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SLA Metaphor Development

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Contents

SLA Metaphor Development	1
<i>Maisarah M. Almirabi</i>	
The Semantic Feature of [Shape] in the Bamunka Noun	8
<i>Ciara Anderson</i>	
Double-Obviatives and Direction-Marking in Kutenai	18
<i>Irene Appelbaum</i>	
Pathways of Change in Romance Motion Events: A Corpus-Based Comparison	25
<i>Catherine Arnett</i>	
Linguistic and Cognitive Temporal Representations in Traditional Negev Arabic	35
<i>Letizia Cerqueglini</i>	
Alliteration and Rhyming in Mandarin Onomatopoeia	41
<i>Yi Jen Chen</i>	
A Factorial Typology of Codas in the Prosodic Hierarchy	48
<i>Trevor Driscoll</i>	
A Method for Depicting Vowel Sounds in Three Dimensions	57
<i>Grandon Goertz and Terese Anderson</i>	
Cross-linguistic Patterns in the Argument Structure of Posture Verbs in English and Spanish	70
<i>Diana Gómez Vázquez</i>	
Taming Free Merge Further – Sub-Extraction and its Kin	82
<i>Nobu Goto and Andreas Blümel</i>	
The Syntax of Sentential Negation in Standard Arabic and Jazani Arabic	94
<i>Eman Hadadi</i>	
Serial Tonal Derivations in Southern Taiwanese Diminutive Structure	105
<i>Yuchau E. Hsiao</i>	
Psych Adjectives and Their Cross-categorical Behaviors	113
<i>Yang Liu</i>	
Some Linguistic Features in Green Hmong, White Hmong, and Hmong Leng	118
<i>Chô Ly</i>	
Optional Raising and Labeling in ECM	129
<i>Manabu Mizuguchi</i>	
An Analysis of Deadjectival Nominalization: A DM-theoretic View	141
<i>Junya Morita</i>	
Labeling Algorithm, Agreement, and Pro-form <i>no</i> in Japanese	151
<i>Masao Ochi</i>	
Constructing Naturalistic Artificial Languages for Language Acquisition Research	162
<i>Mariel L. Schroeder</i>	
The Use of Word Order and Determiners to Mark Information Structure in Adult and Child Saudi Arabic	173
<i>Mashaël Semsem and Jidong Chen</i>	
Bilingual Kazakh Children’s Code Switching	179
<i>Asel Shayakhmet</i>	
Pronouns and Logophoricity in South Saami	184
<i>Mikael Vinka</i>	
Domain of Suppletion: From Japanese Numeral	196
<i>Yusuke Yoda</i>	

SLA Metaphor Development

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1 Introduction

Based on Vygotsky (1980) view that mediation is an important factor of language improvement and extend that view to SLA. Coupling that with the views by Selinker (1972), and Krashen et al (1979) that an interlanguage is expected to reach the situations of linguistic fossilization and a steady state, or ultimate attainment, this study attempts at figuring out how mediation, within a professional community of practice, would disallow fossilization of an advanced L2 speaker. In addition to this, it shows how the ultimate attainment hypothesis would apply for an L2 learner who is actively immersed in a native English environment.

It was found that advanced L2 speakers, based on the case study investigated for this paper, do not show an increasing or decreasing patterns of using metaphors in general, conventional metaphors, and unconventional metaphors when analyzing thirteen writing tokens by the participant in different points within a six-year period. In addition to this, when comparing the metaphor use, based on both the number and the conventionality of the metaphors, with a native speaker of English writing in the same genre and topic, the number of unconventional metaphors used by the L2 learner was greater than the number of the metaphors used by the native speaker. These findings may indicate that advanced L2 learners have their L2 fossilized and as reaching an ultimate attainment of the language regardless if they are practicing their language when linguistically immersed in several communities of practice where the language of communication is exclusively the L2, which is English.

2 Literature review

As metaphors being persuasive in everyday language, Lakoff and Johnson (1980), metaphors can logically be thought of as indicators for language development. This means that when tracking the language development of an L1 or an L2 learner, metaphors can show interesting patterns that can indicate the language development. A few studies have been done to show how language acquisition is reflected by metaphor usage and comprehension but, to the best of my knowledge, L2 metaphorical development has not yet been studied. As L1 metaphorical development, metaphors follow some stages for development. They start somatically, culturally or experientially, and final cognitively and linguistically. Children metaphorical development should follow these stages in order, in other words no stage precedes the other. Another way of looking at metaphor development is by knowing that metaphor understanding goes through a state of metaphor/literal meaning conflation when starting to learn the L1. This conflation is indicated by not distinguishing between the literal and metaphorical meaning of a metaphorical word. As an example used by Johnson 1997, the word 'see' which means the literal seeing and the metaphorical knowing was not used with the metaphorical meaning, seeing is knowing, separate from the literal meaning. The age of the child can also constitute a stage of metaphorical development. Children at the age of three show no comprehension of metaphors, and at the age of four, they show metaphorical comprehension when assisted with contextual clues. However, when children are five they show comprehension of metaphorical expressions without contextual clues (Emig 1972, Johnson 1997, Ozcaliskan 2004, and Schnell 2007).

One of the things we can equip ourselves with while looking for the patterns of language development is in relation to the creativity of metaphor making and using. Metaphor creativity is said to be the result of different experience in life (Lakoff and Johnson 1999, and Kövecses 2005). Creativity allows the production of unconventional metaphors. When relating this to second language acquisition, it logically follows that when the metaphor is more conventional, the language learner is more advanced in their L2. Although this creativity indicates the language improvement of the L2 learner, it does not necessarily indicate that L2 is

improving toward a native-like level of language proficiency. This can be supported by comparing and contrasting the metaphorical usage of an advanced L2 user of a language with the metaphorical usage of native user of the same language.

In this study, the frequency and conventionality of metaphors by the L2 user were compared and contrasted with the frequency and conventionality of the native user. This was done to check the level of the proficiency of the L2 of the participant in this study. If the results studying writings of the L2 learner are similar to the results of the writings of the native speaker of English, then the Ultimate attainment hypothesis is not in affect for the L2 speaker in this study. When the metaphors used by the L2 speaker are not changing in frequency and they are at the same level of conventionality and the frequency and conventionality are not similar to the native speaker of English, then the L2 of our participant may have reached a fossilization status.

3 Methodology

3.1 Participants In this study, only one participant was focused on, a case study. This participant is a PhD holder who has been actively working and participating in several communities of practice in which his L2 is used exclusively. Of these communities: New York University, Colombia university, and the United Nations (UN). This participant is also a newspaper columnist who has been publishing in an English language column regularly for the past six years. The participant is an L1 speaker of Arabic. He is also a political economist.

3.2 Materials and procedure For this study, I collected writings of one L2 learner during a six-year period. The total number of writing tokens is 13 published newspaper articles, with a total number of 11291 words. The metaphor identification procedure (MIP), by the Pragglejaz group (2007), was used to find the metaphor occurrences in the newspaper articles. Supposing that L2 development is taking place during this six-year period, the metaphor frequency was tracked throughout the six-year period to look for a frequency of metaphor pattern to be connected with L2 development. This frequency was found by simply calculating the percentage of the metaphors to the total number of words in every newspaper article. Then the metaphