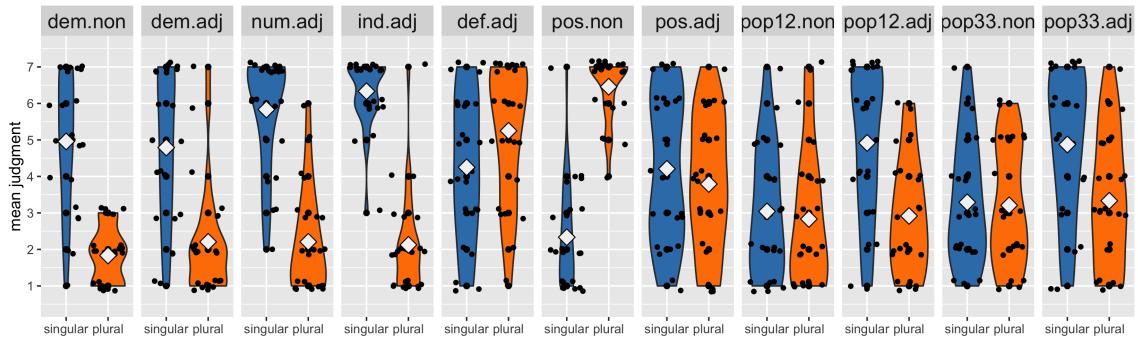


Fig. 3.7: Plot for Experiment 3

Through the distribution of the judgments in the violin figure in 3.7, we can see the variation among the speakers. In conditions with number marked sources including dem.non, dem.adj, num.adj, and ind.adj, ratings of the singular and the plural pivots did not show much variation. Most participants rated the singular pivots high and the plural pivots low. What is also notable is that there is more variation in singular pivots in dem.non, dem.adj, and num.adj conditions than in the plural pivots. In other words, a number of participants gave low ratings to the singular pivots. As for the def.adj condition, the singular pivot shows a large amount of variation. Roughly the same number of participants rated the sentence at all 7 points of the scale. As for the plural pivot in this condition, more participants gave higher ratings. However the variation is notably larger than that of the conditions with number marked sources. The pos.non condition shows little variation; most participants gave the singular pivots low ratings and the plural pivots high ratings. Like the def.adj condition, the pos.adj condition shows a considerable amount of variation. The pop12.non and pop33.non conditions show similar patterns in terms of variation; more participants gave low ratings to both

the singular and the plural pivots. The pop33.adj and pop12.adj conditions show similar patterns as well; in both conditions more participants rated the singular pivots high and the plural pivots low. What is worth mentioning is that the variation in the pop12.adj and pop33.adj in both the singular and the plural pivot is larger than that in conditions with number marked sources.

In addition to the variations and the mean rating, I calculate for each participant the rating difference between the singular and plural pivots. The results are summarized in Figure 3.8. The x-axis is the difference between the rating of the singular pivot and that of the plural pivot (singular - plural). The positive values indicate that the rating of the singular is higher than that of the plural, while the negative values indicate the opposite. Zero value indicates that the ratings of the singular and the plural pivot are the same. The y-axis is the number of participants who show the value differences in that condition. From the individual rating difference between singular and plural pivots, we can learn 1) whether the direction between the two pivots in Experiment 3 are the same as the results from the previous 2 experiments and 2) the potential source for the variation among participants shown in Figure 3.7.

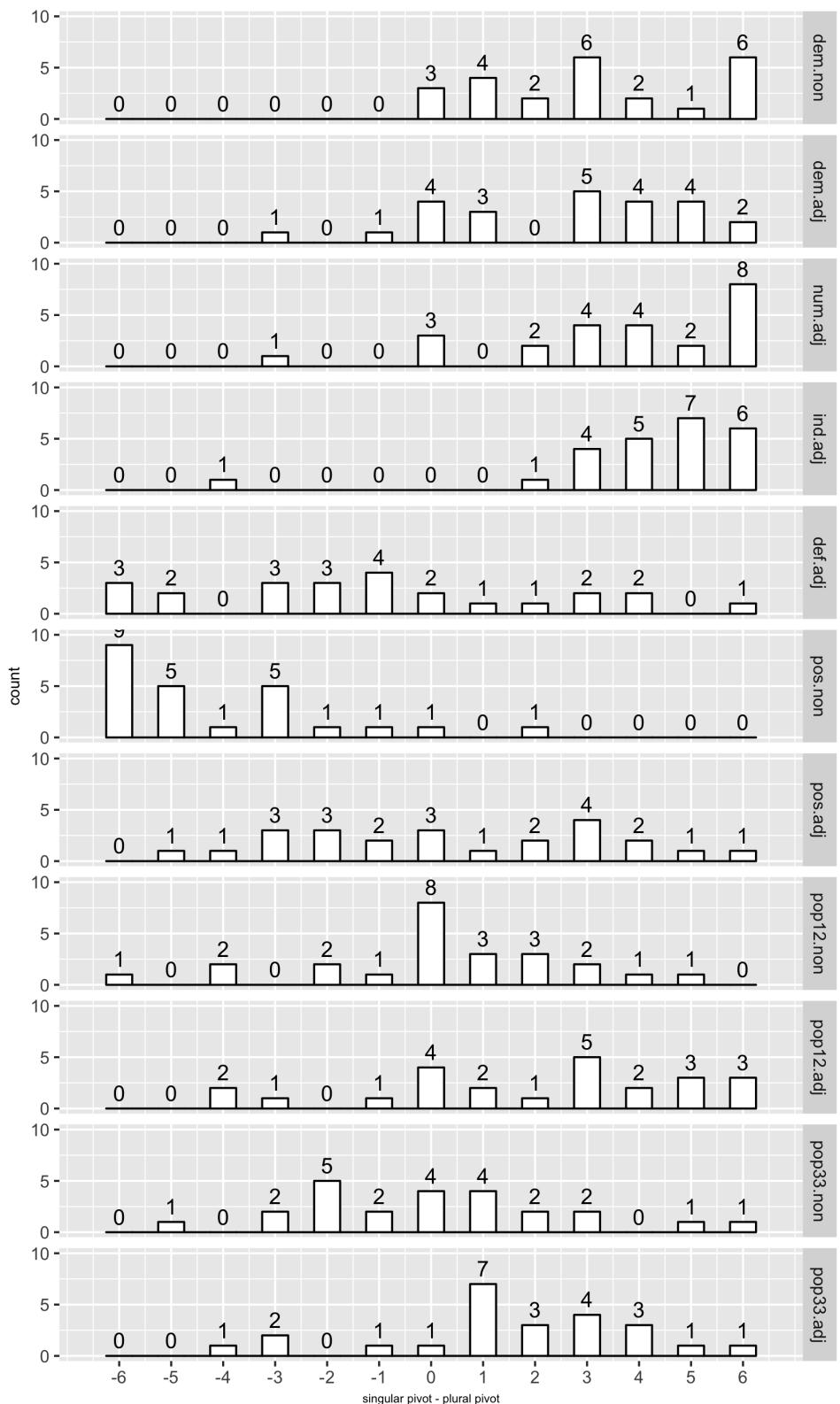


Fig. 3.8: Rating difference for Experiment 3

For the dem.non condition, 21 out of 24 participants preferred singular pivots over plural ones. The remaining three participants did not find them different. For the dem.adj condition, 18 out of 24 participants preferred singular pivots over plural. Four rated them the same. Two rated the plural pivots higher than the singular ones. For num.adj, 20 out of 24 participants preferred singular pivots over plural. Three rated them the same. One participant gave the plural pivots a high rating. For ind.adj, 23 out of 24 participants preferred singular pivots over plural. One participant gave the plural pivots a higher rating. For pos.non, 1 out of 24 participants rated singular higher than plural. 1 participant rated the two the same. 22 participants rated the plural pivots higher than the singular ones. These results are compatible with the forced choice tasks in Experiment 1 and 2.

For def.adj, 7 out of 24 participants preferred the singular pivots over plural. Two participants gave the singular and plural pivots the same rating. 15 out of 24 participants preferred the plural pivots over singular. Note that 7 out of these 15 participants rated plural pivots 1 or 2 points higher than the singular pivots. This is different from the pos.non condition where only 2 out of the 22 participants rated plural pivots 1 or 2 points higher and the rest 20 participants rated plural at least 3 points higher than singular. The rating difference in this condition is also compatible with the results from the forced choice task in Experiment 2 where no significant difference was found between the singular and plural pivots.

For pos.adj 11 participants gave the singular pivot a higher rating, 10 participants

gave the plural a higher rating, and 3 gave the two the same rating. The rating difference of this condition differs from the results from the forced choice task in Experiment 2. Recall that in Experiment 2, the singular pivot is significantly preferred. One potential reason for the difference is that the forced choice task is the most sensitive task to differences between conditions. It then follows that some of the results from the forced choice task do not show up in 7 point Likert scale.

For pop12.non, 8 out of 24 participants gave singular and plural pivots the same rating. 6 participants gave a higher rating to plural pivots and 10 gave a higher rating to singular pivots. 17 out of the 24 participants gave singular and plural pivots ratings with a difference lower than 2 points. For pop33.non, 10 gave the singular pivot higher ratings, 10 gave the plural pivot higher ratings, and 4 gave the two the same rating. Just like pop12.non, 17 out of 24 participants gave the singular and plural pivots ratings with a difference less than 2 points. These results are compatible with those from Experiment 2 where neither of these conditions showed significant difference. For pop12.adj, 16 out of 24 participants gave singular a higher rating. 4 gave plural a higher rating and 4 gave the two the same rating. For pop33.adj, 19 out of 24 participants gave singular a higher rating. 4 gave plural a higher rating and 1 gave the two the same rating. These results are also compatible with Experiment 2.

From the statistics, the plot, and the rating differences, we can see that results from the dem.non, dem.adj, num.adj, ind.adj conditions are compatible with Experiments 1 and 2; the singular pivot is acceptable, but not the plural pivot. Pos.non is

also in line with the two previous experiments; the plural pivot is acceptable, but not the singular pivot. Pop12.non and pop33.non did not show significant contrasts and in both cases the singular and the plural pivot are not accepted. In both pop12.adj and pop33.adj conditions, singular pivots are acceptable, plural pivots are not. However the variation in these two conditions are larger than that in conditions like dem.adj. The pos.adj condition did not show significant contrasts between singular and plural pivots, unlike Experiment 2. In the def.adj condition, the plural pivot is not significantly different from the singular pivot. These two conditions also involve a large amount of variation.

3.2.3.3 Discussion

Let us look at whether the results from Experiment 3 are expected from the analysis put forward in Chapter 2. Note that from the results of the 7 point Likert scale task, we can learn three pieces of information: the relative preference between singular and plural pivots, the absolute rating for singular and plural pivots, and the speaker variation of judgment for each condition.

For conditions with number marked sources such as dem.non, dem.adj, num.adj, and ind.adj, the proposed analysis predicts that the singular pivots are accepted while the plural pivots are not. This is confirmed by the results. Not only did the participants prefer the singular pivot in these conditions, the average ratings of the singular pivots are between 5 and 7, while the average rating of the plural pivots are around 2. This

means that the singular pivots are indeed accepted and the plural ones are not. Regarding the speaker variation, the plural pivots in these conditions did not show much variation. However, the singular pivots in dem.non and dem.adj showed more variation; some participants did not accept singular pivots in these conditions either. I tentatively assume that the multi-dominance construction within NP, which is behind the singular pivots in NRNR, can be given a low rating by some speakers due to its low frequency. Crucially this effect is not seen in the majority of speakers.

The pos.non condition is also predicted by the analysis. The plural pivot in this condition has a mean rating of 6.46 out of 7 and the singular is rated at 2.33. There is relatively little speaker variation. Results of the pop12.non and pop33.non conditions show that neither the singular nor the plural pivot is acceptable, just as [Shen et al. \(2017\)](#) predicted.

On the other hand, two conditions namely pos.adj and def.adj remain deviant from the predictions made by [Shen \(2016\)](#). The pos.adj is predicted to prefer the singular pivot, however, Experiment 3 shows no significant contrast. The result from the Likert scale task contrasts with that from the forced choice task in Experiment 2. Recall that in Experiment 2, the same condition shows a significant preference toward the singular pivot. The difference between the results from Experiment 2 and 3 might result from the nature of the methodology: 7 point Likert scale tasks have been shown to be less sensitive to subtle contrasts than forced choice tasks ([Sprouse et al. 2013](#)). Note that the direction of preference for the pos.adj condition in Experiment 3 is predicted:

the singular pivot gets a mean rating of 4.21 and the plural gets 3.8. What is also not predicted is the large speaker variation shown in this condition, as is shown in Fig 3.7. In Fig. 3.8, we can see that 5 participants gave the plural pivots more than 2 points higher than the singular pivot, at the same time 8 participants did the opposite. This could indicate two distinct populations, one prefers singular pivots to plural in NRNR while the other population shows the opposite pattern. The analysis provided in Chapter 2 can capture one of the two populations. I will leave the other population for future research.

Last but not the least, the def.adj condition shows no significant difference between the singular and the plural pivot despite the fact that the analysis in Chapter 2 predicts the singular to be acceptable, but not the plural. Although informal judgment collection reveals an overwhelming preference for singular pivots, this has not been replicated in Experiments 1-3. In Section 3.2.2, I listed a couple of possible explanations and possible ways to tease them apart. One explanation is that some participants mis-parsed the ungrammatical target sentence in (219a) as the grammatical sentence in (219b). Just like the pos.adj condition, the speaker variation in the def.adj condition is obvious. This might be partially caused by the mis-parse in (218) as well. However, I do not have a complete explanation for the speaker variation here.

- (219)
 - a. *The tall and the short students are a couple.
 - b. The tall and short students are a couple.

3.2.4 Experiment 4: on possessive pronouns

The three experiments reported above cover Nominal Right Node Raising construction with different sources. Experiment 4 focuses on NRNR with possessive pronouns as sources and looks into whether the number marking on the pivot differs according to different combinations of possessive pronouns. [Shen et al. \(2017\)](#) reported that in NRNR, the possessive pronoun source in the first conjunct needs to be compatible with both overt and covert possessee. In English, the 3rd person masculine singular possessive pronoun *his* meets these requirement. This predicts that the singular pivot is accepted and preferred in the higher.non condition, whereas neither the singular pivot nor the plural pivot is acceptable in conditions with other bare possessive pronouns in the first conjunct. All the conditions with adjectives, however, are predicted to show a preference of the singular pivot, because adjectives in English agree with the head noun, thus licenses the multi-dominance structure. The predictions are shown in (220).

- (220) a. His and her student are a couple.
- b. *Her and his student are a couple.⁵
- c. His tall and her short student are a couple.
- d. *His tall and her short students are a couple.
- e. Her tall and his short student are a couple.
- f. *Her tall and his short students are a couple.

⁵ One may suspect that the difference between *his and her* and *her and his* would be due to the more conventional word order of *his and her*. One indirect evidence against this speculation is that Experiments 1-3 show no difference between *her and his* and the more conventional *my and your* sequence.

3.2.4.1 Materials

Experiment 4 uses a 7 point Likert scale task. In this task, the participants were given pairs of minimally different sentences and asked to rate the naturalness of each sentence by a rating between 1-7.

The design is similar to Experiment 3. The only factor is the number marking on the pivots and the two levels are singular and plural. Two lexically matched conditions have been created for each condition and the order of the two sentences in the test items are counter-balanced. There are 12 sources in total in Table 3.8.

condition code	example
hisher.non	His and her student(s) came from the U.S.
hisher.adj	His tall and her short student(s) came from the U.S.
herhis.non	Her and his student(s) came from the U.S.
herhis.adj	Her tall and his short student(s) came from the U.S.
hershis.non	Hers and his student(s) came from the U.S.
hershis.adj	Hers tall and his short student(s) came from the U.S.
pos.non	Mary's and John's student(s) came from the U.S.
pos.adj	Mary's tall and John's short student(s) came from the U.S.
yoursmy.non	Yours and my student(s) came from the U.S.
yoursmy.adj	Yours tall and my short student(s) came from the U.S.
myhis.adj	My and his student(s) came from the U.S.
myhis.adj	My tall and his short student(s) came from the U.S.

Table 3.8:

Each list consists of two control items and one test item. Each item consists of one contextual sentence, one image depicting the scenario, and two minimally different sentences to judge, in that order. The image is moved from after the minimal pair of sentences to between the context sentence and the minimal pair of sentences. This is to ensure that the participants pay attention to the scenario depicted in the image. The

control items are the same across lists. They are the same from Experiment 3, see (216) and (217). A sample text item is in (221).

(221) Sample test item

Two professors and their students have travelled to France for an international conference. Professor Smith came from Canada and Professor Miller came from the U.K.

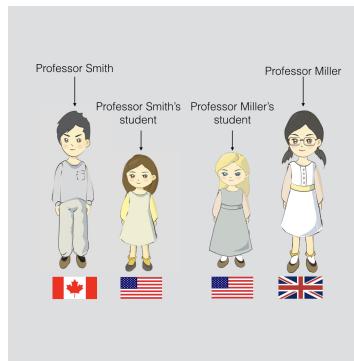


Fig. 3.9: Exp 4: sample test item

- a. His and her student came from the U.S.
- b. His and her students came from the U.S.

3.2.4.2 Participants and procedure

Given the 12 sources, 2 orders, and 2 lexically matched conditions, 48 lists were created. Each list was done by 6 participants (288 participants in total). This experiment was carried out on Amazon Mechanical Turk. Each participant was paid 30 cents (5 cents per judgment).

3.2.4.3 Results

For the 7 point scale task, I present the results in two ways: statistical results from a linear mixed effects modal and the mean judgments plotted. All 288 participants were included in the analyses.

A linear mixed effects model is created with the singular/plural pivot as the fixed factor. The results are summarized in Table 3.9. Four pieces of information are provided: the mean rating (out of 7) for the sentences with singular pivots under the source (*singular mean*), the mean rating (out of 7) with plural pivots under the source (*plural mean*), the F value, and the p-value. Statistically significant results are indicated with boldface ($p < 0.05$). The predicted preferred pivots in each condition are shown in the *prediction* column. Conditions that show predicted results are in blue and the ones that show unpredicted results are in orange.

sources	example	singular mean	plural mean	F value	p-value	prediction
hisher.non	his and her student(s)	2.2	4.3	14.8	0.0004	singular
hisher.adj	his tall and her short student(s)	4.4	4.3	0.02	0.88	singular
herhis.non	her and his student(s)	2.5	4	8.2	0.0063	neither
herhis.adj	her tall and his short student(s)	3.8	3.2	1.1	0.31	singular
hershis.non	hers and his student(s)	2.2	3	2.5	0.13	neither
hershis.adj	hers tall and his short student(s)	1.4	1.5	2.1	0.16	neither
pos.non	John's and Mary's student(s)	2.2	6	76.1	2.6e-11	plural
pos.adj	John's tall tall and Mary's short student(s)	4.1	3.8	0.4	0.56	singular
yoursmy.non	yours and my student(s)	3.3	3	0.2	0.64	neither
yoursmy.adj	yours tall and my short student(s)	2	1.9	0.1	0.73	neither
myhis.non	my and his student(s)	3.4	3	0.6	0.45	neither
myhis.adj	my tall and his short student(s)	5.1	3.1	12.7	0.0009	singular

Table 3.9: Experiment 4 Results with no Exclusion

For both hisher.non and herhis.non, the mean ratings for plural pivot are above 4 and the mean ratings for singular pivot are 2.2 and 2.5. Both show a significant preference toward the plural pivots. The corresponding conditions with adjectives, hisher.adj

and herhis.adj, did not show significant differences in rating. Hisher.adj shows a mean rating of 4.4 for singular pivot and 4.3 for plural pivot. Herhis.adj shows 3.8 for singular and 3.2 for plural. Neither of these two conditions show significant difference between the two pivots.

The hershis.non condition shows low ratings on both singular (2.2) and plural pivots (3). The hershis.adj condition also shows low ratings: 1.4 for singular and 1.5 for plural. Neither of these two conditions show significant difference between the two pivots.

Pos.non shows a mean rating of 2.2 for singular pivots and 6 for plural pivots, which has been consistent throughout the four experiments so far. Pos.adj, on the other hand, shows 4.1 for singular pivots and 3.8 for singular pivots, similar to Experiment 3. The yoursmy.non condition shows low rating for both singular (3.3) and plural pivots (3). Yoursmy.adj shows even lower ratings: 2 for singular pivots and 1.9 for plural pivots. The myhis.non shows a mean rating of 3.4 for singular pivots and 3 for plural pivots. The past three conditions did not show significant preference between the two types of pivots. The myhis.adj condition shows 5.1 for singular and 3.1 for plural. The singular pivot is significantly more acceptable than the plural pivot.

The results for each condition are also plotted in Figure 3.10. The white diamond indicates the mean judgment of that condition. The black dots indicates the individual judgments of that condition. The width of the colored bars (blue = singular, orange = plural) indicates the distribution of the judgments in each condition.

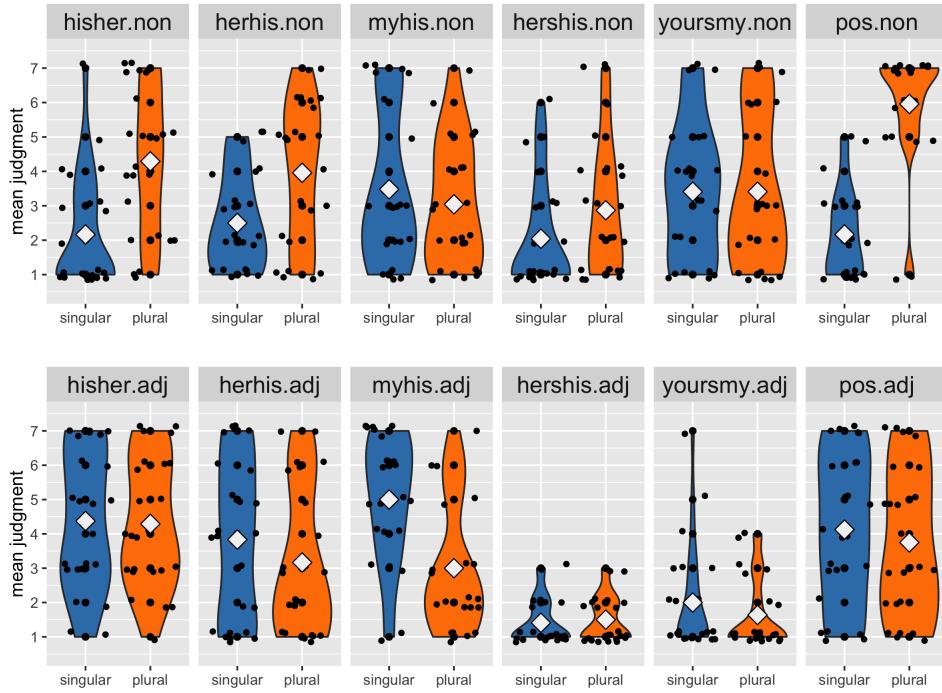


Fig. 3.10: Plot for Experiment 4 with no Exclusion

From Figure 3.10, we can see that the hisher.non and herhis.non conditions show similar amount of variation; most participants gave the singular pivot ratings lower than 4 while the plural pivots show more variation. Participants spread out across different ratings, driving the mean rating to around 4, the middle point of the scale. Curiously, the myhis.non condition shows a different pattern where most participants gave both pivots ratings below 4. The hisher.adj and herhis.adj conditions show a large amount of variation for both singular and plural pivots. The myhis.adj condition, on the other hand, shows less variation. Participants tend to rate the singular pivot higher than 3 and the plural pivot at or lower than 3. The hershis.non condition shows less variation where the majority participants gave both the pivots a low rating. Despite the nominal posses-

sive pronoun in the first conjunct, the yoursmy.non condition shows a larger amount of variation than the hershis.non condition. The versions with adjectives, hershis.adj and yoursmy.adj, both show bottom rating without much variation. Lastly, the conditions with possessive DPs with and without adjectives show similar results from Experiment 3. The pos.non condition gets a high rating on the plural pivot and a low rating on the singular pivot. There is little variation on either pivot. The pos.adj condition, on the other hand, shows a large amount of variation. Participants spread across the scale evenly.

As in Experiment 3, I calculate the rating difference between the singular and plural pivots for each participant. The results are summarized in Fig. 3.11. In each chart, the x-axis is the difference between the rating of the singular pivot and that of the plural pivot (singular - plural). The positive values indicate that the rating of the singular is higher than that of the plural and the negative values indicate the opposite. Zero value indicates that the ratings of the singular and the plural pivot are the same. The y-axis is the number of participants who show the value differences in that condition. From the individual rating difference between singular and plural pivots, we can learn about the potential source for the variation among participants shown in Figure 3.10.

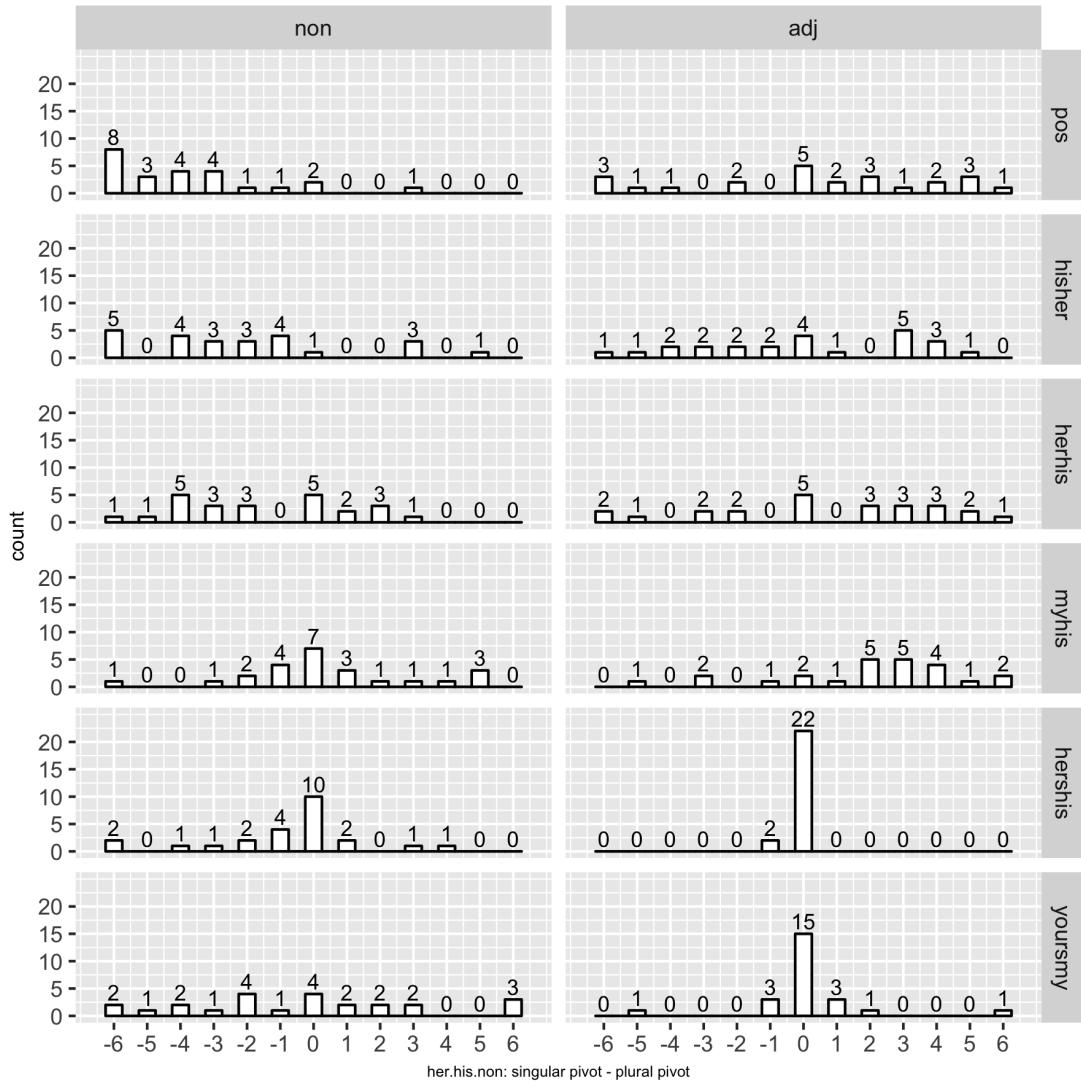


Fig. 3.11: Rating difference for Experiment 4

For pos.non, 21 participants show preference toward the plural pivot, 2 show no preference, and 1 shows preference toward the singular pivot. For pos.adj, 7 participants show preference toward plural pivots, 5 participants show no or little preference, 12 participants show preference toward singular pivots. For hisher.non, 19 participants show plural preference, 1 shows no preference, and 3 show preference toward singu-

lar pivots. For hisher.adj, 10 out of 24 participants show plural preference, 4 show no preference, and 10 show singular preference. In the herhis.non condition, 13 participants show plural preference, 5 show no preference, and 6 show singular preference. In the herhis.adj condition, 7 show plural preference, 5 show no preference and 12 show singular preference. In the myhis.non condition, 17 out 24 participants gave the singular and plural pivots ratings within 2 points of difference including 7 who rated them the same. 2 participants show preference toward plural pivots and 5 show preference toward singular. In the myhis.adj condition, 18 participants show plural preference, 2 show no preference, and 4 show singular preference. In hershis.non condition, 18 out of 24 participants gave the two pivots ratings within 2 points of difference. 4 participants show plural preference and 2 show singular preference. Similarly in hershis.adj, 22 participants gave the two pivots the same rating and 2 gave the plural pivot 1 point higher than the singular pivot. In the yoursmy.non condition, 11 participants gave the plural pivots a higher score, 9 gave the singular pivots a higher score, and 4 rated them the same. Lastly, in the yoursmy.adj condition, 21 out of 24 participants gave the singular and plural pivots scores with less than 2 points of difference. 1 participant rated the plural pivot a higher score and 2 gave the singular pivot higher scores.

The variation patterns are similar between hisher and herhis in both the bare version and the version with adjectives. The order of *his* and *her* did not show an effect.

3.2.4.4 Discussion

Having laid out the results from Experiment 4, I discuss what the results say about the theory.

As discussed in Chapter 2, [Shen et al. \(2017\)](#) puts forward an account for NRNR with bare possessive pronouns as the sources. The claim is that the possessive pronoun must be able to license both overt and covert possessee, e.g. his. This claim predicts that the higher.non condition can license singular pivots but not plural. (222) provides a sentence supporting this prediction from the corpus.⁶

- (222) ..because as long as each of us continued doing his and her part in the plot,
everything would continue more or less all right (COCA)

Since *her* and *my* can only license overt possessees, they are predicted not to be compatible with the singular pivot in the *herhis.non* and the *myhis* conditions. Similarly, since *hers* and *yours* can only license covert possessees, they are predicted not to be compatible with the singular pivot in the *hershis.non* and the *yoursmy.non* conditions.

Results from Experiment 4 only confirmed part of the predictions. The participants did not show the predicted difference for the singular pivots in *higher.non* and *herhis.non/myhis.non*. The mean rating of the singular pivot in the *higher.non* condition is 2.2 and 2.5 in the *herhis.non* condition, both of which are toward the bottom of the scale. The mean rating of the singular pivot in the *myhis.non* condition is 3.4. Although

⁶ Thanks to Jonathan Bobaljik for pointing this out to me.

the prediction that *myhis.non* and *herhis.non* disallow a singular pivot is borne out, the predicted available singular pivot in the *hisher.non* condition is not found. The distribution of the ratings illustrated in Fig 3.10 and Fig 3.11 indicates that the judgments come from one population since the majority of the participants dislike the singular pivot. This result shows that *his* does not have a special status as the first source in NRNR.

The plural pivots in the *hisher.non* and *herhis.non* conditions have a significantly higher mean rating: 4.3 for the former and 4 for the latter. The plural pivots are acceptable in these conditions. This indicates that the possessive pronouns like *his* and *her* behave similarly to bare possessive DPs like *John's* and *Mary's*. A possible analysis would be one which assumes that the possessive pronouns, like possessive DPs, are in the Spec,DP position. Phrases like *his and her students* would involve a conjoined specifier structure and a single plural NUM head like what was proposed for *John's and Mary's students* in Chapter 2. However, the plural pivot in the *myhis.non* condition has a mean rating of 3, which is lower than that in the *hisher.non* and *herhis.non* conditions. This difference is not predicted.

Results from the nominal possessive pronouns on the other hand are as predicted. The singular pivot in the *hershis.non* condition has a mean rating of 2.2 and 3.3 in the *yoursmy.non* condition; both are on the low side. The speaker variation in the *hershis.non* condition is low while that in the *yoursmy.non* is higher. At this moment I do not have an explanation for the different variation.

In sum, bare possessive pronouns in English allow the plural marking on the pivot but not the singular marking, similar to bare possessive DPs. This result indicates that the mechanism proposed in [Shen et al. 2017](#) is not applicable to all speakers. A significant part of the speakers treat possessive pronouns as possessive DPs.

Apart from the predictions made in [Shen et al. 2017](#), the account to NRNR proposed in Chapter 2 predicts that some conditions with adjectives, including herhis.adj, myhis.adj, pos.adj, and hisher.adj, show a singular preference. However only myhis.adj shows a significant preference. Herhis.adj, pos.adj and hisher.adj show no significant difference between singular and plural pivots. The rating differences between singular and plural pivots in these conditions show that a subset of the participants prefer plural pivots and another subset of the participants prefer singular pivots, while a smaller subset find the singular/plural pivots similar in terms of acceptability. It is unexpected for the theory in Chapter 2 to have only one of the four conditions show significant preference for the singular pivot.

There are several possible explanations for the inconsistency among these four sources. First it could be that there are two populations among English speakers regarding the singular/plural pivot under possessive + adj. One population prefers plural and the other prefers singular. The sampled 24 speakers in the hisher.adj, herhis.adj, pos.adj conditions are representative while the sampled speakers in the myhis.adj are not. This predicts that if more participants are included, all four conditions will show non-significant difference between singular and plural pivots. This explanation also

predicts that each speaker is consistent among the four conditions. If they are tested for all four conditions, the preference would be either toward the singular or the plural pivot. Second, it could also be the case that the singular preference observed in the myhis.adj condition reflects the accurate picture. The non-significant results from the hisher.adj, herhi.adj, and pos.adj are confounded by e.g. sampling or frequency reasons.

There is another surprising fact regarding the results from Experiment 4. Two conditions in Experiment 4, herhis.non and herhis.adj, were also included in Experiment 3 using the same design and methodology (herhis.non/adj in Experiment 3 were labeled as *pop33.non/adj*). However, the results for these two conditions are different, as shown in Table 3.10. In Experiment 3, herhis.non does not show a significant difference between the singular and plural pivots, whereas in Experiment 4, there is a significant preference for plural pivots over singular ones. In Experiment 3, the herhis.adj condition shows a significant preference for singular pivots; however, no significant difference has been observed in Experiment 4. I include the distribution of the preference in the table. This is surprising given that the design, method, and number of participants are the same between the two experiments. For the herhis.non condition, we have seen evidence for two populations with two different analyses for bare possessive pronouns. The difference could result from different sampling from these two populations in two experiments.

sources	singular mean	plural mean	F value	p-value	prefer singular	prefer plural	no preference
herhis.non in Exp 3	3.3	3.2	0.03	0.8649	10	10	4
herhis.non in Exp 4	2.5	4	8.21	0.0063	6	13	5
herhis.adj in Exp 3	4.9	3.3	9.24	0.0058	19	1	4
herhis.adj in Exp 4	3.8	3.2	1.05	0.3099	12	7	5

Table 3.10: herhis.non and herhis.adj in Experiment 3 and 4

3.2.5 Summary of experiments on NRNR with matching values

Here I sum up the findings from the first four experiments which look at the number marking on the pivot noun in NRNR under different sources. Experiment 1 and 2 use the forced choice task. Experiment 3 and Experiment 4 use the 7 point Likert scale task. Experiments 1-3 include a variety of sources e.g. demonstratives, numerals, articles, possessives. Experiment 4 focuses on possessive DPs and possessive pronouns.

For the sources that are overtly marked such as dem.non, dem.adj, num.adj, ind.adj, the singular pivot noun is rated as acceptable and significantly better than plural pivots in all the experiments.

Sources that do not show overt number marking can be separated into two kinds. The simplex kind consists of one element, such as bare possessive DP e.g. pos.non *John's and Mary's student(s)* and bare possessive pronouns e.g. *his and her students*. The complex kind consists of two elements, for example pos.adj, def.adj, hisher.adj, etc. Within the simplex sources, pos.non shows the opposite pattern; the plural is rated acceptable and the singular is not across all four experiments. This is in accordance to the predictions from the theory laid out in Chapter 2.

For the bare possessive pronouns like *her and his student(s)* and *my and your*

student(s), Experiment 3 shows that neither the singular nor the plural pivot is accepted.

On the other hand, Experiment 4 shows that plural pivots are accepted in *his and her student(s)* and *her and his student(s)*, but not in *my and his student(s)*. Experiment 2 shows a significant preference toward the plural pivot in *her and his student(s)*, but not in *my and your student(s)*. These findings show that a subset of the participants treat bare possessive pronouns on par with bare possessive DPs e.g. *John's and Mary's student(s)*. For these participants, the plural pivot is licensed under bare possessive pronouns. For other participants, possessive pronouns are treated as heads with phi features, in which analysis *her and his* does not license singular or plural pivots.

The differences within conditions with possessive pronouns (e.g. myyour.non and hisher.non in Experiment 4) result from the composition of these two subtype of participants in a certain condition. This predicts that if one participant is asked to judge multiple conditions involving possessive pronoun, their judgments would be consistent.

For complex sources that do not show overt number marking, like pos.adj *John's tall and Mary's short student(s)*, the forced choice task in Expeirment 2 shows a significant preference towards the singular pivot in the pos.adj, pop12.adj, and pop33.adj conditions. This is predicted by the account proposed in Chapter 3. However, results from the 7 point Likert scale tasks in Experiment 3 and 4 are less clear. In Experiment 3, although pop12.adj and pop33.adj still show significant preference toward the singular pivot, pos.adj did not show significant preference. In Experiment 4, only the my-his.adj condition shows a significant preference toward the singular pivot; the pos.adj,

hisher.adj, and herhis.adj conditions do not show significant preference. The difference between the ratings each participant gave the singular and the plural pivot shows that a considerable subgroup of participants gave the two pivots the same rating in most of these conditions. This indicates that the 7 point Likert scale task is less sensitive in detecting the subtle difference between the pivots.

Lastly, the def.adj condition e.g. *the tall and the short student(s)* shows no significant preference in Experiment 2 and 3, which is not predicted by Chapter 2. I propose that this result is at least partially driven by a coerced string which is only available in this condition.

A general and robust pattern observed in the complex sources is that overt number marking plays an important role. Although the predicted pattern can be observed in the more sensitive forced choice task, the 7 point Likert scale task only showed the predicted preference in some of the conditions, but not others. The next section will discuss two experiments on NRNR with mismatching values, where the effect of the overt marking is also observed.

3.3 NRNR with mismatching values

The experiments presented above aimed to test NRNR with two sources with the same number value, i.e. singular. The following two experiments aim to test NRNR with two sources with conflicting values, i.e. one singular and one plural. The analysis laid out in Chapter 2 predicts that in these cases the pivot noun will show the same number

marking as the linearly closest source, i.e. closest conjunct agreement.

3.3.1 Experiment 5: forced choice task 3

3.3.1.1 Materials

Experiment 5 is a forced choice task. Like Experiment 1 and 2, the participants were asked to choose the more natural sounding one out of two minimally different sentences.

The only factor is the number marking on the pivot noun and the two levels are singular and plural. Two lexically matched conditions are created for each source in order to avoid differences across conditions due to lexical content. There are two variations of mismatches: one where the first conjunct is singular and the second is plural (SP) and one where the first conjunct is plural and the second is singular (PS). 8 sources are included: dem.non (*these and that*), dem.adj (*these tall and that short*), num.adj (*two tall and one short*), def.adj (*the tall and the short*), pos.non (*John's and Mary's*), pos.adj (*John's tall and Mary's short*), hisher.non (*his and her*), hisher.adj (*his tall and her short*). Example sentences are shown in (223) and (224).

(223) singular-plural (SP)

- a. dem.non: This and those student(s) came from the U.S.
- b. dem.adj: This tall and those short student(s) came from the U.S.
- c. num.adj: One tall and two short student(s) came from the U.S.

- d. def.adj: The tall and the short student(s) came from the U.S.
- e. pos.non: John's and Mary's student(s) came from the U.S.
- f. pos.adj: John's tall and Mary's short student(s) came from the U.S.
- g. hisher.non: His and her student(s) came from the U.S.
- h. hisher.adj: His tall and her short students(s) came from the U.S.

(224) plural-singular (PS)

- a. dem.non: These and that student(s) came from the U.S.
- b. dem.adj: These tall and that short student(s) came from the U.S.
- c. num.adj: Two tall and one short student(s) came from the U.S.
- d. def.adj: The tall and the short student(s) came from the U.S.
- e. pos.non: John's and Mary's student(s) came from the U.S.
- f. pos.adj: John's tall and Mary's short student(s) came from the U.S.
- g. hisher.non: His and her student(s) came from the U.S.
- h. hisher.adj: His tall and her short students(s) came from the U.S.

To make sure that the mismatch interpretations are targeted, each item includes a picture depicting a scenario where one DP refers to two individuals and the other DP refers to one. This is important especially for conditions which do not show morphological number marking e.g. def.adj, pos.adj, etc.

Each list contains 2 control items (same from Experiment 3, 4 see (216) and (217)) and one test item (225). The control items come before the test item. The control

items are the same in every list including the order of the sentences and the order of the items. Each item consists of a context sentence, a minimal pair of sentences, along with one picture that depicting scenario, in that order. I would like to thank Dorothy Ahn and Yimei Xiang for allowing me to use their illustrations in the stimuli. Within each item, the order of the singular pivot sentences and the plural pivot sentences are counterbalanced.

(225) Sample test item

Three tall students and three short students have travelled to France for an international conference.

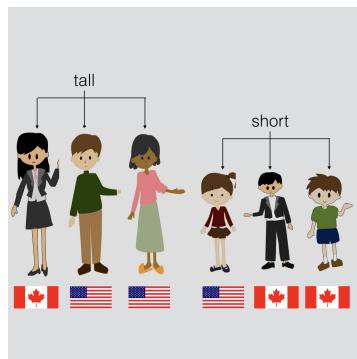


Fig. 3.12: Exp 5: sample test item

- a. Two tall and one short student came from the U.S.
- b. Two tall and one short students came from the U.S.

3.3.1.2 Procedure and participants

With 8 sources, 2 sentence orders, 2 lexically matched conditions and 2 variations of mismatch, there are 64 lists in total. 6 participants took each list. The experiment was conducted on Amazon Mechanical Turk. A total of 384 participants finished the survey. Each participant was paid 15 cents (5 cents per judgment).

3.3.1.3 Results

Each condition was completed by 24 participants. 7 participants got 1 out of the 2 control items wrong and 1 participant got both control items wrong. All 384 participants were included in the analysis.

Table 3.11 summarizes the results from the binomial test on Experiment 5. The *sg (count)* column indicates the number of participants who chose the singular pivot over the plural pivot; the *pl (count)* column indicates the number of participants who chose the opposite. 24 participants completed each condition as indicated in the *total* column. The *sg (%)* column indicates the percentage of participants who chose the singular pivot over the plural pivot; the *pl (%)* column indicates the percentage of participants who chose the opposite. P-values that are significant are in bold. The *prediction* column shows the predicted preferred pivot given the theory. Conditions that show results as predicted are in blue and conditions that show unpredicted results are in orange.

The results of Experiment 5 are divided into two types of mismatches: 1. first

conjunct plural-second conjunct singular (PS) and 2. first conjunct singular-second conjunct plural (SP). For the SP mismatch, a preference for plural pivots is observed for all the conditions. For the PS mismatch, significant preference toward the singular pivot is observed for conditions with number marked sources: dem.non, dem.adj, num.adj. On the other hand, significant preference toward the plural pivot is observed for def.adj, pos.non, higher.non. No significant preference is observed on the pos.adj and the higher.adj condition.

condition	example	sg (count)	pl (count)	total	sg (%)	pl (%)	p-value	prediction
dem.non.ps	these and that N	23	1	24	95.8%	4.2%	5.722e-06	singular
dem.adj.ps	these tall and that short N	19	5	24	79.2%	20.8%	0.0066	singular
def.adj.ps	the tall and the short N	6	18	24	25%	75%	0.0227	singular
num.adj.ps	two tall and one short N	20	4	24	83.3%	26.7%	0.0015	singular
pos.non.ps	John's and Mary's N	2	22	24	8.3%	91.7%	3.588e-05	plural
pos.adj.ps	John's tall and Mary's short N	9	15	24	37.5%	62.5%	0.3075	singular
higher.non.ps	his and her N	3	21	24	87.5%	12.5%	0.0003	singular
higher.adj.ps	his tall and her short N	9	15	24	37.5%	62.5%	0.3075	singular
dem.non.sp	this and those N	1	23	24	4.2%	95.8%	2.98e-06	plural
dem.adj.sp	this tall and those short N	0	24	24	0%	100%	1.192e-07	plural
def.adj.sp	the tall and the short N	3	21	24	12.5%	87.5%	0.0003	plural
num.adj.sp	one tall and two short N	0	24	24	0%	100%	1.192e-07	plural
pos.non.sp	John's and Mary's N	2	22	24	8.3%	91.7%	3.588e-05	plural
pos.adj.sp	John's tall and Mary's short N	4	20	24	16.7%	83.3%	0.0015	plural
higher.non.sp	his and her N	1	23	24	4.2%	95.8%	2.98e-06	plural
higher.adj.sp	his tall and her short N	3	21	24	12.5%	87.5%	0.0003	plural

Table 3.11: Results for Experiment 5

3.3.1.4 Discussion

Chapter 2 of this dissertation proposes a multi-dominance structure for conditions including dem.non, dem.adj, num.adj, def.adj, pos.adj, higher.adj, and a conjoined-specifier structure for the pos.non condition. I also claim that in mismatch cases the multi-dominance structure will result in a closest conjunct agreement pattern and the conjoined-

specifier structure will generate the plural pivot.

Linking the predictions to the experiment, it is predicted that the pos.non condition will show a significant preference toward the plural pivot in both SP and PS mismatch types. This prediction is borne out. The pos.non.ps and the pos.non.sp conditions both show significant preference toward the plural pivot.

For conditions like dem.non, dem.adj, num.adj, def.adj, pos.adj, higher.adj, on the other hand, it is predicted that the plural pivots are preferred in SP mismatch and the singular pivots are preferred in PS mismatch. For SP mismatch, this prediction is borne out. All conditions show a significant plural preference.

For PS mismatch, things are not as straight forward. Conditions which show overt morphological number marking including dem.non.ps, dem.adj.ps, and num.adj.ps show singular preference as predicted. The pos.adj.ps and the higher.adj.ps conditions do not show significant preference toward either of the pivots. The def.non.ps shows plural preference. This is not predicted. Note that these unpredicted patterns are found in conditions with no overt morphological marking of number.

The difference regarding closest conjunct agreement between the morphologically marked conditions and the non-marked conditions indicates that the closest conjunct agreement is more readily accepted when there are morphological cues. This could result from the ease of parsing. Take num.adj.ps in (226) as an example, the sentence overtly specifies the number values of the first and the second conjunct. The marking on the pivot noun just need to match the number value from the second con-

junct.

- (226) Two tall and one short student(*s) came from the U.S.

For pos.adj.ps in (227) on the other hand, one cannot judge the acceptability of the sentence without looking at the scenario. Note that *John's tall and Mary short students came from the U.S.* is grammatical under various interpretations. The participants need to check the scenario, reconstruct and keep track of the number values on the two conjuncts in that scenario without the help of morphological cues. Then the number marking on the pivot needs to match the ‘invisible’ number value from the second conjunct. I propose that this parsing cost drives the preference toward singular pivots down in the conditions with no overt number marking.

- (227) John's tall and Mary's short student(s) came from the U.S.

PS scenario: John has two tall students who came from the U.S. Mary has one short student who came from the U.S.

What about the difference within the conditions with no overt number marking? Although hisher.adj.ps and pos.adj.ps show no significant preference, the def.adj.ps condition actually shows the opposite to the predicted pattern: a significant preference toward the plural pivot. Like in the discussion of def.adj in the matching conditions in the first three experiments, I propose that the definite.adj conditions are subject to an

additional confound: the omission of the second determiner (possibly due to inattention). The target string in (228a) is coerced into the string in (228b) where the plural noun is acceptable. This coercion is limited to the def.adj condition because this is the only condition where the element in this position is identical in the two conjuncts, cf. *John's tall and Mary's short student*. This makes the coercion possible. Furthermore, the coerced string in (228b) is more frequent than (228a), which makes the coercion probable. I propose it is this coercion that drives the acceptance of plural pivots even further in the def.adj.ps condition than pos.adj.ps and higher.adj.ps. One way to test whether the coercion indeed occurs is to ask the participants to repeat the test sentence and see what they come up with. The prediction is that they would come up with the coerced string in (228b) instead of the presented string (228a).

- (228) a. the tall and the short students (target string)
- b. the tall and **the** short students (coerced string)

Finally, higher.non.ps shows a significant preference for plural pivots, similar to pos.non.ps. This pattern is compatible with results from Experiment 4 where higher.non and her-his.non with matching values show a preference for plural pivots. As discussed before, if we assume that at least some of the speakers treat possessive pronouns like *his* on the par with possessor DPs like *John's*, this parallelism is accounted for.

It is worthy noting that while results in certain conditions are unexpected in the analysis as it stands in Chapter 2, the results of the different experiments are consistent

regarding which conditions show unexpected results, which can be explained with the additional assumptions as laid out above.

3.3.2 Experiment 6: 7 point Likert scale task

3.3.2.1 Materials

Experiment 6 is a 7 point Likert scale task. The participants were asked to rate the naturalness of sentences with a 7 point scale, 1 being the least natural and 7 being the most natural. While the methodology is different, the materials are identical to those in Experiment 5.

3.3.2.2 Procedure and participants

With 8 sources, 2 sentence orders, 2 lexically matched conditions and 2 variations of mismatch (PS, SP), 64 lists were created in total. 6 participants took each list. The experiment was conducted on Amazon Mechanical Turk. A total of 384 participants completed the survey. Each participant was paid 30 cents (5 cents per judgment).

3.3.2.3 Results

16 participants had one or both of the control items wrong. Excluding these 16 participants does not make a significant difference to the results. The following analysis includes all 384 participants. For the 7 point scale task, I show the results in two ways: I show statistical results from a linear mixed effects model and I plot the responses and

the mean judgments.

I will first discuss the singular-plural type mismatch (SP). A linear mixed effects model was created with the singular/plural pivot as the fixed factor. The results are summarized in Table 3.12. Four pieces of information are provided: the mean rating (out of 7) for the sentences with singular pivots under the source (*singular mean*), the mean rating (out of 7) with plural pivots under the source (*plural mean*), the F value, and the p-value (statistically significant results are in bold). Predictions from the proposal in Chapter 2 is also included in the *prediction* column. Conditions that show predicted results are in blue and the ones that show unpredicted results are in orange.

sources	example	singular mean	plural mean	F value	p-value	prediction
dem.non.sp	this and those N	1.3	2.8	13.96	0.0011	plural
dem.adj.sp	this tall and those short N	1.7	4.7	33.59	5.862e-07	plural
num.adj.sp	one tall and two short N	1.7	6.4	186.14	2.2e-16	plural
def.adj.sp	the tall and the short N	3.6	5.8	15.01	0.0003	plural
pos.non.sp	John's and Mary's N	2.8	5.6	43.99	3.247e-08	plural
pos.adj.sp	John's tall and Mary's short N	3	5.8	32.52	8.057e-07	plural
hisher.non.sp	his and her N	2.1	5.2	71.08	1.724e-08	plural
hisher.adj.sp	his tall and her short N	3	5.4	20.01	5.028e-05	plural

Table 3.12: Results for Experiment 6: Singular - Plural mismatch

In this type of mismatch, the closest conjunct agreement pattern would be a low rating of the singular pivot and the high rating of the pivot pivot, since the closest conjunct is plural. This is observed in all the conditions except the dem.non.sp. As shown, all eight conditions show a significant preference toward the plural pivot in SP mismatch. In terms of mean ratings, the singular pivot is rated around or lower than 3 in conditions including dem.adj.sp, num.adj.sp, pos.non.sp, pos.adj.sp, hisher.non.sp, and hisher.adj.sp. Singular pivots in the def.adj.sp conditions get 3.6. I take this as evidence

that the singular pivots are not available in any of the conditions in SP mismatch. The plural pivot is rated higher than 4.5 in all the conditions except for the dem.non.sp where the plural gets a 2.8. This result shows that the plural pivot is acceptable in all the conditions other than dem.non.sp. Neither the singular nor the plural pivots are acceptable under mismatching demonstratives. This is consistent with the informally collected judgments reported in Chapter 2.

The results for each condition are also plotted in Figure 3.13. The white diamond indicates the mean judgment of that condition. The black dots indicates the individual judgments of that condition. The width of the colored bars (blue = singular, orange = plural) indicates the distribution of the judgments in each condition.

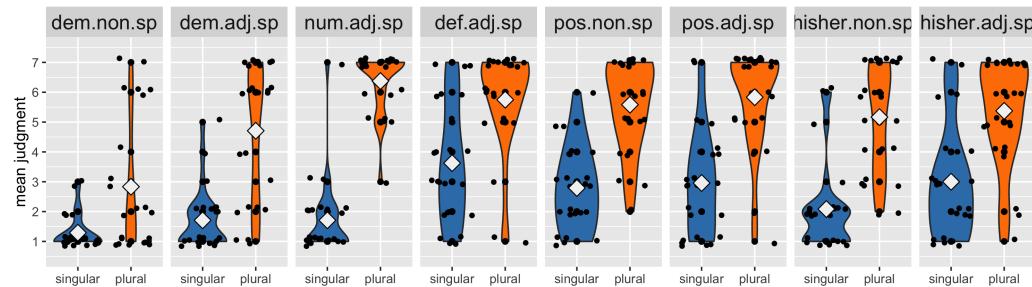


Fig. 3.13: Plot for Experiment 6: Singular - Plural mismatch

The plot shows that in each condition the judgments came from one population. A relatively small amount of variation is observed. The mean ratings reflect the general pattern of judgments from the majority of participants.

I calculated the rating difference between the singular and plural pivots for each participant. The results are summarized in Fig. 3.14. In each chart, the x-axis is the

difference between the rating of the singular pivot and that of the plural pivot (singular - plural). The positive values indicate that the rating of the singular is higher than that of the plural, while the negative values indicate the opposite. Zero value indicates that the ratings of the singular and the plural pivot are the same. The y-axis is the number of participants who show the value differences in that condition.

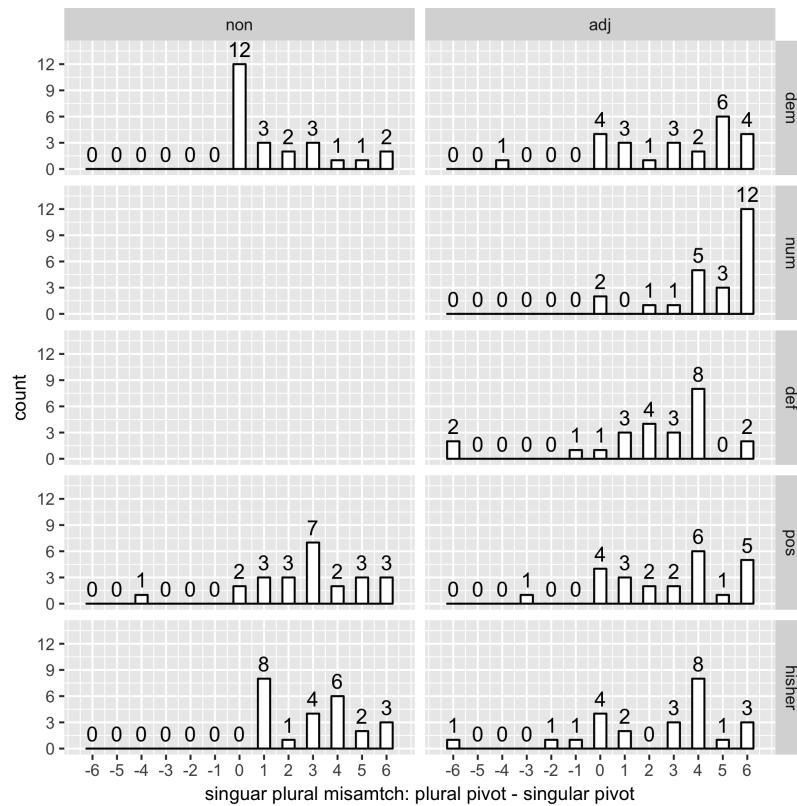


Fig. 3.14: Rating difference for Experiment 6: Singular - Plural mismatch

In all of the conditions, very few participants gave the singular pivot a higher rating than plural (max. 3 out of 12 in hisher.adj.sp and def.adj.sp). The overwhelming majority gave the plural pivot a higher rating in all the conditions. In conditions including dem.adj.sp, pos.adj.non, and hisher.adj.non, 4 out of 24 participants gave the

two pivots the same rating. In the dem.non.sp condition, 12 out of 24 participants gave the two pivots the same rating. Combining with the low rating on both pivots in this condition, we can conclude that these participants reject both the singular and the plural pivot under bare demonstratives.

Based on results from the meaning rating, the participant variation, and the different rating between the two pivots, we can conclude that the singular pivot is not accepted in the SP mismatch and the plural pivot is accepted in all the conditions except dem.non.sp.

Now we turn to the Plural - Singular mismatch. Since the closest conjunct is singular in this mismatch, the closest conjunct agreement would manifest itself as a high rating of singular pivots and a low rating of plural pivots.

Like before, a linear mixed effects model is created with the singular/plural as the fixed factor. The results are summarized in Table 3.13. Four pieces of information are provided: the mean rating (out of 7) for the sentences with singular pivots under the source (*singular mean*), the mean rating (out of 7) with plural pivots under the source (*plural mean*), the F value, and the p-value (statistically significant results are in bold). Predictions from the proposal in Chapter 2 are also included in the *prediction* column. Conditions that show predicted results are in blue and conditions that show unpredicted results are in orange.

sources	example	singular mean	plural mean	F value	p-value	prediction
dem.non.ps	these and that N	3.8	1.5	20.32	4.484e-05	singular
dem.adj.ps	these tall and that short N	4.3	2.3	10.20	0.003	singular
num.adj.ps	two tall and one short N	5.2	3	15.71	0.0003	singular
def.adj.ps	the tall and the short N	3.9	5.6	10.82	0.002	singular
pos.non.ps	John's and Mary's N	1.9	5.8	93.53	1.432e-09	plural
pos.adj.ps	John's tall and Mary's short N	4.3	4.3	0.0194	0.8899	singular
hisher.non.ps	his and her N	2.3	5.2	32.52	8.057e-07	singular
hisher.adj.ps	his tall and her short N	4.1	4.3	0.17	0.6792	singular

Table 3.13: Results for Experiment 6: Plural - Singular mismatch

Results from the PS mismatch are more complicated than those from the SP mismatch. Dem.non.ps, dem.adj.ps, and num.adj.ps show a significant preference toward the singular pivot. In dem.non.ps, the mean rating for the singular pivot is 3.8, which is borderline, while the mean for the plural pivot is 1.5. In dem.adj.ps, the singular mean is 4.3, which is acceptable, and the plural mean is 2.3. In the num.adj.ps condition, the singular mean is 5.2 and the plural is 3.

The def.adj.ps condition shows a significant preference toward the plural pivot with the singular mean of 3.9 and the plural mean of 5.6. The singular is a borderline case and the plural pivot is accepted. The pos.non.ps condition shows a significant preference toward the plural pivot with the singular mean of 1.9 and the plural mean of 5.8. Similarly the hisher.non.ps condition shows a significant preference toward the plural with the singular mean of 2.3 and the plural mean of 5.2. Pos.adj.ps did not show a significant preference toward either pivots. The means for both pivots are the same at 4.3. Similarly, hisher.adj.ps also did not show a significant preference with the singular mean of 4.1 and the plural mean of 4.3.

The results for each condition are also plotted in Figure 3.15. The white diamond

indicates the mean judgment of that condition. The black dots indicates the individual judgments of that condition. The width of the colored bars (blue = singular, orange = plural) indicates the distribution of the judgments in each condition.

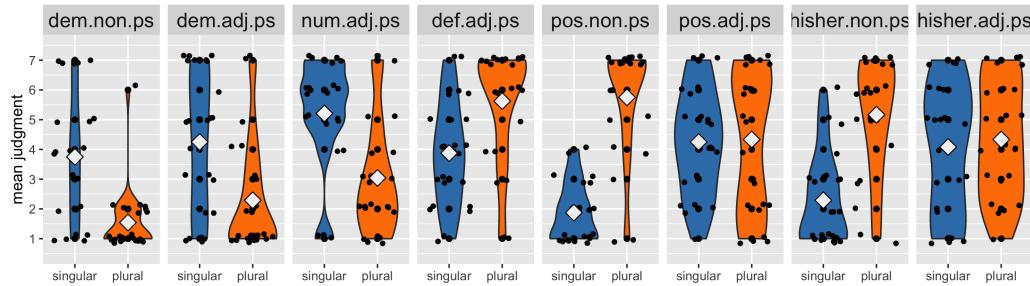


Fig. 3.15: Plot for Experiment 6: Plural - Singular mismatch

For dem.non.ps, dem.adj.ps, and num.adj.ps, the overwhelming majority of participants reject the plural pivot. There is more variation in the singular pivot in dem.non.ps and dem.adj.ps. In the def.adj.ps condition, more participants gave the singular pivot a rating of 4 out of 7; the plural pivot, on the other hand, is judged acceptable. In the pos.non.ps condition, there is relatively little variation in both the singular and the plural pivot. In the pos.adj.ps, the majority of the participants gave the singular pivot a rating of 4. At the same time, one group of participants gave the plural pivot high ratings while the other group gave it low ratings. Higher.non.ps, similar to pos.non.ps, shows relatively little variation; the plural is given high ratings and the singular pivot is given low ratings. Lastly, the higher.adj.ps condition involves a large amount of variation for both singular and plural pivots.

In addition to the mean rating and the plot, I calculated for each participant the

rating difference between the singular and plural pivots. The results are summarized in Fig. 3.16. In each chart, the x-axis is the difference between the rating of the singular pivot and that of the plural pivot ($\text{singular} - \text{plural}$). The positive values indicate that the rating of the singular is higher than that of the plural, while the negative values indicate the opposite. Zero value indicates that the ratings of the singular and the plural pivot are the same. The y-axis is the number of participants who show the value differences in that condition.

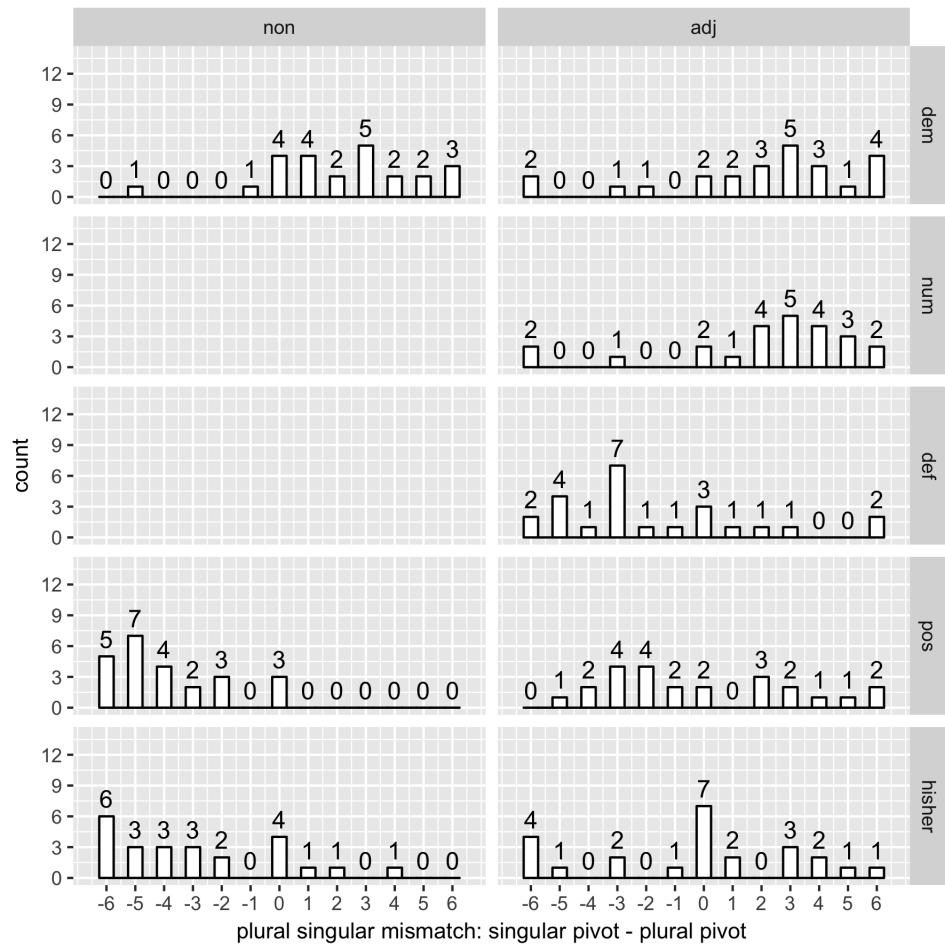


Fig. 3.16: Rating difference for Experiment 6: Plural - Singular mismatch

In dem.non.ps, 2 participants gave plural pivots a higher rating while 18 participants gave singular pivots a higher rating. 4 participants gave them the same rating. In dem.adj.ps and num.adj.ps, 3-4 participants gave plural pivots a higher rating and 17-18 gave singular pivots a higher rating. 2-3 participants gave them the same rating. In the def.adj.ps condition, 5 out of 24 participants gave the singular pivot a higher rating and 16 gave the plural pivot a higher rating. In the pos.non.ps condition, 15 participants gave the plural a higher rating, 3 gave the two pivots the same rating, and 0 gave the singular pivot a higher rating. In the pos.adj.ps condition, 14 participants gave the plural a higher rating, 2 gave the two pivots the same rating, and 8 participants gave the singular pivot a higher rating. In hisher.non.ps, 17 gave the plural pivot a higher rating, 4 gave the two pivots the same rating, and 3 gave the singular pivot a higher rating. In hisher.adj.ps, 8 participants gave the plural pivot a higher rating, 7 gave the two pivots the same rating, and 9 gave the singular pivot a higher rating.

In summary, in dem.non.ps condition, the singular pivot is borderline acceptable, while the plural pivot is rejected. In the dem.adj.ps and num.adj.ps conditions, the singular pivot is acceptable, while the plural is not. For conditions including pos.non.ps and hisher.non.ps, the plural pivot is acceptable, while the singular is not. For def.adj.ps, the plural pivot is acceptable and the singular is borderline acceptable. In pos.adj.ps and hisher.adj.ps, both singular and plural pivots are slightly above the mid point of the scale.

3.3.2.4 Discussion

What do the results say about the theory proposed in Chapter 2? The proposed multi-dominance analysis predicts a closest conjunct agreement pattern in the mismatch cases. This is confirmed for the SP mismatch type. Similar to the forced choice task in Experiment 5, the 7 point Likert scale in Experiment 6 shows a significant preference for the plural pivot in all conditions involving multi-dominance, including dem.non.sp, dem.adj.sp, num.adj.sp, pos.adj.sp, higher.adj.sp.

For all but one condition, the singular pivot is unacceptable while the plural pivot is acceptable, just as predicted. The dem.non.sp condition stands out as an exception in that both the singular and the plural pivot are rejected. This is compatible with the judgments collected via informal survey in Chapter 2. I contend that Closest Conjunct Agreement (CCA) is not universally available for mismatch cases. For some reason in English, CCA is not available as a repair strategy for bare demonstratives. Note that this restriction is not universal; in languages including Icelandic and Brazilian Portuguese, the CCA under bare demonstratives is available. I leave accounting for this restriction for future research.

Note that pos.non.sp and higher.non.sp are not analyzed as multi-dominance, but a structure with conjoined specifiers, as shown in (229). The structure has only one NUM head with a PL feature. The pivot noun is predicted to be plural regardless of how many students John or Mary possesses. This prediction is also borne out in the SP mismatch type.

- (229) [John's and Mary's] POSS NUM_[PL] student_{PL} came from the U.S.

For the PS mismatch, on the other hand, the analysis in Chapter 2 predicts that the singular pivots are accepted under multi-dominance, since the second DP is singular. The dem.adj.ps and the num.adj.ps condition show the predicted pattern; the plural pivot is rejected while the singular pivot is acceptable. For the dem.non.ps condition, the plural pivot is rejected, which is predicted, and the singular pivot is borderline acceptable. The low rating of the singular pivot under bare demonstrative is due to the same restriction on dem.non.sp; CCA is not available under bare demonstratives in English.

As mentioned above, for conditions that fall under the conjoined specifier condition like pos.non.ps, the plural pivot is predicted to be available, while the singular is not regardless of the number of the students that each possessor possesses. This prediction is borne out in the PS mismatch type; the plural pivot is rated at 5.8 and the singular at 1.9. The higher.non.ps condition shows the same pattern as pos.non.ps, which indicates that the conjoined specifier analysis is extended to the possessive pronouns in NRNR.

- (230) [John's and Mary's] POSS NUM_[PL] student_{PL}

The pos.adj.ps and higher.adj.ps conditions did not show a significant preference toward the singular pivot, as predicted. The mean ratings for both the singular and the plural pivot are 4.3 and 4.3 in pos.adj.ps and 4.1 and 4.3 in higher.adj.ps. These results are

compatible with those from the forced choice task in Experiment 5, which also did not show significant preference between the pivots in the PS mismatch type. Another condition that shows an unpredicted pattern is def.adj.ps. Like dem.adj.ps, the def.adj.ps condition is predicted to allow the singular pivot and disallow the plural pivot. The results from Experiment 6, however, show that the plural pivot is acceptable (mean = 5.6) and the singular pivot is borderline (mean = 3.9).

Like in Experiment 5, the unpredicted patterns are observed in conditions without overt number marking. As mentioned in the discussion of Experiment 5, I propose the unpredicted patterns are due to parsing reasons. The overt number markings on the sources function as morphological cues for the closest conjunct agreement. For example, in (231a), the singular marking on the noun matches with the numeral *one* in the second conjunct and the sentence is readily acceptable. The plural pivot is not acceptable regardless of the interpretation of the sentence. When the number markings are absent as in (231b), both the singular and the plural pivots could be grammatical with different interpretations. The participants have to check the scenario, reconstruct, and keep track of the number specification on both of the sources in the scenario. Then the participants need to match the morphological marking on the pivot noun with the covert number value of the second conjunct, which in the case of PS mismatch, is different from the number value of the whole subject. This processing cost drives the rating of the singular pivot down and that of the plural pivot up (since it matches with the number value of the whole subject).

- (231) a. Two tall and **one** short student(*s) came from the U.S.
 b. John's tall and Mary's short student came from the U.S.

Lastly, compared with hisher.adj.ps and pos.adj.ps conditions, the def.adj.ps condition shows a pattern that is further away from the predicted one: significant preference toward the plural pivot. This special behavior of definite article+adjective has been consistent in Experiment 1, 2, 3, 5 and 6. As mentioned above, I propose a confound that def.adj conditions are uniquely subject to: the omission of the second definite article. As is shown in (232), the sentence in (a) is predicted to be unacceptable in the PS mismatch where there are two tall students and one short student. However, the coerced string with the plural head noun is grammatical as long as the total of tall students and short students is more than one. If the target string is coerced to the string in (b), the participants would give sentences with the plural pivot a higher score than they deserve. One way to test whether the coercion indeed occurs is to ask the participants to repeat the test sentence and see what they come up with. The prediction is that they would come up with the coerced string in (232b) instead of the presented string (232a).

- (232) a. target string: The tall and the short students came from the U.S.
 b. coerced string: The tall and short students came from the U.S.

3.3.3 Summary of experiments on NRNR with mismatching values

The two experiments on NRNR with mismatching values show converging results. As predicted, conditions that fall under the conjoined specifier analysis, like pos.non allow plural pivots and disallow singular pivots, regardless of the order of the mismatching number values. The behavior of the higher.non condition is the same as that of pos.non, which supports the conjoined specifier analysis for bare possessive pronouns in NRNR (contra. [Shen et al. 2017](#)).

For conditions that fall under the multi-dominance analysis, the predicted closest conjunct agreement patterns consistently show up in sources with overt morphological marking such as dem.adj and num.adj. In the absence of morphological marking, the CCA pattern is not preferred. I propose that the lack of the morphological cue and the plural value of the whole NRNR subject work together to mask the predicted CCA pattern. Note that both the forced choice task and the 7 point Likert scale task are comprehension tasks. It is possible that production tasks would show a clearer picture.

The unique behavior of def.adj conditions provides further support to the proposed confound that participants omit the second *the* in judging sentences with def.adj.

Lastly, bare demonstratives have been shown not to allow CCA in mismatch cases. This language specific restriction on CCA is observed in both informal surveys and the 7 point Likert scale tasks. The reason for such restriction remains unknown.

3.4 Conclusion

In this section, I combine results from Experiments 1 to 6 and see what we have learned about the licensing of singular and plural pivot nouns in NRNR under different sources.

In Table 3.14, I list the results from each experiment for each source. I split Experiment 5 and 6 by the mismatch type. I specify the tasks involved in the experiments. In the forced choice task, *singular/plural* indicates the significant preference. In the 7 point scale task, *singular/plural* indicates the accepted pivot and *neither* indicates that neither pivot is accepted. *N.s.* represents results that do not reach statistical significance. Results that are not straight-forwardly consistent with the analysis presented in Chapter and have additional explanations are in red. Pop33 conditions include hisher and herhis conditions. Since they do not show different patterns in any of the experiments, I will treat them as one condition here.

sources	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 5 SP	Experiment 5 PS	Experiment 6 SP	Experiment 6 PS
task	forced choice	forced choice	7p scale	7p scale	forced choice	forced choice	7p scale	7p scale
dem.non	singular	n/a	singular	n/a	plural	singular	neither	neither
dem.adj	singular	n/a	singular	n/a	plural	singular	plural	singular
num.adj	singular	n/a	singular	n/a	plural	singular	plural	singular
ind.adj	singular	singular	singular	n/a	n/a	n/a	n/a	n/a
def.adj	plural	n.s.	n.s.	n/a	plural	plural	plural	plural
pos.non	plural	plural	plural	plural	plural	plural	plural	plural
pos.adj	n.s.	singular	n.s.	n.s.	plural	n.s.	plural	n.s.
pop33.non	n.s.	n.s.	neither	plural	plural	plural	plural	plural
pop33.adj	n.s.	singular	singular	n.s.	plural	n.s.	plural	n.s.

Table 3.14: summary of Experiments 1-6

Sources with overt morphological marking largely confirmed the proposal made in Chapter 2. When both DPs in the NRNR are singular, the pivot noun must be singular in the dem.non, dem.adj, and num.adj conditions. In mismatch cases, the dem.adj and num.adj conditions show closest conjunct agreement. The dem.non condition, on the

other hand, resists CCA. From the cross-linguistic evidence from Chapter 2, we know that this restriction on CCA is not universal as bare demonstratives in other languages do allow CCA.

The multi-dominance analysis of NRNR in Chapter 2 also extends to sources that do not show morphological agreement e.g. pos.adj, pop33.adj, and def.adj. However, the patterns are less clear than the morphologically marked sources.

With the confounds in Experiment 1 identified and corrected, both pos.adj and pop33.adj conditions with matching sources show the predicted singular preference in the forced choice task in Experiment 2. In the 7 point Likert scale tasks in Experiments 3 and 4, neither conditions show significant preference between the singular and plural pivots. Part of this difference is due to distinct tasks involved. The forced choice task is more sensitive to subtle differences between items than the 7 point Likert scale task (see also [Sprouse et al. 2013](#)), which is compatible with the significant preference in Experiment 2 and the non-significant result in Experiment 3.

Why is the difference between singular and plural pivots more subtle under the sources that lack morphological marking? I propose that participants use morphological markings on the sources as cues for the number value of the DP. This cue is not available in sources with no morphological marking. In particular, the singular number markings on the sources restricts the potential interpretation of (233b) to one with a tall student and a short student. The plural marking is ruled out just based on the sentence itself. In comparison, the unmarked sources *John's tall* and *Mary's short* do not restrict

the interpretations of (233b). As a result, the sentence (233b) is grammatical under an interpretation where John has multiple tall students and Mary has multiple short students. The participants have to refer to the image accompanying the scenario to get and keep track of the number value of each DP before they decide on the acceptability of the pivots. This effect can potentially be gotten rid of if the interpretation is made even more salient so that the participants would not need to use morphological cues.

- (233) a. *This tall and that short students came from the U.S.
 b. John's tall and Mary's short students came from the U.S. (* with *two students* reading)

In mismatch cases in Experiments 5 and 6, neither pos.adj nor pop33.adj show significant preference in the PS mismatch type. I propose that this is also due to the lack of morphological cues in these conditions. The participants need to refer to the scenario, keep track of two different values of the DP and their order before deciding what number marking should be present on the pivot noun. For the morphologically marked sources, on the other hand, the number values of each DP and their order is morphologically overt.

Even within the conditions with no morphological markings, the def.adj condition is an outlier in that it shows no significant preference in the forced choice task in Experiments 2 and 3 and significant plural preference in Experiments 5 and 6. I propose that in addition to the extra processing cost from the lack of morphological cues, the

def.adj condition is subject to a unique confound: the omission of the definite article in the second source (possibly by inattention). If this is the case, at least a subset of the participants gave their judgments on (234a) instead of the target sentence (234b). Note that (234a) is acceptable for the target reading. One way to detect this confound is to ask the participant to repeat the sentence they just judged. The participants are predicted to reproduce (234a) rather than (234b).

- (234) a. The tall and short students came from the U.S. (ok with *two students* reading)
- b. The tall and the short students came from the U.S. (* with *two students* reading)

Apart from the multi-dominance structure, the generalization which motivated the conjoined-specifier analysis for pos.non (*John's and Mary's*) is verified in all six experiments. The prediction for the conjoined specifier structure is that the head noun is plural in both matching and mismatching cases. In mismatching cases, the order of the singular and plural DPs is predicted to be irrelevant for the number marking. These predictions are borne out in all experiments. Additionally, pop33.non conditions (*his and her*) show the same pattern as pos.non in Experiments 4, 5, and 6, which indicates that the pop33.non also falls under the conjoined specifier analysis. However, in Experiment 2, the pop33.non conditions show no significant preference between singular and plural pivots. The 7 point Likert scale task in Experiment 3 reveals that neither pivots

are accepted. This is in line with the predictions from the multi-dominance analysis proposed in [Shen et al. 2017](#). It is possible that a subgroup of the speakers employed the conjoined specifier analysis while another subgroup employed the multi-dominance analysis.

In sum, for the conditions with a multi-dominance structure, the experiments on matching and mismatching cases verified the predictions, especially in the morphologically marked conditions. Through the experiments, we also spotted possible confounds due to the lack of overt marking. For the conjoined-specifier analysis, the results from the experiments support that this is the correct analysis for pos.non and pop33.non for a subgroup of speakers.

Chapter 4

Multi-valued Ns and Ts

4.1 Introduction

In Chapter 2, we saw that nominal right node raising constructions (NRNR) involve multi-valuation: in (235) the nominal *student* is valued by both NUM heads in the conjuncts. I proposed a multi-dominance analysis for the construction.

- (235) This tall and that short *student* are a couple.

An assumption that I have been adopting in the analysis is that when one noun is valued by two or more singular values, the multiple instances of the singular value are spelled out as singular. I label this type of agreement as distributive agreement. Distributive agreement is not necessarily the only possibility to resolve multi-valuation. One can also imagine that the two singular values on one element are ‘summed’ and get spelled out as a dual or plural value. I will label this type of agreement as summative agreement (following [Grosz \(2015\)](#)). The schemes for the two types of agreement are outlined below.

- (236) Distributive agreement



- (237) Summative agreement



Along with distributive agreement, summative agreement in multi-valuation has been proposed for constructions other than NRNR. For example [Grosz \(2015\)](#) notes that in (238), the verb *have* agrees with both embedded subjects: *Sue* and *Mary*. The two singular values copied onto the verb are spelled out as plural. As noted in the previous chapter, summative agreement is also observed on multi-valued Ns in Bulgarian and Russian by [Harizanov and Gribanova \(2014\)](#) and [Belyaev et al. \(2015\)](#).

- (238) John's glad that Sue, and Bill's proud that Mary *have* been to Cameroon.

This chapter examines multi-valuation on different agreement targets, nouns and verbs, and focuses on the distribution of distributive agreement and summative agreement across languages and agreement targets. Based on a survey of more than 15 languages, I argue for a novel generalization regarding the two types of agreement across agreement targets in (239).

- (239) Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also dis-

tributive agreement and not summative agreement.

Section 4.2 illustrates summative agreement phenomena. Section 4.3 proposes and argues for the distributive agreement generalization. Section 4.4 reviews previous accounts proposed for the two types of agreement. Section 4.5 proposes that the distributive agreement generalization is a case of Agreement Hierarchy. Section 4.6 discusses potential multi-valued determiner and adjective cases. Section 4.7 concludes.

4.2 Summative agreement

This section outlines the summative agreement patterns observed on Ns and Ts across languages.¹

4.2.1 Summative agreement on multi-valued Ns

As noted in Chapter 2, Harizanov and Gribanova (2014, 2015); Belyaev et al. (2015) illustrate that in NRNR in Russian (240) and Bulgarian (241), the pivot that is valued by two singular goals is spelled out as plural.

(240)	vysokij i xudoj mužčiny tall.SG and thin.SG man.PL 'A tall man and a thin man'	(Russian)
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¹ While the discussion of summative agreement here focuses on Ns and Ts, other obvious agreement targets like determiners and adjectives are not discussed here. Section 4.6 discusses the nuance involved in multi-valued determiners and adjectives.

- (241) a. bǎlgarsk-i-ja i rusk-i narod-i
 Bulgarian-SG.M-the and Russian-SG.M nation-PL.
 ‘the Bulgarian and Russian nations’ (a Bulgarian nation and a Russian nation)
- b. pǎrv-a-ta i posledn-a stranic-i
 first-SG.F-the and last-SG.F page-PL
 ‘the first and last pages’ (a first and a last one) (Bulgarian)

Observe that the sentences in (241) are not parallel to the NRNR construction that we have been discussing; rather, they involve only one definite marker on the first adjective. In (242) each conjunct includes one definite marker and an adjective. Both singular and plural pivots are available, however the singular pivot in (242a) is much more acceptable than the plural pivot in (242b). Another restriction on the plural pivot is that it is banned when the pivot noun refers to animate individuals. as shown in (243).

The same extends to other animate individuals like children, mothers, brothers, guitar players, artists.

- (242) a. ?parvata i poslednata stranitsa
 first.sg.def and last.sf.def page.sg.
- b. %parvata i poslednata stranitsi
 first.sg.def and last.sg.def page.pl
 ‘the first page and the last page’ (Bulgarian)
- (243) purvata i poslednata banda/*bandi
 first.sg.def and last.sg.def band.sg/*band.pl
 ‘the first and the last band’ (Bulgarian)

[Belyaev et al. \(2015\)](#) observe that the noun modified by two singular post-nominal adjectives in Italian must be plural as is shown in (244). The authors also note that prenominal adjectives only license singular pivot as (245)– the same observation is made in Chapter 2 of this dissertation.

- (244) Alla partenza saranno ammainate le *bandiere rossa e bianca* accompagnate possibilmente da segnale acustico.
 to departure will.be.PL lowered.PL the.PL flag.PL red.SG and white.SG accompanied.PL possibly by signal acoustic
 ‘At the departure the red and white flags will be lowered, possibly accompanied by an acoustic signal.’ [2 flags total: one red, one white] (Italian)
- (245) La novità era nel senso che essa cambiava la natura della liquidazione, cosicche vecchio e nuovo regime diventavano non più comparabili ...
 ‘The novelty was in the sense that it changed the nature of liquidation, so that the old and new regimes became no longer comparable ...’ [2 regimes: one old, one new] (7 from [Belyaev et al. \(2015\)](#) originally from *La Repubblica* corpus)

As shown above, summative agreement is observed on multi-valued Ns in Russian, Bulgarian, and Italian with post-nominal modifiers.

4.2.2 Summative agreement on multi-valued Ts

This section focuses on summative agreement observed on verbal elements that agree with multiple goals, i.e Multi-valued Ts. There are two cases on multi-valued Ts in the

literature, both of which can show summative agreement.

4.2.2.1 T' Right Node Raising (T' RNR)

Like NRNR, the first case of multi-valued Ts involves right node raising. [Postal \(1998\)](#); [Yatabe \(2003\)](#); [Grosz \(2015\)](#) observe that in T' right node raising constructions as in (246), the verb *have* agrees with both singular subjects *Bill* and *John* and can show plural agreement. This summative agreement pattern is seen in English, Western Armenian, Standard Gujarati, Hebrew, Italian, and Czech.

- (246) Sue is proud that Bill_[SG] and Mary is glad that John_[SG] have_[PL]/has_{SG} traveled to Cameroon.

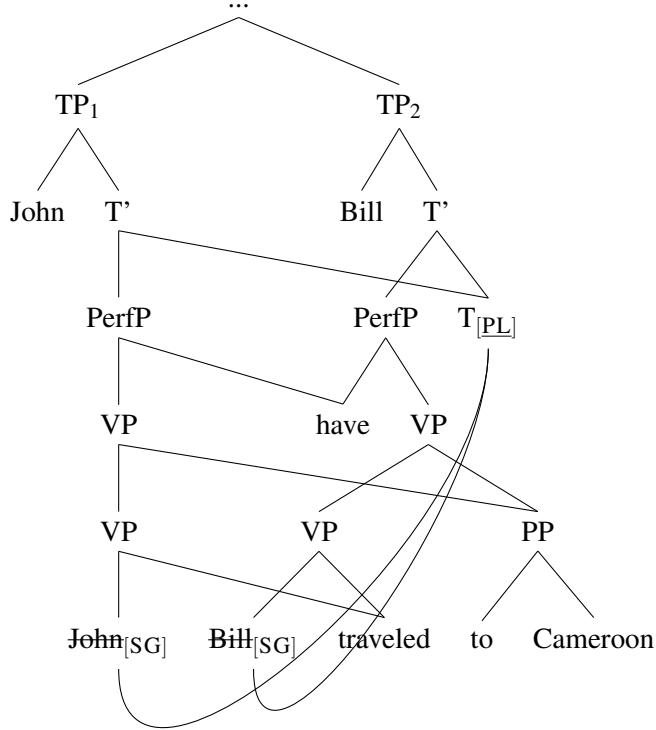
On the other hand, Serbo-Croatian, Dutch, and Greek categorically ban plural agreement in these cases, allowing only singular agreement, i.e. distributive agreement. Northern dialects of German seem to pattern with Dutch in disallowing plural agreement, as opposed to Southern dialects. Speakers of Austrian German tend to prefer plural over singular agreement.² See examples of summative agreement in Western Armenian, Standard Gujarati, Hebrew, and Italian in (247)-(250).

² Note that the acceptability of summative agreement in (246) is subject to inter-speaker variation. 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 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 (246) creates an illusory controller for the plural agreement, further experimental evidence is needed. However, note that this possible illusion cannot extend to other languages that allow summative agreement like Hebrew in (249).

- (247) [John- \emptyset həbard e vor Mary-n_[SG]] jev [Bill- \emptyset urax e vor Sue-n_[SG]]
 John-def proud is that Mary-def and Bill-def happy is that Sue-def
aprigē ajtsel-adz en_[PL] / e_[SG]
Africa visit-pfv are / is
 ‘John’s proud that Mary and Bill’s happy that Sue have visited Africa.’ (Western Armenian)
- (248) [Mary khush hati ke John_[SG]] ane [Sue-ne garva hato ke Bill_[SG]]
 Mary glad was that John and Sue-dat proud was that Bill
Australia ga-yaa_[PL] / ga-yo_[SG].
Australia go-m.pl / go-m.sg
 ‘Mary’s glad that John and Sue’s proud that Bill have traveled to Australia.’
 (Standard Gujarati)
- (249) [Dina smexa she-Yosi_[SG]] ve-[Maya ge’ā she-Dani_[SG]]
 Dina glad that-Yosi and-Maya proud that-Dani
nas'u_[PL] / nasa_[SG] le-ostralya.
traveled.past.3pl / 3sg to-Austarlia
 ‘Dina’s glad that Yosi and Maya’s proud that Dani have traveled to Australia.’
 (Hebrew)
- (250) [Maria é felice che Gianni_[SG]], e [Sue é orgogliosa che Bill_[SG]]
 Maria is happy that Gianni, and Sue is proud that Bill
abbiano_[PL] / abbia_[SG] viaggiato in Australia
have.subj.past.3pl / .3sg traveled to Australia.
 ‘Maria is glad that Gianni, and Sue is proud that Bill, have traveled to Australia.’ (Italian)

Grosz (2015) argues for a multi-dominance analysis for the summative agreement in (251) where the T merges with both PerfPs and agrees with both of the embedded subjects. Following this analysis, the T in T’ RNR is multi-valued by two singular values. What is important here is that the multi-valued T in (251) is spelled out as plural.

(251)



For the distributive agreement observed in T' RNR, [Grosz \(2015\)](#) suggests two possibilities. The first possibility involves a suggestions made in [Barros and Vicente \(2011\)](#). They suggest that RNR involves at least multi-dominance and ellipsis (see also [Abels \(2004\)](#)). These two different mechanisms could be the reason behind the different agreement marking in T' RNR. As we have already seen, multi-dominance generates the summative agreement pattern. On the other hand, the singular agreement could result from ellipsis. For example, the sentence in (252) begins as two full conjoined sentences and the PerfP of the first conjunct is elided. The theoretical consequence of this approach is that languages that allow summative agreement in T' RNR allow both multi-dominance and ellipsis, whereas languages that only allow singular agreement in

T' RNR do not allow multi-dominance. The relevant consequence of this approach for multi-valuation is that in T' RNR, only summative agreement requires multi-valued Ts, singular agreement does not require multi-valued Ts.

- (252) Sue is proud that Bill_[SG] has_[SG] traveled to Cameroon and Mary is glad that John_[SG] has_[SG] traveled to Cameroon.

The second possibility to derive the singular and plural agreement in T' RNR is to assume that multi-dominance is behind T' RNR in every language regardless of the agreement. The different agreement patterns do not involve different mechanisms behind RNR, rather, they involve different mechanisms of agreement. The consequence of this approach to multi-valuation is that both the singular agreement and summative agreement in T' RNR involve multi-valued Ts. The point of variation is how languages resolve multi-valued Ts with two singular values. Languages like English resolve the multi-valuation with summative agreement or agreement with the closest subject (CCA), while languages like Dutch resolve it only with the closest subject agreement.

[Grosz \(2015\)](#) supports this approach on two grounds: 1. In Serbo-Croatian, multi-dominance has been independently argued for (see ?). If ellipsis is the source of the singular agreement and multi-dominance is the source of the summative agreement, then languages like Serbo-Croatian should at least allow summative agreement. However, the multi-valued T can only show singular agreement in Serbo-Croatian. This pattern is accounted for if multi-dominance can also generate singular agreement. 2.

This approach assumes a unified treatment of T' RNR that is relevant to the shared T, which is more parsimonious.

In addition to [Grosz \(2015\)](#), I provide further evidence for the multi-dominance analysis for T' RNR rather than the analysis involving both multi-dominance and ellipsis. [Barros and Vicente \(2011\)](#) uses morphological mismatch as a diagnostic for the ellipsis analysis for RNR. In (253), the elided verb (*negotiated*) and the understood possessive pronoun (*her*) in the first conjunct do not match with those in the second conjunct (*negotiate, his*), but the sentence is acceptable.

(253) Alice already has, and Bob is about to, negotiate his salary with the manager.

(15 in [Barros and Vicente \(2011\)](#))

'Alice already has ~~negotiated her~~ salary with the manager and Bob is about to negotiate his salary with the manager'

Building on their work, [Larson \(2012\)](#) points out that in T' RNR, the morphological mismatch is not available as shown in (254).

(254) *Alice is happy that Iris can spell ~~her name~~, and Claire is proud that Daniel, can spell his name. (13 in [Larson \(2012\)](#))

Since no agreement is shown on the embedded verb in (254), the multi-dominance analysis is not required. If the ellipsis analysis is available for T' RNR at all, the (254)

is predicted to be acceptable with the morphological mismatch between *Iris* and *his*, contrary to the fact. The takeaway would be that English does not allow T' ellipsis at all for some independent reason. This is not a surprising result since we already know that not every constituent can undergo ellipsis, e.g. VP ellipsis in English but not in German. This is further supported by the fact that forward ellipsis in English cannot target the T' position in (255).

- (255) *Alice is happy that Iris can walk and Claire is proud that Daniel can walk.

If T' ellipsis is not allowed, then the shared T in T' RNR, be it singular or plural, should result from a multi-dominance structure. For these reasons, I conclude that both the singular and plural shared Ts in T' RNR involve multi-dominance, thus multi-valuation.

It is important to note that the arguments above only show that the T' RNR construction does not involve PF deletion/ellipsis. It does not make the claim that PF deletion/ellipsis operations are not involved in RNR constructions in general. RNR sentences like (256) have been argued to involve ellipsis or PF deletion in [Hartmann \(2000\)](#); [An \(2007a\)](#); [Ha \(2008b\)](#). These cases are not relevant for the discussion on multi-valuation, thus they are left aside.

- (256) Bill made and Jon sold - a piece of furniture. (from [Ha \(2008b\)](#))

4.2.2.2 Composed plural in Nocte

The second case of multi-valued Ts does not involve Right Node Raising but subject/object agreement. [Gluckman \(2016\)](#) observes that in Nocte, the verb agrees with both the subject and the object and both are realized as one morpheme on the verb (portmanteau). Interestingly, when the subject is 1st person singular and the object is 2nd person singular, the verb shows 1st person plural agreement. (257) shows that *-e* is 1st person plural marker. (258) shows that the 1st person plural marker is found on the verb in a sentence with no 1st plural argument, but two singular arguments.³ The same pattern is found in Karuk (Hokan), Yimas (Papuan), Wayampi (Tupí-Guaraní), Mapudungun (S.A. isolate), Bolinao (Austronesian), Tongva (Uto-Aztecán), Anindilyakwa (Australian), Colloquial Ainu (Ishikari dialect). Jim Wood (p.c.) points out that Masalit (also known as Masarak) has similar phenomena. The agreement pattern is schematics in (259).

(257)	ni roantang rang- ka -e 1pl always ASP- go -1pl 'We always go'
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(258)	nga -ma nang hetho -e 1sg -NOM 2sg teach -1pl 'I shall teach you'
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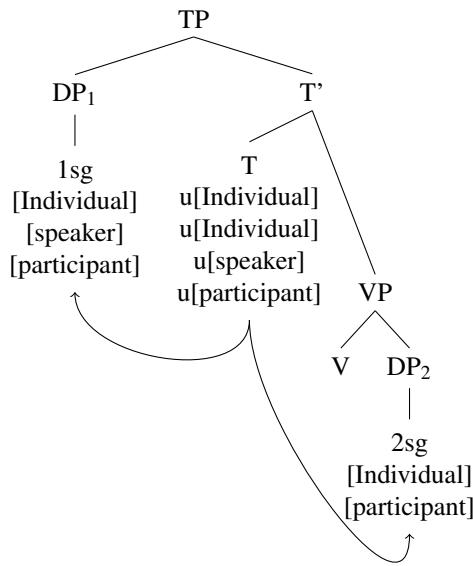
(259)	Subject [singular ₁] Object [singular ₂] <u>T [plural]</u>
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Gluckman proposes that the plural marking in (258) is a ‘composed plural’ formed

³ Apart from this pattern, Nocte also shows a person hierarchy 1>2>3 where the verb shows 1sg agreement in a sentence where the subject is 2sg and the object is 1sg. See [Gluckman \(2016\)](#) for a detailed analysis.

by two singular arguments. In (260), 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. Although the composed plurality does not involve RNR, it involves one probe getting two singular features from two goals, i.e. multi-valuation. In languages that [Gluckman \(2016\)](#) investigates the multi-valued T is spelled out as plural, i.e. summative agreement.

(260)



In subject/object agreement in Nocte and other languages, the multi-valued Ts are manifested in summative agreement. One might wonder if there are languages where

the multi-valued Ts in the same construction are marked as singular, i.e. distributive agreement. Note that because of effects of a person feature hierarchy, summative agreement is only visible when the subject is 1st person singular and the object is 2nd person singular. Consequently, if such languages do exist, the agreement pattern would be as in (261), where T agrees with the 1st person singular subject and the 2nd second person object, and T shows singular agreement. Due to the person hierarchy, the T should be **1st person** singular. Sentences following the pattern in (261) would be theoretically ambiguous between: 1. a language that only has subject agreement, 2. a language where the number agreement is contingent on the person hierarchy (T will show all the phi features on the 1st person argument), or 3. a language where multi-valued Ts are marked as singular. I will leave how to disambiguate these three possibilities to future research.

$$(261) \quad \text{Subject}_{1st[SG]} \text{ Object}_{2nd[SG]} \text{ T}_{1st[SG]}$$

The composed plurality in Nocte presents another case of multi-valued T which shows summative agreement. It also shows that multi-valuation is not restricted to right node raising constructions, but rather, is a general phenomenon.

4.3 Distributive agreement generalization

In the previous section we saw that both the summative agreement and the distributive agreement pattern have been observed on multi-valued Ns and Ts. A natural question

to ask is whether the distribution of summative agreement and distributive agreement in the multi-valuation context is random across targets or rule-based in a certain language – i.e. is there a correlation among the agreement patterns on multi-valued Ns and Ts cross-linguistically?

In investigating this question, I conducted a cross-linguistic survey of multi-valuation on Ns and Ts. Multi-valued Ns are probed with NRNR and multi-valued Ts with T' RNR. In each construction, the pivot is valued by two singular goals. The plural marking indicates summative agreement and the singular marking indicates distributive agreement. Combining the survey and the observations made in the previous literature ([Arregi and Nevins \(2013\)](#); [Belyaev et al. \(2015\)](#); [Grosz \(2015\)](#); [Harizanov and Gribanova \(2015\)](#); [Shen \(2016, 2017, 2018\)](#)), I summarize the cross-linguistic distribution of the two types of agreement below in Table 4.1. The cross-linguistic data are presented in the following subsections.⁴

⁴ I delay the discussion of multi-valued adjectives to section 4.6. The data will show an asymmetry between the prenominal and the post-nominal adjectives.

	multi-valued N	multi-valued T
Spanish	singular	*
Hungarian	singular	*
Greek	singular	singular
Brazilian Portuguese	singular	singular
Dutch	singular	singular
Polish	singular	singular
Serbo-Croatian	singular	singular
Hindi	singular	singular
Slovenian	singular	singular
Romanian	singular	singular
Icelandic	singular	singular
Finnish	singular	singular
German	singular	singular/plural
English	singular	singular/plural
Hebrew	singular/plural	singular/plural
Italian	singular	plural
Slovak	singular	plural
Russian	plural	plural

Table 4.1: Distribution of Summative and distributive agreement across Targets and Languages

As one can see from Table 4.1, the distribution is not random. Modulo cases where neither singular nor plural is acceptable, if the multi-valued Ts show summative agreement in a certain language, multi-valued Ns may show either singular (e.g. English, Slovak) or plural marking (e.g. Russian). However, when the multi-valued Ts show singular marking, multi-valued Ns can only show singular marking (e.g. Greek, Dutch), not plural. In other words, there is a monotonicity in the multi-valuation agreement: singular multi-valued Ts entail singular multi-valued Ns. This observation is formulated in terms of the two types of agreement in the distributive agreement generalization in (262).

- (262) Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also show distributive agreement and not summative agreement.

In terms of the types of languages, Table 4.2 illustrates that out of the four logically possible patterns, only three are attested. No language has been found that requires multi-valued Ts to show singular agreement and multi-valued Ns to show plural agreement. The rest of this section illustrates the generalization with facts from individual languages.

	multi-valued Ns	multi-valued T
Slovenian	distributive	distributive
Russian	summative	summative
English	distributive	summative
unattested	summative	distributive

Table 4.2: 3/4 signature

4.3.1 Type 1: distributive agreement on multi-valued Ns and Ts

The first type of language shows distributive agreement on multi-valued Ns and Ts, putting aside for now cases where neither singular nor plural marking is possible on one of the agreement targets. This type of languages includes Slovenian, Serbo-Croatian, Polish, Slovak, Icelandic, Dutch, Hindi, Romanian, Brazilian Portuguese, Spanish, Greek, Finnish, Hungarian, Spanish. Below are examples from Slovenian, Icelandic, Polish, Finnish, Hungarian.

Slovenian

- (263) Multi-valued Ns in Slovenian: distributive agreement
- a. Ta in tista punca sta par.
This and that girl are couple
 - b. *Ta in tista punci sta par.
This and that girls.dual are couple.
'This girl and that girl are a couple.'
- (264) Multi-valued Ts in Slovenian: distributive agreement
- a. Jure misli da Maja in Boris verjame da Sara potuje na Kitajsko.
Jure thinks that Maja and Boris believes that Sara travel.sg to China.
 - b. *Jure misli da Maja in Boris verjame da Sara potujeta na Kitajsko.
Jure thinks that Maja and Boris believes that Sara travel.pl to China.
'Jure thinks that Maja, and Boris believes that Sara, traveled to China.'

Icelandic

- (265) Multi-valued Ns in Icelandic: distributive agreement
- a. ?Minn og þinn *nemandi* eru sætt par.
my.sg and your.sg student.sg are cute couple
'My and your student are a cute couple.'
 - b. *Minn og þinn *nemendur* eru sætt par.
My.sg and your.sg student.pl are cute couple
'My and your students are a cute couple.'
- (266) Multi-valued Ts in Icelandic: distributive agreement
- a. Jón heldur að María og Villi trúir að Súsanna hafi
Jon thinks that Maria and Villi believes that Susanna have.pres.subj.sg
ferðast til Kína.
travelled to China
 - b. *Jón heldur að María og Villi trúir að Súsanna hafa
Jon thinks that Maria and Villi believes that Susanna have.pres.subj.pl
ferðast til Kína.
travelled to China
'John thinks that Mary travelled to China and Bill believes that Sue travelled to China.'

Polish

- (267) Multi-valued Ns in Polish: distributive agreement
- a. Ten wysoki i tamten niski chłopak biegli
This tall and that short boy ran.
 - b. *ten wysoki i tamten niski chłopcy biegli
This tall and that short boys ran.
'This tall boy and that short boy ran.'
- (268) Multi-valued Ts in Polish: distributive agreement
- a. Jan myśli że Maria, a Bill wierzy że Sue, pdróżowała do Chin.
John thinks that Mary and Bill believes that Sue traveled.sg.F to China
 - b. *Jan myśli że Maria, a Bill wierzy że Sue, podróżowały do Chin.
John thinks that Mary and Bill believes that Sue traveled.pl.F to China
'John thinks that Mary travelled to China and Bill believes that Sue travelled to China.'

Finnish

- (269) Multi-valued Ns in Finnish: distributive agreement
- a. tama ja tuo kissa ovat pari
this.sg and that.sg cat.sg be.pres.3pl couple.sg
 - b. *tama ja tuo kissat ovat pari
this.sg and that.sg cat.pl be.pres.3pl couple.sg
'This and that cat are a couple.'

(270) Multi-valued Ts in Finnish: distributive agreement

- a. *John on ylpea (siita) etta Mary ja Bill ovat
John be.pres.3sg proud.sg it.sg that Mary and Bill be.pres.3pl
iloisia (siita) etta Sue on kayneet Kiinassa
happy.pl it.sg that Sue be.pres.3sg be.pl China
- b. *John on ylpea (siita) etta Mary ja Bill ovat
John be.pres.3sg proud.sg it.sg that Mary and Bill be.pres.3pl
iloisia (siita) etta Sue ovat kayneet Kiinassa
happy.pl it.sg that Sue be.pres.3pl be.pl China
'John is proud that Mary, and Bill is happy that Sue are in China.'

Hungarian

(271) Multi-valued Ns in Hungarian: distributive agreement

- a. Ez a magas és az az alacsony diák rokonok.
this the tall and that the short student related
'This tall and that short student are related.'
- b. *Ez a magas és az az alacsony diákok rokonok.
this the tall and that the short students related
'This tall and that short students are related.'

(272) Multi-valued Ts in Hungarian: *

- a. *János orul, hogy Marcsi és Béla buszke, hogy Zsuzsi elutaztak
John glad that Mary and Bill proud that Sue have-travelled
Kínába.
to-China
'John's glad that Mary and Bill's proud that Sue have traveled to China.'
- b. János orul, hogy Marcsi és Béla buszke, hogy Zsuzsi elutazott
John glad that Mary and Bill proud that Sue has-travelled
Kínába.
to-China
'John is glad that Mary and Bill are proud that Sue traveled to China.'

4.3.2 Type 2: summative agreement on multi-valued Ns and Ts

The second language type allows summative agreement on Multi-valued Ns and Ts.

So far Russian in (273) has been observed to show this pattern. And Hebrew in (274) shows optional summative agreement, the judgments there are subject to individual variation.

Russian

(273) Distributive/summative agreement on Multi-valued Ns in Russian

- a. vysokij i xudoj mužčina
tall.SG and thin.SG man.SG
'(A/the) tall man and (a/the) thin man' [split reading, 2 men total] (Russian) ((10) from [Belyaev et al. \(2015\)](#))
- b. vysokij i xudoj mužčiny
tall.SG and thin.SG man.PL
OK: '(The) tall and thin men' [split reading, 2 men total] (Russian) ((12) from [Belyaev et al. \(2015\)](#))

(274) Summative agreement on Multi-valued Ts in Russian

- a. ??Ivan dumaet chto Masha, a Vasya dumaet chto Dasha, ezdil-a
Ivan thinks COMP Masha, and Vasya thinks COMP Dasha, went.sg
v Kitaj.
to China.
'Ivan thinks that Masha, and Vasya thinks that Dasha went to China.'
- b. Ivan dumaet chto Masha, a Vasya dumaet chto Dasha, ezdil-i
Ivan thinks COMP Masha, and Vasya thinks COMP Dasha, went.pl
v Kitaj.
to China.
'Ivan thinks that Masha, and Vasya thinks that Dasha went to China.'

Hebrew

(275) Multi-valued Ns in Hebrew: both

- a. ha-student ha-gavoha ha-ze ve-ha-namux ha-hu hem krovey
the-student the-tall the-this and the-short the-that are
 miSpaxa
 relatives
- b. *ha-studentim* ha-gvohim ha-ale ve-ha-nemuxim ha-hem hem
the-students the-tall the-these and the-short the-those
 krovey miSpaxa
 are relatives
 ‘This tall and this short students are relatives.’

(276) Multi-valued Ts in Hebrew: both

- a. Dina smexa she-Yosi ve-[Maya ge'a she-Dani. *nasa*
 Dina glad that-Yosi and-Maya proud that-Dani *traveled.PAST.3SG*
 le-ostralya.
 to-Australia
- b. Dina smexa she-Yosi ve-[Maya ge'a she-Dani. *nas'u*
 Dina glad that-Yosi and-Maya proud that-Dani *traveled.PAST.3PL*
 le-ostralya.
 to-Australia
 ‘Dina is glad that Yosi traveled to Australia and Maya is proud that Dani traveled to Australia.’

4.3.3 Type 3: distributive agreement on multi-valued Ns, summative agreement

on multi-valued Ts

The third type of language shows distributive agreement on multi-valued Ns and summative agreement on Multi-valued Ts. English, Slovak, German, and Italian are included in this type. Examples from English and Slovak are shown below.

English

- (277) Multi-valued Ns in English: distributive agreement
- a. This tall and that short student are a couple.
 - b. *This tall and that short students are a couple.
- (278) Multi-valued Ts in English: distributive agreement and summative agreement
- a. Sue's proud that Bill, and Mary's glad that John has traveled to Cameroon.
 - b. Sue's proud that Bill, and Mary's glad that John have traveled to Cameroon.

Slovak

- (279) Multi-valued Ns in Slovak: distributive agreement
- a. Jeden vysoky a jeden nizky student su parik.
One tall.sg and one short.sg student.sg are a couple.
 - b. *Jeden vysoky a jeden nizky studenti su parik.
One tall.sg and one short.sg students.pl are a couple.
- (280) Multi-valued Ts in Slovak: summative agreement
- a. *Tána je pysná, že Franta, a Vera je ráda, že Tom, bude.
Tanja is proud that Franta and Vera is glad that Tom will.3SG
cestovat do Nigérie
travel.inf to Nigeria
'Tanja is proud that Franta and Vera is glad that Tom will travelled to
Nigeria'
 - b. Tána je pysná, že Franta, a Vera je ráda, že Tom, budou
Tanja is proud that Franta and Vera is glad that Tom will.3PL
cestovat do Nigérie.
travel.inf to Nigeria.
'Tanja is proud that Franta and Vera is glad that Tom will travelled to
Nigeria'

Summary Crossing the agreement targets (DP internal targets and DP external targets) with the types of agreement (Distributive and Summative), there are four logically possible types of languages. As the data above illustrates, three out of the four logically

possible types are attested; Table 4.3 summarizes these facts. No languages in Type 4, which would show summative agreement on multi-valued Ns/Ds and distributive agreement on multi-valued Ts, have been attested. In other words, the distributive agreement generalization stands as repeated in (282)

	multi-valued Ns	multi-valued T	Attested
Type 1	Distributive	Distributive	Slovnian
Type 2	Summative	Summative	Russian
Type 3	Distributive	Summative	English
Type 4	Summative	Distributive	unattested

Table 4.3: Attested language types

(281) Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also distributive agreement and not summative agreement.

4.4 Previous literature

To my knowledge, the generalization in (281) is a novel discovery and no account has been proposed for it until now. However, there are several proposals that address the difference between summative agreement and distributive agreement in multi-valuation. In this section, I review these proposals.

4.4.1 ‘Slot counting’ in Shen 2016

In [Shen \(2017, 2018\)](#), I pointed out the different number marking on multi-valued Ns and Ts in English and other languages. The crucial examples are repeated in (282). When the noun in (282a) is valued by two singular goals, it can only be marked singular. When the T in (282b) is valued by two singular subjects, it can be marked as singular or plural.

(282) Asymmetry between multi-valued Ns and multi-valued Ts

a. Multi-valued N:

This_[SG] tall and that_[SG] short student_[SG]/*students_[PL] are a couple.

b. Multi-valued T:

Sue is proud that Bill_[SG] and Mary is glad that John_[SG] has_[SG]/have_[PL] traveled to Cameroon.

I attribute the singular multi-valued Ts in English to ellipsis and the asymmetry in (282) to different feature set-ups of Ns and Ts. Following the proposal in [Gluckman \(2016\)](#), I propose that T heads in English have two unvalued number features.⁵ Note that this assumption differs from Gluckman in that I assume a traditional singular/dual/plural feature inventory rather than the privative Individual feature as shown in (260). Furthermore, I propose that Ns in English have only one unvalued number feature. The

⁵ One can imagine an alternative where T heads in English have an infinite number of unvalued number features or one unvalued number feature that can probe multiple times.

feature set-ups are schematized in (283). The spell-out rules that I assume are in (284) where one single instance of the singular feature is spelled out as singular; multiple instances of singular features and any instance of plural features are spelled out as plural.

$$(283) \quad \text{a. } N = [\text{Num:}__]$$

$$\text{b. } T = [\text{Num:}__, \text{Num:}__]$$

$$(284) \quad \text{a. } [\text{SG}] \leftrightarrow \text{singular}$$

$$\text{b. } [\underline{\text{SG}}, \underline{\text{SG}}] \leftrightarrow \text{plural}$$

$$\text{c. } [\underline{\text{PL}}, \underline{\text{SG}}] \leftrightarrow \text{plural}$$

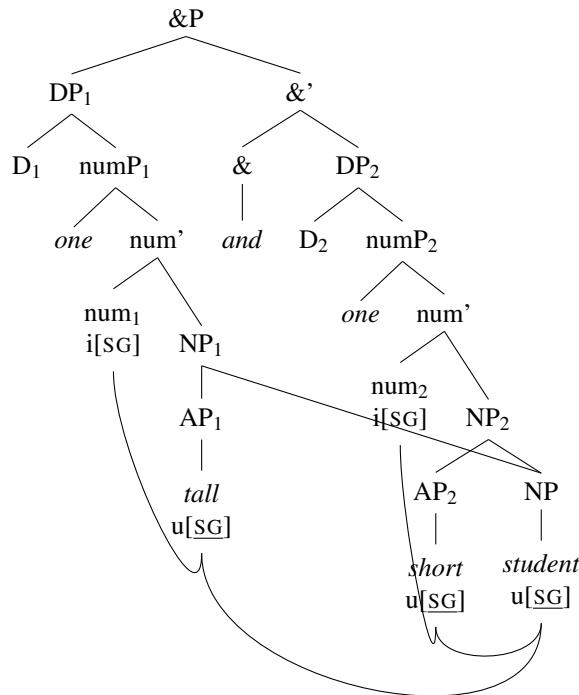
$$\text{d. } [\underline{\text{PL}}, \underline{\text{PL}}] \leftrightarrow \text{plural}$$

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 follow Chomsky (2000, 2001); Bhatt and Walkow (2013) in assuming a two step Agree: the probe first MATCHES with the goal to ensure feature identification, then 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.

Now I show how the multi-valuation patterns are derived. In the NRNR case in (285) where a nominal is valued by two singular features, the unvalued feature on the head noun matches with the unvalued features on both adjectives, establishing feature identification. The unvalued feature on AP₁ matches with and gets valued by the valued feature [SG] on NUM₁; the unvalued feature on AP₂ does the same with NUM₂. Since

both adjectives now have [SG], the head noun, in principle, can get two [SG]s. 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.⁶ As a result, the multi-valued noun is spelled-out as singular according to the spell out rules in (284).⁷

(285) One tall and one short student are a couple.



As for the summative agreement in (286a), Grosz (2015) argues for a multi-dominance analysis (see (251) for the structure). The multi-dominated T head matches

⁶ One way to implement this process is postpone the valuation to the PF and copy the linearly closest [SG] to the head noun. As is noted in Chapter 2, the closest conjunct agreement pattern in mismatch cases where two DPs are of different number specifications supports this analysis.

⁷ 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.

with both embedded subjects *Bill* and *John*, each of which has a [SG]. Just as 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 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 (286c).

- (286) 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.

Note that for English and other languages that only distinguish singular and plural, the proposal can be T heads has two unvalued number features or an infinite number of unvalued number features. Both versions can account for the facts observed. Moreover, an infinite number of unvalued number features would naturally account for languages with a singular/dual/plural system if they show summative agreement on multi-valued Ts. The prediction goes that when valued by two singular subjects, the T is dual; when valued by two dual/plural subjects or three singular subjects, the T is plural. For the two-unvalued-features version, the number of number features needs to be parameterized: Ts have 2 features in English, but 3 features in languages with dual. In this sense the version with an infinite number of number features on Ts involves less stipulation.

However, the idea that Ts contain an infinite number of unvalued number features might be considered unrealistic. Unfortunately the only language with dual I have access to is Slovenian, which only shows distributive agreement on multi-valued Ts.

If a multi-valued T in English is valued by three singular subjects, both versions would predict the T to show plural, which is borne out in (287). If the T has two number features, both will be valued by singular and according to the spell-out rules, two singular values are spelled out as plural. If the T has an infinite number of number features, the T would have three singular values. The same spell-out rule would be used and mark the T as plural.

- (287) John's proud that Mary, Bill's glad that Sue, and George's happy that Meredith have travelled to China.

For both versions of the feature setup, the spell-out rules are to be enriched as in (288) for languages with dual that show summative agreement on multi-valued Ts.⁸

- (288)
- a. $[\underline{\text{SG}}] \leftrightarrow \text{singular}$
 - b. $[\underline{\text{SG}}, \underline{\text{SG}}] \leftrightarrow \text{dual}$
 - c. $[\underline{\text{SG}}, \underline{\text{SG}}, \underline{\text{SG}}] \leftrightarrow \text{plural}$
 - d. $[\underline{\text{PL}}, \underline{\text{SG}}] \leftrightarrow \text{plural}$

⁸ One alternative to the enriched spell-out rules is to postulate an algorithm which combines two singular values into a dual value and a plural value for more than 2 singular values or combinations of dual and a singular value. This can simplify the spell-out rules while capturing the intuition that values are summed up. I leave the implications of this algorithm to future research.

- e. $[\underline{\text{DL}}, \underline{\text{DL}}] \leftrightarrow \text{plural}$
- f. $[\underline{\text{SG}}, \underline{\text{DL}}] \leftrightarrow \text{plural}$
- g. $[\underline{\text{PL}}, \underline{\text{DL}}] \leftrightarrow \text{plural}$
- h. $[\underline{\text{PL}}, \underline{\text{PL}}] \leftrightarrow \text{plural}$

For the composed plurality in Nocte and Nocte-like languages, I adopt the essence of Gluckman (2016)'s analysis shown in (260). 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. T, then, gets another [SG] valued from the 1st person singular subject. The two [SG] values are realized as the plural form of T.

- (289)
- a. $\text{Subject}_{[\underline{\text{SG}}]} \text{T}_{[_,_]} \text{Object}_{[\underline{\text{SG}}]}$
 - b. $\text{Subject}_{[\underline{\text{SG}}]} \text{T}_{[\underline{\text{SG}}, \underline{_}]} \text{Object}_{[\underline{\text{SG}}]}$
 - c. $\text{Subject}_{[\underline{\text{SG}}]} \text{T}_{[\underline{\text{SG}}, \underline{\text{SG}}]} \text{Object}_{[\underline{\text{SG}}]}$

As is shown above, despite the apparent asymmetry between predicate-argument agreement and nominal concord regarding multi-valuation, the current proposal can derive the different multi-valuation patterns while maintaining a unified Agree analysis of agreement and concord. Next I provide empirical evidence for my proposal from mismatch cases where the two goals have distinct values.

4.4.1.1 Evidence from mismatches

The current proposal is further supported by mismatched cases of multi-valuation. As is mentioned in Chapter 2, (290a,c) are well-formed because the head nouns show the same value as the second conjunct while (290b,d) are unacceptable. That is to say that when the two goals that the probe agrees with have different feature values, the head noun in NRNR shows the same value as the linearly closest NUM head, i.e. NRNR shows closest conjunct agreement in mismatch cases.

(290) Mismatch in Multi-Valued N: Closest Conjunct Agreement

- 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.

This behavior is expected under the current proposal. 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, the valuation cannot proceed due to the fact that the head noun only has one unvalued feature (only one 'slot' for one value). Here I follow [Bhatt and Walkow \(2013\)](#) which argues that when the valuation cannot proceed in the syntax, it is postponed to PF where linearization occurs. The probe will then chose the value from the linearly closest goal that it matched with. I argue that the same happens

in NRNR as is shown in (291): valuation of the head noun in mismatched NRNR cases is postponed to PF. The value on the closest (second) NUM head is copied onto the noun; in other words, closest conjunct agreement.⁹

- (291) a. Ten tall_[PL] and one short_[SG] student_[] are a couple.
- b. Ten tall_[PL] and one short_[SG] student_[SG] are a couple.

The mismatch case of multi-valued Ts is shown in the T' 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, as we find with 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. This prediction is borne out in (292), the T *have* is plural regardless of the order of the two embedded subjects. The derivation is schematised in (293).

- (292) a. Sue's proud that the twins and Mary's glad that John have traveled to Cameroon.
- b. Sue's glad that John and Mary's proud that the twins have traveled to Cameroon.

⁹ Note that the **matching** case where both of the goals are singular is also compatible with the closest conjunct agreement proposal. While recognizing CCA as a viable candidate, I leave the exact valuation process in the matching cases open now.

- (293) 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.

(292) shows that the agreement in mismatch cases of T' RNR can only go in the direction predicted by summative agreement rather than CCA. The singular T is not available in mismatch cases in (294), even when the embedded subject in the second conjunct is singular in (294a). It is difficult to see how the ellipsis analysis could account for the difference between (292a) and (294a).

- (294) a. *Mary is proud that the twins, and Sue is glad that John, has travelled to
the U.S.

b. *Sue is glad that John and Mary is proud that the twins, has travelled to
the U.S.

4.4.1.2 Two triggers of Closest Conjunct Agreement

I have shown that the mismatched cases of NRNR result in a CCA pattern while the mismatched cases of T' RNR do not trigger CCA due to T's multiple slots for number values. The idea is that CCA is forced on NRNR due to the single value slot on Ns; T heads do not have this limitation and CCA is not triggered. However, closest conjunct agreement is observed on T in English existential constructions as shown in (295) and

observed in Sobin (1997); Schütze (1999); Alexiadou et al. (2014). Instead of the full &P *one book and two notebooks*, the copula shows agreement with the linearly closest conjunct *one book*.¹⁰

- (295) There is/*are [[**one book**] and two notebooks] on the table.

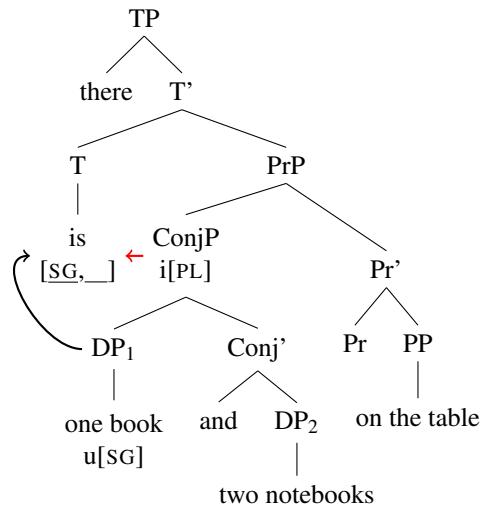
One might think that the current proposal of T's feature set-up predicts otherwise. Since T has multiple unvalued number features, CCA should not be invoked in (295). However, I argue the CCA in (295) is not triggered by multi-valuation on the T head in the same way as the CCA in mismatch cases in NRNR. As long as the CCA in the existential constructions is triggered by an independent restriction, it does not pose a challenge for the current proposal.

Smith (2015) argues for such an independent restriction. Agree involving interpretable features (i.e. semantic agreement) can only proceed if the goal c-commands the probe, whereas Agree involving uninterpretable features can proceed in a configuration where the probe c-commands the goal, – i.e. semantic agreement is upward but the morphological agreement is bi-directional. It is further assumed that &Ps in English only have interpretable features that come from a resolution of the conjuncts. In (296) (derivation of (295)), the &P does not c-command the probe T, thus the agreement cannot proceed. When semantic agreement fails, the T agrees with the highest conjunct in the &P. Since the DP in the first conjunct has uninterpretable features, agreement can

¹⁰ Thanks to Bob Frank for bringing up this issue.

proceed even when the goal is c-commanded by the probe. See [Smith \(2015\)](#) for the detailed discussion. Following this account, the CCA in English existential constructions is not triggered by the feature setup of the T but by restrictions on Agree itself. As a result, the observed CCA does not pose a challenge to the current proposal. Note that in principle the argument does not rely on the specific implementation of Smith's account. As long as there is an independent restriction that triggers the CCA in existential constructions, the current proposal is not challenged. There are much research where different sources for first conjunct agreement are proposed, see [Munn \(1999\)](#); [Bošković \(2009\)](#) among many others.

- (296) There is one book and two notebooks on the table.



The ‘slot counting’ approach proposed in [Shen \(2016, 2018\)](#) accounts for the distributive agreement on multi-valued Ns and the summative agreement on multi-valued Ts in English with the different feature setups of the two heads. Extending the account

to other types of languages, languages that only allow singular marked multi-valued Ts (like Dutch and Greek) would be assumed to have a variant of T that only has one number slot. Languages that allow plural marked multi-valued Ns (like Bulgarian and Russian) would be assumed to have a variant of N that can have multiple number slots.

Although this analysis, in principle, can account for the language variation regarding agreement in multi-valuation, the proposed distribution of the number slots does not follow from deeper principles. As a result, the analysis predicts all four types of languages in Table 4.4 to exist. As we have already seen in the previous section, while the first three types of languages are attested, Type 4 is not attested. For the slot counting account, it indicates that no language that allows Ts with one slot cannot allow Ns with multiple slots. The lack of such distribution is surprising.

	multi-valued Ns	multi-valued T
Type 1	one slot	one slot
Type 2	multiple slots	multiple slots
Type 3	one slot	multiple slots
Type 4	multiple slots	one slot

Table 4.4: 3/4 signature

4.4.2 LFG approach

Now we turn to the approach argued for by [Belyaev et al. \(2015\)](#) in the Lexical Functional Grammar framework. Unlike in GB/Minimalism, the agreement process in LFG does not involve valuing unvalued features. Instead, a lexicalist view is assumed where all elements enter the structure with inflectional information. The agreement is suc-

cessful between two elements if the relevant feature values are compatible with each other (or if the elements with features can be unified with their local syntactic context). For example, in ‘*I am tall.*’, the 1st person singular feature on *I* is compatible with the same feature on *am*. Elements with no features always unify with their local syntactic contexts.

LFG assumes two types of features: CONCORD features that are linked to morphology and INDEX that are linked to semantics/reference. Outside LFG and HPSG, the CONCORD feature is similar to the morphological feature and the INDEX feature is similar to the semantic feature (see [Landau \(2015\)](#)). [King and Dalrymple \(2004\)](#); [Belyaev et al. \(2015\)](#) follow [Wechsler and Zlatić \(2000\)](#); [Wechsler and Zlatić \(2003\)](#) in assuming that the CONCORD feature is closely related to DP internal agreement whereas the INDEX feature is closely related to predicate-argument agreement. [Belyaev et al. \(2015\)](#) assume a rigid mapping between agreement types and feature types (contrary to [King and Dalrymple \(2004\)](#)); DP internal agreement only involves CONCORD features and DP external agreement only involves INDEX features. The point of variation is distributivity of the features.

According to the standard assumption, the CONCORD feature is distributive while the INDEX feature is non-distributive, originally proposed by [Dalrymple and Kaplan \(2000\)](#). The non-distributive features can be associated with a set representing a coordinate structure as a whole. The distributive features can be associated only with the members of a set, the individual conjuncts, but not with the set as a whole. For example

in (297) the DP internal agreement between *this* and *man and woman* involve CONCORD features. The singular feature on *this* is associated with the individual conjuncts *man* and *woman*. The agreement between *are* and the subject *this man and woman* involve the INDEX feature, since the [PL] value on the verb associate with the conjunction as a whole and not individual conjuncts (given that both conjuncts are singular).

- (297) This man and woman are a couple.

To account for the singular pivot in English/Hindi and the plural pivot in Bulgarian/Russian in NRNR, [Belyaev et al. \(2015\)](#) diverge from the standard assumption about distributivity and assume that the (non)distributivity of the CONCORD feature varies across languages as well as constructions in the same language. In particular, assuming that sentences in (298) involve the conjunction of non-constituents *this tall* and *that short*, the singular pivot in (298a) involves the distributive CONCORD feature. The [sg] value on the pivot is distributive since it is associated with each individual singular conjunct. The plural pivot *students* in (298b) involves the non-distributive CONCORD feature. The [pl] value on the pivot is a non-distributive feature since it is associated with the conjunction as a whole and not the individual conjuncts. English only allows the singular pivot in (298a) because English only has the distributive version of CONCORD features. Bulgarian and Russian on the other hand have both versions of CONCORD features, which makes both singular and plural pivots possible. Note that this analysis has to make the assumption that conjunction of non-constituents is possible.

- (298) a. singular pivot: This_[sg] tall and that_[sg] short *student*_[sg] are a couple.
 b. plural pivot: This_[sg] tall and that_[sg] short *students*_[pl] are a couple.

Although designed to account for the cross-linguistic variation on multi-value Ns, the above analysis can be extended to multi-valued Ts. Assume that like CONCORD features relevant to DP internal agreement, INDEX features relevant to DP external focus also come with a distributive version and a non-distributive version.

When agreeing with two singular subjects, English T heads can involve either the distributive version or the non-distributive version of the INDEX feature. When the the distributive version is involved, the multi-valued T is spelled out as singular since each subject it agrees with is singular. When the non-distributive version is involved, the multi-valued T is spelled out as plural since the reference of the two subjects is plural.

Languages that show plural agreement on both the multi-valued Ns and Ts, like Russian, are different from English in that both the DP internal and external agreement involve the non-distributive versions of CONCORD and INDEX features. The agreement involving non-distributive features is spelled out as plural. As for languages that show singular agreement on both the multi-valued Ns and Ts, like Dutch and Slovenian, the DP internal and external agreement can be assumed to involve distributive versions of the features.

Although both the distributive agreement and the summative agreement pattern can be accounted for in the LFG approach, the distributive agreement generalization

remains unaccounted for. It's not clear why there is no such language where the DP internal agreement involves the non-distributive CONCORD features AND the DP external agreement involves the distributive version of the INDEX features, given that in some languages the DP internal agreement involves non-distributive features and in other languages the DP external agreement involves distributive features.

Lastly recall that in English the mismatch cases in NRNR show closest conjunct agreement as in (299) while the mismatch cases in T' RNR show resolved agreement as in (300). As is shown in the last section, the slot-counting approach have a straight forward account for these different mismatch patterns. For the LFG approach, one needs to assume that the INDEX features require resolved agreement and the CORCORD features renders closest conjunct agreement.

- (299) a. This tall and those short students came from the U.S.
- b. These tall and that short student came from the U.S.

- (300) a. Mary is proud that the twins, and John is glad that Sue, have been to the U.S.
- b. John is glad that Sue, and Mary is proud that the twins, have been to the U.S.

So far in this chapter, I have laid out observations of summative agreement where the pivot agreeing with two singular goals is spelled out as plural. Furthermore I have

argued for the Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also distributive agreement and not summative agreement. This section discusses two previous approaches that look into multi-valuation across targets. Neither the ‘slot-counting’ analysis nor the LFG analysis can account for the distributive agreement generalization.

4.5 Multi-valuation as an Agreement Hierarchy effect

Having shown that previous analyses proposed for multi-valuation fall short in accounting for the distributive agreement generalization, this section makes a connection between the generalization and the Agreement Hierarchy. The generalization and the crucial pattern is repeated in (301) and Table 4.5. Three out of four logically possible agreement patterns are attested. The language type where multi-valued Ns show summative agreement while multi-valued Ts show distributive agreement is not attested.

- (301) Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also distributive agreement and not summative agreement.

	multi-valued Ns	multi-valued Ts	Attested
Type 1	Distributive	Distributive	Slovnian
Type 2	Summative	Summative	Russian
Type 3	Distributive	Summative	English
Type 4	Summative	Distributive	unattested

Table 4.5: Attested language types

The 3/4 effect on multi-valued Ns and Ts is also observed on other agreement phenomena. In a series of work, [Corbett \(1979, 2000, 2006\)](#) observes a general implication relation among agreement targets when agreeing with hybrid nouns. Hybrid nouns can control both morphological agreement and semantic agreement. In (302), the hybrid noun *committee* in certain varieties of English can control singular or plural agreement on the verb *have*. Note that (302b) involves a mismatch on different agreement targets: the demonstrative shows morphological agreement while the verb shows semantic agreement. Note that the demonstrative can only show singular agreement as is in (302c).

- (302) a. This committee has gathered.
- b. This committee have gathered.
- c. *These committee have gathered.

The same pattern is observed on other agreement targets. Although predicates in English can show either morphological or semantic agreement, personal pronouns tend to show more semantic agreement than predicates. In (303a), the copula shows singular while the personal pronoun shows plural marking, both of which are controlled by *the*

government. Mismatch in the opposite direction is impossible as is shown in (303b) where the copula is plural and the personal pronoun is singular.

(303) from [Smith \(2015\)](#)

- a. The government is embarrassing themselves.
- b. *The government are embarrassing itself.

This effect is also observed in gender agreement in Russian. In Russian, *vrač* ‘doctor’ is morphologically masculine but can refer to a female individual (semantically feminine). (304) shows that it is possible for the adjective and the verb to both show either masculine agreement or feminine agreement. However, mismatch between the two targets can only be in one direction. It is possible for the adjective to be masculine and the verb to be feminine, but not the other way around. Table 4.6 shows the scheme: when the verb shows morphological agreement, the attributive element cannot show semantic agreement.

(304) Russian hybrid nouns: morphologically masculine, semantically feminine.

- a. Novyj vrač skazal
new.**masc** doctor said.**masc**
‘The new doctor said.’
- b. Novyj vrač skazala
new.**masc** doctor said.**fem**
‘The new doctor said.’

- c. *Novaja vrač skazal.
new.fem doctor said.masc
'The new doctor said.'
 - d. Novaja vrač skazala
new.fem doctor said.fem
'The new doctor said.'

	attributive	verb
attested	morphological	morphological
attested	semantic	semantic
attested	morphological	semantic
*not attested	semantic	morphological

Table 4.6: the Agreement Hierarchy effect: hybrid noun agreement

With evidence from a variety of constructions and languages, Corbett proposes the Agreement Hierarchy in (305). The hierarchy effect holds for at least 3 levels: (1) in the corpus, the positions to the right of the hierarchy are more likely to show semantic agreement and the positions to the left of the hierarchy are more likely to show morphological agreement; (2) within one sentence, if a position shows morphological agreement, no positions to its left can show semantic agreement; (3) in a particular language, if morphological agreement is possible in a position on the hierarchy, it is also possible with all the positions on its left. For more recent work on the Agreement Hierarchy, see [Smith \(2015\)](#); [Landau \(2016\)](#); [Wurmbrand \(2017a\)](#).

The relevant effect here is the 3rd level. The Agreement Hierarchy in (305) predicts a typological gap: no languages show morphological agreement on a position X and semantic agreement on positions left of X when agreeing with hybrid nouns. If we align distributive agreement in multi-valuation with morphological agreement and summative agreement with semantic agreement, then the typological gap observed in multi-valuation is parallel to the prediction: no languages show distributive agreement on multi-valued Ts and summative agreement on multi-valued Ns, given that Ns are on the left of Ts in the hierarchy in (306).

(306) N — T

Based on this parallel between multi-valuation and agreement with hybrid nouns, I propose that multi-valuation is a case of the Agreement Hierarchy effects. Connecting the distributive agreement in multi-valuation with morphological agreement in the Agreement Hierarchy is a natural move. Morphological agreement in Corbett's sense involves a shared morphological number marking. In (307a) the demonstrative *this* involves morphological agreement with the noun *committee* because they are both marked as singular (as opposed to plural verb *have*). In (307b), the multi-valued noun *student* also shows the same singular marking with *this* and *that*, despite the plural reference of the whole DP.

(307) a. This.sg committee.sg have.pl gathered

- b. This.sg tall and that.sg short student.sg have gathered.

Moreover, [Corbett \(1979\)](#) also proposes that CCA involves a resolution of mismatch in morphological agreement. This is parallel to the CCA observed in mismatch cases in multi-valuation in (308).

- (308) These tall and that short student have gathered.

Linking summative agreement in multi-valuation with semantic agreement in the Agreement Hierarchy is also justified on conceptual grounds. Semantic agreement with hybrid nouns reflects not the morphological marking of the noun, but the semantic reference. In accounting for the summative agreement on multi-valued Ts, [Grosz \(2015\)](#) proposes that the reference feature on each embedded subject gets copied onto T as in (309a). If both embedded subjects have the same reference as in (309b), the plural agreement on T is ruled out. Thus the summative agreement in multi-valuation makes reference to semantic reference, a trademark for semantic agreement. In Section 4.6.4, I present another motivation to connect multi-valuation to the Agreement Hierarchy.

- (309) a. John's glad that Sue₁ and Bill's proud that Mary₂ have₁₊₂ been to China.
 b. John's glad that his mother₁ and Bill's proud that his wife₁ has/*have been to China.

Treating multi-valuation as an Agreement Hierarchy effect creates a set of research

questions. 1. If agreement with hybrid nouns and multi-valuation both follow the Agreement Hierarchy, one question to ask is whether the same target on the hierarchy shows the same type of agreement in the two constructions. In (310), we see that verbs in English can show both morphological and semantic agreement in multi-valuation and agreement with hybrid nouns. The question remains whether there can be an agreement type difference between constructions on the same target, e.g. an element shows morphological agreement when multi-valued and semantic agreement when agreeing with hybrid nouns.

- (310) a. This committee has/have gathered.
- b. John's glad that Sue and Bill's proud that Mary has/have been to China.

2. The original Agreement Hierarchy contains only attributive elements in the DP internal agreement targets. Multi-valuation puts nouns themselves on the hierarchy as an agreement target. Since [Ritter \(1991\)](#), more research assumes that a noun gets its number value from NUM head. The interesting question is the relative positions of attributive elements and nouns on the hierarchy. Although this question is well beyond the scope of this dissertation, I discuss cases of possible multi-valued attributive elements in the next section.

3. The proposed hierarchy between N and T reminds one of another agreement hierarchy: the Predicate Hierarchy ([Comrie \(1975\)](#); [Corbett \(2006\)](#)) as in (311). The Predicate Hierarchy works similarly as the Agreement Hierarchy except in a restricted

predicative position; elements on the left of the hierarchy are more likely to show morphological agreement when used as a predicate while the elements on the right end are more likely to show semantic agreement. Note that on this hierarchy, the noun is more likely to show semantic agreement than the verb. On the surface, this pattern goes against the observation in (306) that multi-valuation Ns are more likely to show morphological agreement than the Ts. However this is not a problem for the analysis proposed here if we assume that the Predicate Hierarchy and the Agreement Hierarchy are somewhat independent from each other. Corbett (2006) already makes such a claim by noting that despite the fact that predicate is on the left of the relative pronoun in the Agreement Hierarchy (305), there is no direct claim about the relative likelihood of semantic agreement between predicate nouns and relative pronouns. Wurmbrand (2017a) discusses NP ellipsis data to support this claim. The multi-valuation aspect of Predicate Agreement is left for future research.

$$(311) \quad \begin{array}{ccccccc} \text{predicate verb} & - & \text{participle} & - & \text{adjective} & - & \text{noun} \\ & \leftarrow \text{morphological/singular agreement} & & & & \text{semantic/plural agreement} \rightarrow & \end{array}$$

4.6 Multi-valued determiners and adjectives?

By comparing multi-valued Ns and multi-valued Ts, this chapter has been treating multi-valuation as a unified operation. One natural candidate to investigate is multi-valued nominal modifiers, namely determiners and adjectives. In this section, I dis-

cuss the cross-linguistic agreement patterns on determiners and adjectives in multi-valuation-like constructions. I argue that although multi-valued adjectives and demonstratives can, in theory, exist, the observed patterns are likely to involve various alternative structures.

4.6.1 Predictions from the Agreement Hierarchy

The original motivation for the Agreement Hierarchy comes from the asymmetry between predicates and attributive elements. When agreeing with hybrid nouns, the attributive elements, like adjectives, determiners, and demonstratives, are more likely to show morphological agreement while the predicates are more likely to show semantic agreement. In multi-valuation, it is thus predicted that attributive elements are more likely to show distributive agreement while multi-valued Ts are more likely to show summative agreement. I postulate the predicted generalization as (312a), which makes the typological prediction in (312b).¹¹ The next subsection examines if the prediction is borne out.

- (312) a. Predicted Generalization on Multi-valued Ds/As and Ts: distributive agreement on multi-valued Ts entails distributive agreement on multi-valued Ds/As.

¹¹ Another question involves the relative positions of multi-valued As/Ds and Ns. Since the original Agreement Hierarchy does not include nouns, it does not make predictions regarding the relative positions of As/Ds and Ns. This issue has the potential of identifying the relevant factors deciding the positions on the hierarchy; however, as I will show in this section, the status of multi-valued As/Ds involve complications. Deciding the ranking of As/Ds and Ns is left to future research.

- b. Predicted typological gap: languages with singular multi-valued Ts and plural multi-valued Ds/As.

4.6.2 Predictions vs. Empirical Patterns

Before getting into the predictions regarding languages with singular multi-valued Ts, we first consider languages with summative agreement on multi-valued Ts. The Hierarchy predicts two types of languages to exist: languages with singular multi-valued Ds/As and plural multi-valued Ts and languages with plural multi-valued Ds/As and Ts. These two types of languages are both attested.

4.6.2.1 Summative agreement on Ts and summative agreement on Ds/As

As we seen above, Russian, Hebrew, and Czech/Slovak have been reported to show summative agreement on multi-valued Ts. These languages also allow summative agreement on Ds/As as shown below.

- (313) Multi-valued demonstratives in Russian: summative agreement
- a. *èta ženščina i devočka
this-F.SG woman-F.SG and girl-F.SG
'this woman and girl'
 - b. èti mužčina i ženščina
these-PL man-M.SG and woman-F.SG
'this man and woman' (from [King and Dalrymple \(2004\)](#))

- (314) Multi-valued adjectives in Russian: Both
- a. byvshij president i ministr vstrechajutsa
former.sg president and minister date.pl
'The former president and the former minister are dating.'
also available: 'The former president and the current minister are dating.'
 - b. byvshije president i ministr vstrechajutsa
former.pl president.sg and minister.sg date.pl
'The former president and the former minister are dating.'
- (315) Multi-valued Ds in Hebrew: Both ¹²
- a. ha-yeled ve-ha-iS ha-ele hem krovey miSpaxa
the-boy and-the-man the-these are close family
 - b. ha-yeled ve-ha-iS ha-ze hem krovey miSpaxa
the-boy and-the-man the-this are close family
'This boy and this man are relatives.'
- (316) Multi-valued Adjectives in Slovak: summative agreement
- a. Bývalí prezident a minister sú vo vz'ahu.
Former.pl president.sg.masc and minister.sg.masc are.pl a couple.
#‘The former president and the former minister are a couple.’
 - b. #Bývalý prezident a minister sú vo
Former.sg.masc president.sg.masc and minister.sg.masc are.pl a
vz'ahu.
couple.
#‘The former president and the former minister are a couple.’
available: ‘The former president and the current minister are a couple.’
- (317) Multi-valued Demonstratives in Slovak: Both
- a. Títo muž a chlapec si sú príbuzní
These.pl.masc man.sg and boy.sg reflexive-particle are relatives.
'this man and this boy are relatives'
 - b. Tento muž a chlapec si sú príbuzní.
This.sg man.sg and boy.sg reflexive-particle are relatives
'this man and this boy are relatives'

¹² summative agreement on the demonstrative is accepted by both of the native speakers of Hebrew I have consulted; however, only one accepted the distributive agreement under the relevant reading. One speaker can only accept (315b) with demonstrative modifying 'man' and not 'boy'.

- (318) Multi-valued demonstratives+adjectives in Slovak: summative agreement
- a. Tento vysoký muž a chlapec sú Slováci
This.sg.masc tall.sg.masc man.sg and boy.sg are Slovaks.
#‘this tall man and this tall boy are Slovaks’
available ‘this tall man and this boy are are Slovaks’
 - b. Títo vysokí muž a chlapec sú Slováci
These.pl tall.pl.masc man.sg and boy.sg are Slovaks’.
‘this tall man and this tall boy are Slovaks’

4.6.2.2 Summative agreement on Ts and distributive agreement on Ds/As

English shows summative agreement on Ts, as reported by [Grosz \(2015\)](#). As for demonstratives, [Corbett \(1979\)](#) observes that only distributive agreement is possible, as shown in (319).

- (319) Multi-valued Ds in English: distributive agreement
- a. This man and woman are a couple.
 - b. *These man and woman are a couple.

4.6.2.3 Distributive agreement on Ts and distributive agreement on Ds/As

The crucial prediction involves languages that only show distributive agreement on multi-valued Ts. The hierarchy predicts that multi-valued Ds/As must also show

distributive agreement and not summative agreement.

Dutch and Icelandic conform with the prediction. As reported previously, they show distributive agreement on multi-valued Ts. The following sentences show that multi-valued Ds in these languages also show distributive agreement.

(320) Multi-valued Ds in Icelandic: distributive agreement

- a. minn faðir og sonur eru skyldir.
my father and son are related.pl
- b. *mínir faðir og sonur eru skyldir.
my.pl father and son are related.pl
My father and my son are related.

(321) Multi-valued Ds in Dutch: distributive agreement

- a. het boek en koekje
the.sg.neut book and cookie
'the book and the cookie'
- b. *de boek en koekje
the.pl.neut book and cookie
'the book and the cookie'

4.6.2.4 Distributive agreement on Ts and summative agreement on Ds/As

What the Hierarchy predicts not to exist is the language type where multi-valued Ts show distributive agreement but the demonstratives/adjectives show summative agree-

ment. As noted previously, Serbo-Croatian, Brazilian Portuguese, Slovenian, and Finnish only show distributive agreement on Ts. However, adjectives and/or demonstratives allow summative agreement to a different extent. Note that I will only consider prenominal adjectives at the moment. Post-nominal adjectives allow more summative agreement than prenominal adjectives. I will discuss this asymmetry in Section 4.6.4.

[Villavicencio et al. \(2005\)](#) observes that determiners and prenominal adjectives in Brazilian Portuguese can modify two singular nouns, as shown in (322). Curiously, when only the plural determiner is used in (322), the sentence is judged as unacceptable for two of the three native speakers I consulted.

- (322) Os prováveis diretor e ator principal são Gus
the.MPL probable.PL director.MSG and actor.MSG principal.MSG are Gus
Van Sant e Johnny Deep, respectivamente
Van Sant and Johnny Deep respectively
'the likely director and main actor are, respectively, Gus Van Sant and Johnny Deep'
- (323) *Os diretor e ator principal são Gus Van Sant
the.MPL director.MSG and actor.MSG principal.MSG are Gus Van Sant
e Johnny Deep, respectivamente
and Johnny Deep respectively
'the director and main actor are, respectively, Gus Van Sant and Johnny Deep'

[Heycock and Zamparelli \(2005\)](#) reports that Finnish allows both Distributive and summative agreement are available on determiners; however, the native speaker I consulted with only allowed distributive agreement. (324) shows data from my survey.

(324) Multi-valued Ds in Finnish: distributive agreement and summative agreement

- a. tama kissa ja koira ovat pari
this.sg cat.sg and dog.sg be.pres.3pl couple.sg.nom
'this cat and this dog are a couple'
- b. *nama kissa ja koira ovat pari
these.pl cat.sg and dog.sg be.pres.3pl couple.sg.nom
'this cat and this dog are a couple' (ok according to [Heycock and Zamparelli \(2005\)](#))

In Slovenian, although the demonstratives in (325) show distributive agreement, adjectives show summative agreement in (326).

(325) Multi-valued Ds in Slovenian: distributive agreement

- a. ?Ta mož in fant-ek sta v sorodu.
this man and boy-DIM are.DUAL.M in relation
- b. *Ti mož in fant-ek so v sorodu.
these man and boy-DIM are.DUAL.M in relation
'This man and this boy are related.'

(326) Slovenian adjectives: summative agreement

- a. Bivša predsednica in ministrica sta par
former.fem.sg president.fem.sg and minister.fem.sg are.dl couple
Preferred reading: 'The former president and the minister are a couple.'
- b. ?Bivši predsednica in ministrica sta par
former.fem(dl) president.fem.sg and minister.fem.sg are.dl couple
'The former president and the former minister are a couple.'

Serbian/Croatian/Bosnian only allows distributive agreement on multi-valued Ts; however, it allows summative agreement on demonstratives and adjectives in (327) and

(328). This is also reported by Begović and Aljović (2015)

(327) demonstrative

- a. Ova predsjednica i ministarka su par.
this.sg.fem president.sg.fem and minister.sg.fem are couple
prominent reading: ‘this president and the minister are a couple’
- b. Ove predsjednica i ministarka su par.
these.pl.fem president.sg.fem and minister.sg.fem are couple
‘this president and this minister are a couple’ (with contrast with other pairs of presidents and ministers)

(328) demonstrative+adj

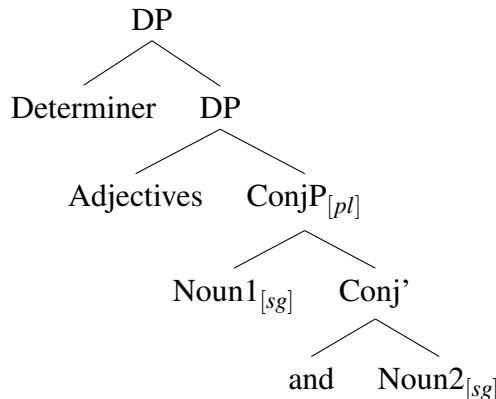
- a. Ova bivša predsjednica i ministarka su par.
this.sg.fem former.sg.fem president and minister are couple
#‘this former president and this former minister’
‘this former President and the minister’
- b. Ove bivše predsjednica i ministarka su par.
this.pl.fem former.pl.fem president.sg.fem and minister.sg.fem are couple.
‘this former president and this former minister’

So far in this section I have shown that in some languages where multi-valued Ts can only show distributive agreement, the attributive elements modifying two singular nouns can show summative agreement. These cases goes against the connection between Agreement Hierarchy and multi-valuation. In the next subsection, I suggest several ways that the connection between the two can be maintained.

4.6.3 Meeting the Challenge

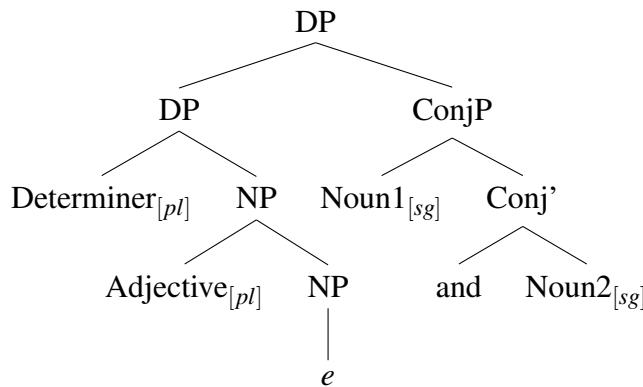
Here I point to the fact that cases above where an attributive element modifies two singular nouns do not necessarily involve multi-valuation. The multi-valued Ns and Ts involve multi-dominance constructions where the multi-valued elements are structurally shared by the controllers. It is not clear, however, whether strings like *this man and woman* involve the multi-dominance structure as well. Previous accounts by King and Dalrymple (2004); Begović and Aljović (2015) propose the structure in (329) where the nouns are conjoined before merging with the determiner and the adjective. In this case, the ‘multi-valued’ determiners and adjectives would not have two singular values. No relevant conclusion can be reached comparing this case with the genuine multi-valued Ns and Ts. At the very least, the construction in (329) is structurally ambiguous. It is premature to compare it with multi-valued Ns and Ts without being able to disambiguate the structures.

(329) [_{DP} Determiner [_{NP} Adjectives [_{ConjP} Noun1 and Noun2]]]



(329) is not the only possible structure for the *demonstrative adjective noun and noun* string. In languages where singular nouns do not require articles, a structure in (330) can also generate a string with an apparent ‘multi-valued attributive element’. In (330), the NP of the DP is a simple plural noun which is empty (through ellipsis of the NP or nominalizaton of the adjective), while the conjunction of the two singular nouns are part of an appositive adjunct to the DP.

(330) [DP Determiner [NP Adjective [NP Noun_[pl]]][ConjP Noun1 and Noun2]]]



In Serbian/Croatian/Bosnian for example, the plural demonstratives and adjectives are more acceptable when the speaker pauses before and after *president.sg and minister.sg* in (332). This is compatible with the structure laid out in (330).

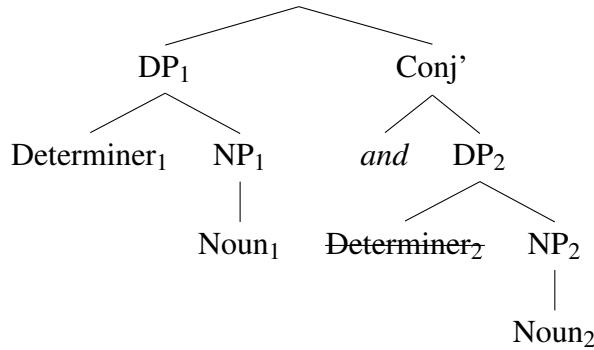
(331) Ove bivše predsjednica i ministarka su par.
 this.pl.fem former.pl.fem president.sg.fem and minister.sg.fem are couple.
 ‘this former president and this former minister’ (ok, with a pause after *former*)

The appositive structure can also account for the surprising contrast in Brazilian Portuguese between (332) and (333). If the phrase *director and major actor* is an appositive phrase, the subject of (332) is *the probably ones* which is a licit subject. (333) is unacceptable since *the.pl* cannot be the subject.

- (332) Os prováveis, diretor e ator principal, são Gus
 the.MPL probable.PL director.MSG and actor.MSG principal.MSG are Gus
 Van Sant e Johnny Deep, respectivamente
 Van Sant and Johnny Deep respectively
 ‘the likely director and main actor are, respectively, Gus Van Sant and Johnny Deep’
- (333) *Os, diretor e ator principal, são Gus Van Sant
 the.MPL director.MSG and actor.MSG principal.MSG are Gus Van Sant
 e Johnny Deep, respectivamente
 and Johnny Deep respectively
 ‘the director and main actor are, respectively, Gus Van Sant and Johnny Deep’

Regarding the singular ‘multi-valued’ determiners, there is also at least one alternative structure involving the combination of DP coordination and the ellipsis of the D head.

- (334) [_{DP} Determiner₁ [_{NP} [Noun₁]] and [_{DP} Determiner₂ [_{NP} [Noun₂]]]]



As a result, patterns reported above as the ‘multi-valued attributive elements’ might not involve multi-valuation at all. Before comparing multi-valued attributives with other multi-valued targets, one needs to be able to disambiguate among the potential structures, which I leave for future research.

4.6.4 Pre- and post-nominal adjectives

The discussion so far has focused on prenominal adjectives. Post-nominal adjectives are reported to be more likely to trigger summative agreement.

[Villavicencio et al. \(2005\)](#) observes that in Brazilian Portuguese both prenominal and post-nominal adjectives can show summative agreement.¹³ In (335), the multi-valued adjective shows summative agreement for both gender (masculine) and number (pl). On the other hand, in (336), the multi-valued adjectives show closest conjunct agreement with the second conjunct in both gender (feminine) and number (sg). In-

¹³ King and Dalrymple (2004) reports that Brazilian Portuguese disallows singular determiners in this context, contrary to Munn (2000) and [Villavicencio et al. \(2005\)](#).

terestingly, a mixed pattern is observed in (337), where the number shows summative agreement (pl), and the gender feature shows CCA. Villavicencio et al. (2005) also notes that the mixed pattern is subject to idiolectal variation.

(335) Gender and number summative

- a. o homem e a mulher modernos
the.MSG man.MSG and the.FSG woman.FSG modern.MPL
'the modern man and woman' (Resolved)

(336) Gender and number CCA

- a. estudos e profissão monástica
studies.MSG and profession.FSG monastic.FSG
'monastic studies and profession'
- b. no povo e gente hebreia
on.the.MSG population.MSG and people.FSG hebrew.FSG
'on the Hebrew people'

(337) Number summative, gender CCA

- a. todo o constrangimento e a dor
all.MSG the.MSG embarrassment.MSG and the.FSG pain.FSG
sofridas
suffered.FPL
'all the embarrassment and pain suffered'
- b. o drama e a loucura vividas
the.MSG drama.MSG and the.FSG madness.FSG lived/felt.FPL
'the drama and the madness experienced'
- c. o aprendizado e a experiência vividas
the.MSG learning.MSG and the.FSG experience.FSG lived/felt.FPL
'the accumulated learning and experience'
- d. o romantismo e a morbidez profundas
the.MSG romanticism.MSG and the.FSG morbidity.FSG deep.FPL
da alma alemã
of.the soul German
'the profound romanticism and morbidity of the German soul'

- e. uma relação entre sobrecarga do organismo e envelhecimento
 a relation between overload of the organism and aging.MSG
 e morte prematuras
 and death.FSG premature.FPL
 ‘A relation between overload of the organism and premature aging and death’

[Cinque \(2010\)](#) observes that in Romance languages like Spanish (338), French (338), and Italian (340), summative agreement on prenominal adjectives is far less accepted than that on post-nominal adjectives.

- (338) Spanish (Cinque 2010, 88)
 - a. con ferviente devoción y cariño
 with fervent.sg devotion.sg and affection
 - b. ??con fervientes devoción y cariño
 with fervent.pl devotion.sg and affection
 - c. con devoción y cariño fervientes
 with devotion.sg and affection fervent.pl
 ‘with fervent devotion and affection’
- (339) French (Cinque 2010, 88; quoting Noailly 1999, 90)
 - a. avec une étonnante grace et sincérité
 with an astonishing.sg grace.sg and sincerity.sg
 - b. ??avec d'étonnantes grace et sincérité
 with astonishing.pl grace.sg and sincerity.sg
 - c. avec une grace et une sincérité étonnantes
 with an grace.sg and a sincerity.sg astonishing.pl
 ‘with astonishing grace and sincerity’
- (340) Italian (Cinque 2010, 89)
 - a. (Ci trattò) con grande amore e affetto
 ((s)he treated.us) with great.sg love.sg and affection.sg
 - b. *?(Ci trattò) con grandi amore e affetto
 ((s)he treated.us) with great.pl love.sg and affection.sg

- c. (Ci trattò) con amore e affetto grandi
 ((s)he treated.us) with love.sg and affection.sg great.pl
 ‘She treated us with great love and affection.’

[Cinque \(2010\)](#) accounts for this asymmetry between prenominal and post-nominal adjectives by assuming that the plural post-nominal adjectives are derived from a reduced relative clause. If this is right, the post-nominal adjectives are predicates in the relative clause modifying the noun. Cinque supports the reduced relative clause analysis by showing that in Italian, adjectives that cannot be predicates (e.g. *complete* (complete.pl), *probabili* (probabile.pl), *semplici* (simple.pl)) cannot show plural agreement when modifying two singular nouns as is shown in (341).

(341) Cinque 2010, 90

- a. ??in sicurezza e padronanza complete
 with confidence.sg and command.sg complete.pl
 ‘with complete confidence and command’
- b. in completa/??complete sicurezza e padronanza
 with complete.sg/??complete.pl confidence and command
 ‘with complete confidence and command’

If post-nominal adjectives are in the predicate position, the summative agreement observed in multi-valuation does not violate the Agreement Hierarchy. However this cannot explain all the cases of summative agreement on post-nominal adjectives. [Bobaljik \(2017\)](#) notes that in Spanish, adjectives that cannot be predicates can still show summative agreement when modifying two singular nouns as is in (342).

- (342) a. El presidente y el vicepresidente previ-o-s son
 the.M.SG president and the.M.SG vice.president **former-M-PL** are
 amigos.
 friends
 ‘The former president and (former) vice-president are friends.’
- b. *El presidente es previo.
 the.M.SG president is former.M.SG
 ‘The president is former.’

It is worth pointing out that the asymmetry between prenominal and post-nominal adjectives is also noted in the Agreement Hierarchy literature by [Corbett \(1979, 2000\)](#). In the Lena dialect of Spanish, nouns like *énte* (people) trigger mass agreement (semantic agreement) on predicates and singular feminine agreement (syntactic agreement) within the NP. Interestingly, post-nominal adjectives show mass agreement as is shown in (343), unlike prenominal adjectives. [Corbett \(2000\)](#) notes that in general, agreement targets that stand after the controller are more likely to show semantic agreement. The common asymmetry between post- and pre-nominal adjectives in agreement with hybrid nouns and multi-valuation further supports the connection between the two.

- (343) a. bwén-a énte
 good-SG.FEM people
- b. énte bwén-o
 people good-MASS
 ‘good people’
- (Corbett 2000, p192-p193, fn. 13)

Multi-valued Ns also show an asymmetry between prenominal and post-nominal adjectives. [Belyaev et al. \(2015\)](#) observes that, in Italian, when the pivot noun in NRNR

is modified by two singular postnominal adjectives, the pivot must be plural, as shown in (344). When the pivot is modified by two singular prenominal adjectives, the pivot must be singular, as shown in (345).

- (344) Alla partenza saranno ammainate le ***bandiere rossa e bianca*** accompagnate possibilmente da segnale acustico. (Italian)
 to departure will.be.PL lowered.PL **the.PL flag.PL red.SG and white.SG** accompanied.PL possibly by signal acoustic
 ‘At the departure, the red and white flags will be lowered, possibly accompanied by an acoustic signal.’ [2 flags total: one red, one white]
- (345) La novità era nel senso che essa cambiava la natura della liquidazione, cosicché vecchio e nuovo regime diventavano non più comparabili...
 the novelty was in.the sense that it changed the nature of.the liquidation so.that **old.SG and new.SG regime.SG** became.PL not anymore comparable
 ‘The novelty was in the sense that it changed the nature of liquidation, so that the old and new regimes became no longer comparable...’ [2 regimes: one old, one new] (Italian, *La Repubblica* corpus)

In sum, despite the structural ambiguity involved in cases where an attributive element modifies two singular nouns, the pre- and post-nominal asymmetry observed supports the connection between multi-valuation and the Agreement Hierarchy.

4.7 Conclusion

Having investigated multi-valued Ns in NRNR constructions in Chapters 2 and 3, this chapter discusses multi-valuation on different agreement targets. First I consider con-

structions involving multi-valued Ts, reported by [Grosz \(2015\)](#) and [Gluckman \(2016\)](#). A cross-linguistic survey comparing multi-valued Ns in NRNR and multi-valued Ts in T' RNR reveals the Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also show distributive agreement and not summative agreement. No language marks multi-valued Ns as plural when multi-valued Ts are spelled out as singular in that language. This typological gap indicates that multi-valuation is a subcase of Agreement Hierarchy effects. At the end of the chapter I briefly discuss the patterns of potential multi-valued determiners and adjectives. I show that some languages seemingly violate the summative agreement in that multi-valued Ts must show plural agreement while adjectives/determiners can show plural marking. I discuss possible explanations for this anomaly while maintaining the generalization by pointing out the structural ambiguity behind the ‘multi-valued’ adjectives/determiners. Weeding the non-multi-valuation structures out is left to future research.

Chapter 5

Conclusion

In this final chapter, I summarize the main findings and claims made in this dissertation before briefly discussing questions that have stemmed from the dissertation.

5.1 a summary of findings and claims

5.1.1 two analyses of NRNR

The first part of the dissertation focused on the nominal right node raising constructions (NRNR) in (346). Two patterns were observed: in (346a), only the singular pivot is allowed and in (346b), only the plural pivot is allowed.

- (346) a. This tall and that short student(*s) are a couple. (singular pattern)
b. John's and Mary's student*(s) are a couple. (plural pattern)

A cross-linguistic survey revealed the generalization in (347).

- (347) Generalization on NRNR: The singular pattern appears when the sources

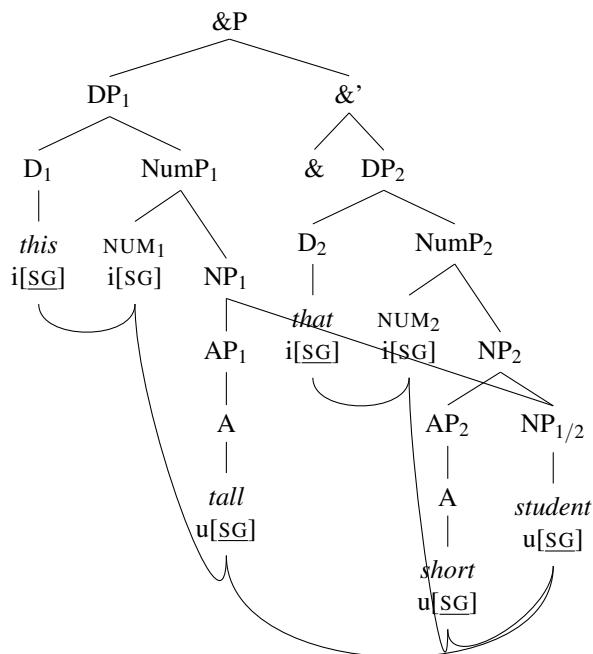
show morphological agreement with the pivot.

I proposed that the two sentences in (346) involve different syntactic structures. I argued for a multi-dominance structure for the singular pivot in (346a) and a conjoined specifier structure for the plural pivot in (346b).

5.1.1.1 Analysis one: multi-dominance

I argue for a multi-dominance analysis for the singular pivot as in (348). I show that alternative analyses of right node raising, such as ellipsis and across-the-board movement, fall short in account for the distribution the singular pivot.

(348) this tall and that short *student* are a couple.



To account for the generalization in (347), I proposed two constraints on multi-dominance. I argue that this analysis presents a challenge for the morphological theory of nominal concord and argues for the syntactic agree theory of nominal concord.

(349) Constraints on Multi-Dominance

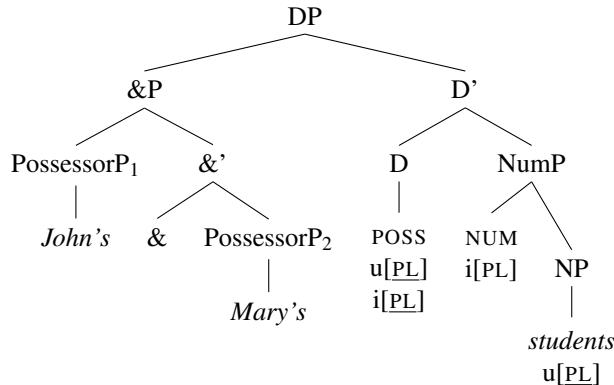
- a. Agree constraint: A node Z is shareable by X and Y if there is an Agree relation between X and Z and Y and Z.
- b. MaxShare: XP can be shared only if there is no YP such that YP dominates XP and YP is shareable, if the XP sharing structure and the YP sharing structure have identical

5.1.1.2 Analysis 2: conjoined specifiers

For the plural pivot with non-agreeing sources, like English possessor DPs in (350), I proposed a conjoined specifier analysis in (351). The two analyses are supported by the mismatch cases, the multi-dominance analysis predicts a closest conjunct agreement pattern; and the conjoined specifier predicts plural pivots. Both predictions are borne out.

- (350) a. John's and Mary's students are a couple.
 b. *John's and Mary's student are a couple.

- (351) John's and Mary's *students* are a couple.



5.1.2 Experiments on NRNR in English

In Chapter 3, I reported six experiments investigating the licensing condition of singular and plural pivots in NRNR in English. In both the forced choice task and the 7 point Likert scale task, the number marked sources have shown to license singular pivots in the matching condition and have shown closest conjunct agreement in the mismatch condition. This is expected under the multi-dominance analysis proposed in Chapter 2. At the same time, the bare possessor DPs only license a plural pivot in both matching and mismatching conditions. This is what the conjoined specifier analysis predicts.

Conditions with possessor DP/possessive pronoun + adjective are predicted to show the same behavior with number marked sources. However, they showed more mixed results in the experiments. I proposed that participants used number markings as a cue to make the judgments. The lack of the morphological cue in these conditions made it harder to make the choice.

For definite article + adjective, the results were consistently leaning toward the

plural pivot. I proposed a unique confound where the participants treat (352a) as (352b), which drove up the rating of the sentences with plural pivot.

- (352) a. *The tall and the short students are a couple.
- b. The tall and short students are a couple.

5.1.3 T' RNR involves multi-dominance

In Chapter 4, I drew on previous literature on T' RNR ([Yatabe \(2003\)](#); [Grosz \(2009\)](#); [Grosz and Patel-Grosz \(2014\)](#)) and claimed that the T' RNR sentences in (353) involve a multi-valued T head. This is also seen in local portmanteaux in languages like Nocte ([Gluckman \(2016\)](#)). Following the arguments in [Larson \(2012\)](#); [Wurmbrand \(2017b\)](#), I argue that both the singular and the plural T head involve multi-dominance thus multi-valuation and not ellipsis.

- (353) John's glad that Mary, and Bill's proud that Sue, has/have been to Cameroon.

5.1.4 The multi-valuation agreement hierarchy

Having established the cases of multi-valued Ns and Ts, I looked at the cross-linguistic agreement pattern of multi-valued Ns and Ts. Two agreement patterns have been observed on multi-valued Ns and Ts: distributive agreement and summative agreement. In the distributive agreement pattern, an element is spelled out as singular when valued by two singular goals and shows closest conjunct agreement in mismatch cases. In the

summative agreement pattern, an element is spelled out as plural or dual when valued by two singular goals and shows resolved agreement in mismatch cases.

A cross-linguistic survey on multi-valuation based on 20 languages revealed the generalization in (354). In terms of languages, three out of four logically possible language types were attested as shown in Table 5.1.

- (354) Distributive agreement generalization: If the multi-valued Ts in a language exclusively show distributive agreement, the multi-valued Ns must also distributive agreement and not summative agreement.

	multi-valued Ns	multi-valued T	languages
Type 1	Distributive	Distributive	Slovenian
Type 2	Summative	Summative	Russian
Type 3	Distributive	Summative	English
Type 4	Summative	Distributive	unattested

Table 5.1: Attested language types

I linked multi-valuation to a similar cross-linguistic pattern observed in hybrid noun agreement in Table 5.2. For various hybrid noun agreement patterns, [Corbett \(1979\)](#) proposed the Agreement Hierarchy in (355). Based on this parallelism with multi-valuation, I proposed that multi-valuation also observes the Agreement Hierarchy. I claimed that distributive agreement in multi-valuation results from morphological agreement and summative agreement results from semantic agreement. I supported this claim with conceptual and empirical evidence.

	attributive	verb
attested	morphological	morphological
attested	semantic	semantic
attested	morphological	semantic
*not attested	semantic	morphological

Table 5.2: the Agreement Hierarchy effect: hybrid noun agreement

5.2 Remaining questions

Toward the end of this dissertation, it is important to acknowledge that several new questions have stemmed from the findings and claims I have made. There are also various remaining questions that had to be left aside. In this last section, I note several such issues for future research. They can be loosely categorized into three kinds: 1. questions regarding nominal right node raising; 2. questions regarding other aspects of the Agreement Hierarchy; 3. questions regarding the formal analysis of the morphological/semantic agreement and the Agreement Hierarchy.

5.2.1 Two kinds of NRNR

In the discussion of NRNR, I distinguished the sources that show morphological number marking, e.g. demonstratives in English, and the sources that do not, e.g. possessor DPs in English. In the discussion in Chapter 3, I also distinguished between the complex and simplex types within the sources that do not show number marking. The pos-

sessor DPs in English are simplex while the possessor DP+adjective conditions involve complex sources that do not show number marking.

I did not discuss the differences between the complex and simplex types of sources that **do** show number marking. Take English in (356), for example, sources in (356a) only consist of a bare demonstrative. In (356b), on the other hand, the sources are complex in that they contain a demonstrative and an adjective. In English, both simplex and complex number marked sources show the singular pattern in NRNR, thus I argue that both of them involve multi-dominance structure.

- (356) a. This and that student(*s) are a couple.
- b. This tall and that short student(*s) are couple.

As is discussed in Chapter 4, in Russian both simplex and complex number marked sources show the plural pattern, as in (357) (simplex) and (358) (complex). The simplex cases in Russian are discussed in [Belyaev et al. \(2015\)](#). I have focused on the complex cases in this dissertation.

- | | |
|--|--|
| <p>(357) (358) vysokij i xudoj mužčiny</p> | <p>tall.SG and thin.SG man.PL
'A tall man and a thin man'</p> |
| | <p>(Russian)</p> |
| <p>(359) a. Etot vysokij i tot nizkij <i>student</i> para.</p> | <p>This tall and that short student.SG couple
'This tall and that short student are a couple.'</p> |

- b. Etot vysokij i tot nizkij *studenty* para.
 This tall and that short student.PL couple
 'This tall and that short students are a couple.' (Russian)

Curiously, simplex and complex number marked sources do not always show the same pattern in NRNR. As I mentioned in Chapter 4, [Harizanov and Gribanova \(2014, 2015\)](#); [Arregi and Nevins \(2013\)](#) observe that the simplex sources show the plural pattern in Bulgarian, as is shown in (360). Notice that there is only one definite article in (360). In (361), when each source has an affixal article, only the singular pivot is allowed. The same pattern is observed in (362) with demonstratives + adjectives.

- (360) bǎlgarsk-i-ja i rusk-i narod-i
 Bulgarian-SG.M-DEF and Russian-SG.M nation-PL.
 'the Bulgarian and Russian nations' (a Bulgarian nation and a Russian nation)
- (361) a. ?parva-ta i posledna-ta *stranits-a*
 first.SG-DEF and last.SG-DEF page-SG
 b. ?*parva-ta i posledna-ta *stranits-i*
 first.SG-DEF and last.SG-DEF page-PL
 'the first page and the last page' (Bulgarian)
- (362) a. ?tazi pyrva i onazi posledna stranica lipsvat ot knigi-te
 this first and that last page miss from books-DEF
 b. *tazi pyrva i onazi posledna stranici lipsvat ot knigi-te
 this first and that last pages miss from books-DEF
 'This first page and that last page are missing from the book.' (Bulgarian)

This dissertation focuses on the complex number marked sources since I argue that these cases involve multi-valuation. The simplex number marked sources are left

aside; however, where the differences between the simplex and complex sources lies, especially when they show different agreement patterns, is an important puzzle.

5.2.2 Possessive pronouns

In Chapter 2, I proposed number feature set-ups for elements including adjectives, demonstratives, definite articles, and possessor DPs. Possessive pronouns in English were left aside. [Shen et al. \(2017\)](#) claim that bare possessive pronouns like *his* and *her* can license singular pivot nouns in NRNR. Based on that, they propose that possessive pronouns, like definite articles, are heads with both interpretable and uninterpretable number features. Results from Experiment 1, 2 and 3 are compatible with [Shen et al. \(2017\)](#)'s proposal.

On the other hand, bare possessive pronouns were shown to license only plural pivot nouns in Experiments 4, 5, and 6. The same pattern is found on the bare possessor DPs. Given the parallel, it is reasonable to assume that for a subgroup of the speakers, possessive pronouns, like possessor DPs, are in the specifier positions and without phi-features. As a result, we end up with two analyses for the possessive pronouns: in one analysis, they are heads with phi features; in the other, they are specifiers with no phi features.

What is left to be discovered is the relation between these two analyses. It could be the case that there are two subgroups of English speakers: one treat possessive pronouns as heads and the other as specifiers. It can also be the case that possessive

pronouns have dual status for each individual speakers. The exact feature set-up for English possessive pronouns is yet to be decided.

5.2.3 Further experimental investigation

In Chapter 3, I discussed several confounds involved in the experiments probing the number marking on the pivot nouns. Two of the confounds spotted in Experiment 1 were inattention to the intended scenarios and local number attraction. Modifications done to the following experiments have successfully gotten rid of these confounds. However, throughout the six experiments, the definite article+adjective condition (def.adj) has shown consistent high rating of the plural pivot, as opposed to the predicted singular preference. I proposed that this effect results from a confound that is unique to the def.adj condition: namely, the omission of the second definite article. As shown in (363), I proposed that some speakers mistook the target sentence in (363a) for the sentence in (363b) due to inattention and the different frequencies of the two structures, giving the plural pivot a higher rating.

- (363) a. The tall and the short students are a couple. (predicted to be #)
b. The tall and short students are a couple. (ok)

Confirming and getting rid of this confound is left aside. One potential way to verify the existence of this confound is to ask the participants in the experiment to repeat the sentences that they just judged in the previous page. If the confound exists, some

participants are predicted to produce the coerced sentence in (363b) rather than the target sentence in (363a).

5.2.4 Multi-valued adjectives and determiners

Chapter 4 of the dissertation connected multi-valuation to the Agreement Hierarchy and put N to the left of the predicate on the Hierarchy. The original Agreement Hierarchy ([Corbett \(1979\)](#)) makes references to attributive elements (A) and predicates. One natural research question is to decide the positioning of N and A on the hierarchy regarding multi-valuation. Although strings that look like multi-valued As e.g. *this man and woman* have been examined by [Corbett \(1979\)](#); [King and Dalrymple \(2004\)](#); [Heycock \(2005\)](#); [Villavicencio et al. \(2005\)](#); [Begović and Aljović \(2015\)](#) among others, previous research did not consider the multi-dominance structure. Strings like *this man and woman* are structurally ambiguous between a multi-dominated *this* and the conjoined N structure illustrated in (364). To determine the agreement pattern of multi-valued As and the positioning between N and A, we need to make sure the phenomena at hand indeed involve multi-valuation. How to rule out the structure in (364) is left aside for future research,

- (364) This [man and woman] are a couple.

5.2.5 Multi-valuation and Hybrid noun agreement

If both hybrid noun agreement and multi-valuation involve the Agreement Hierarchy in terms of morphological and semantic agreement, one question to ask is whether the same target on the hierarchy shows the same type of agreement in the two constructions. In (365), we see that Ts in English can show both morphological and semantic agreement in hybrid noun agreement (365a) and multi-valuation (365b). Whether there can be any mismatch between constructions on the same target remains to be seen, e.g. an element that shows morphological agreement when multi-valued and semantic agreement when agreeing with hybrid nouns.

- (365) a. This committee has/have gathered.
 b. John's glad that Sue, and Bill's proud that Mary, *has/have* been to China.

5.2.6 Predicate Hierarchy and Multi-valuation

A brief remark on yet another agreement hierarchy effect: the Predicate Hierarchy as in (366) ([Comrie \(1975\)](#); [Corbett \(2006\)](#)).

- | | | | | | | | |
|-------|---------------------------|---|------------|---|-----------|----------------------|------|
| (366) | predicate verb | — | participle | — | adjective | — | noun |
| | ← morphological agreement | | | | | semantic agreement → | |

The Predicate Hierarchy works similarly as the Agreement Hierarchy except in a restricted predicative position; elements on the left of the hierarchy are more likely to

show morphological agreement when used as a predicate, while the elements on the right end are more likely to show semantic agreement. Note that on this hierarchy, the noun is more likely to show semantic agreement than the verb. On the surface, this is the opposite order to that is shown in multi-valuation; the T is more likely to show semantic agreement. However, this is not a problem for the analysis proposed here if we assume that the Predicate Hierarchy and the Agreement Hierarchy are somewhat independent from each other. [Corbett \(2006\)](#) already makes such claim by noting that even though the predicate is on the left of the relative pronoun in the Agreement Hierarchy, there is no direct claim about the relative likelihood of semantic agreement between predicate nouns and relative pronouns. [Wurmbrand \(2017a\)](#) uses NP ellipsis data in German to support this claim. The multi-valuation aspect of Predicate Agreement is left for future research.

5.2.7 A formal approach to distributive and summative agreement

In Chapter 4, I proposed that the distributive agreement in multi-valuation results from morphological agreement while the summative agreement results from semantic agreement. This connection is motivated by the 3/4 agreement pattern observed in multi-valuation based on a cross-linguistic survey. I also provided conceptual and empirical arguments for the connection. What is yet to be discussed is what formal properties morphological agreement and distributive agreement share, as well as semantic agreement and summative agreement. Below I will make some reasonable speculations re-

garding the formal aspect of the proposed connection.

Previous works by Pollard and Sag (1994); Wechsler and Zlatić (2003); Smith (2015); Landau (2016); Wurmbrand (2017a) have proposed that two types of agreement results from agreeing with two types of features. One type of feature is labeled morphological, concord, or uninterpretable, $u[_]$. The other type is labeled as semantic, index, or interpretable, $i[_]$. The agreement possibilities on hybrid nouns indicate that one element can contain two types of features. Morphological agreement results from agreeing with $u[_]$ and semantic agreement results from agreeing with $i[_]$. For example, in (367), putting the details of DP internal agreement aside, the DP with a hybrid noun as its head noun e.g. *government* contains an interpretable plural feature and an uninterpretable singular feature. The probe on T in English can either agree with $u[\underline{SG}]$ in (367) or $i[\underline{PL}]$ in (368).

- (367) This goverment has gathered. morphological agreement
 $[DP \text{ this government}]_{u[\underline{SG}], i[\underline{PL}]} T_{u[\underline{SG}]}$

- (368) This government have gathered. semantic agreement
 $[DP \text{ this government}]_{u[\underline{SG}], i[\underline{PL}]} T_{u[\underline{PL}]}$

Hybrid nouns are special in that their morphological feature and semantic feature have different values. Common nouns on the other hand have one value shared by the two features, e.g. *student* $u[\underline{SG}]$, $i[\underline{SG}]$. With this assumption, morphological and semantic

agreement in multi-valuation can be formalized as below. In T' RNR in (369), T agrees with the morphological features on *Mary* and *Sue*; while in (370), it agrees with their semantic features. The operation in (369) and (370) can be extended to other languages and other multi-valued targets (e.g. multi-valued Ns in NRNR). In English, T can either agree with the semantic feature or the morphological feature. As we can see in Chapter 4, the possibility of the types of agreement is subject to language variation and the Agreement Hierarchy.

(369) John's glad that Mary, and Bill's proud that Sue, has been to Cameroon.

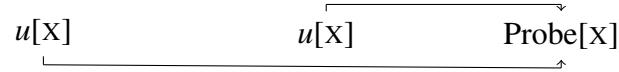
...Mary $u_{[SG],i[SG]}$ and ... Sue $u_{[SG],i[SG]}$, $T_{u_{[SG], SG}}$ morphological

(370) John's glad that Mary, and Bill's proud that Sue, have been to Cameroon.

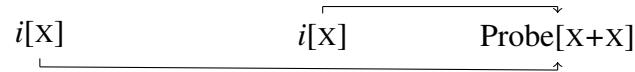
...Mary $u_{[SG],i[SG]}$ and ... Sue $u_{[SG],i[SG]}$, $T_{u_{[SG], SG}}$ semantic

I further postulate the feature arithmetic for morphological and semantic agreement in (371). In (371a), when two morphological features of the same value get copied onto one element, the result is the same as that value, e.g. when multiple singular morphological features get copied to a noun, the noun shows singular. In (371b), when multiple semantic features of the same value get copied onto one element, the result has to be calculated based on the values. For now, I assume a simple addition operation where two or more instances of the singular value give out plural.

- (371) a. Multiple Morphological Agreement



- b. Multiple Semantic Agreement



Above, I proposed that morphological/semantic agreement boils down to agreeing with morphological or semantic features in both hybrid noun agreement and multi-valuation. Different agreement patterns in multi-valuation result from distinct feature arithmetic when resolving multiple morphological/semantic agreement relations. The formalism sketched above makes a new set of predictions and questions. Hashing out the details of them is important, but goes beyond the scope of this dissertation.

5.2.8 A formal approach to the Agreement Hierarchy

In Chapter 4, I argued for the connection between the 3/4 pattern in multi-valuation and the Agreement Hierarchy. It is worth noting that this connection in itself is not an explanation for the 3/4 pattern observed in multi-valuation. The Agreement Hierarchy in itself is a generalization of the cross-linguistic and cross-domain patterns observed in hybrid noun agreement, now also in multi-valuation. Given that hybrid noun agreement has been investigated in the context of the Agreement Hierarchy since the 1970s, a natural move toward a formal account for the multi-valuation pattern is to borrow insights from the existing accounts for hybrid noun agreement. However, such previous accounts are concerned of the sentence level of the Agreement Hierarchy and the

multi-valuation agreement hierarchy operates on the language level. At this point, I am aware of no formal approach to the language level of the Agreement Hierarchy, either for hybrid noun agreement or multi-valuation.

To elaborate, the sentence level of the Hierarchy, which holds within individual sentences is stated in (372).

- (372) the Agreement Hierarchy on the sentence level: no sentence is such that position X shows morphological agreement and position Y (to the left of X on the Hierarchy) shows semantic agreement.

The Agreement Hierarchy effect in hybrid noun agreement can be observed on the sentence level, as in (373) because multiple agreement configurations (attributive-noun, noun-verb, etc) can be packed in one sentence, as in (374). Most of the formal analyses of the Hierarchy deals with (373), for example [Smith \(2015\)](#); [Landau \(2016\)](#).

- (373) Hybrid noun agreement hierarchy on the sentence level: there is no noun such that it triggers morphological agreement on position X and triggers semantic agreement on position Y (to the left of X on the Hierarchy).

- (374) **This government has offered itself to criticism.** [\(Smith \(2015\)\)](#)

Multi-valuation on Ns requires the NRNR construction and multi-valuation on Ts requires the T' RNR construction where the T agrees with two separate embedded sub-

jects. These two constructions cannot be packed in one sentence in the relevant way. As a result, the multi-valuation aspect of the Agreement Hierarchy cannot be evaluated on the sentence level.

On the other hand, the language level of the Hierarchy is stated in (375). Unlike the sentence level, it does not require packing multiple agreement configurations in one sentence. Instead, it holds across different sentences in a language.

- (375) the Agreement Hierarchy on the language level: There is no language such that position X only allows morphological agreement, and position Y (to the left of X on the Hierarchy) allows semantic agreement in **this language**.

Both hybrid noun agreement and multi-valuation can be evaluated on this level, as is stated in (376) and (377), both of which predict a typological gap.

- (376) Hybrid noun agreement hierarchy on the language level: there is no language in which there is a noun that must trigger morphological agreement on the position X and also triggers semantic agreement on position Y (to the left of X on the Hierarchy).

- (377) Multi-valuation agreement hierarchy on the language level: there is no language in which the multi-valued X must show morphological agreement, and multi-valued Y shows semantics agreement, given that Y is on the left of X on the Hierarchy.

As far as I know, the existing accounts for the sentence level of the Hierarchy cannot be extended to the language level in a straight forward way. The formal analysis of the language level of the Hierarchy is an important and far-reaching research program. In this dissertation I frame the research question, leaving it for future research.

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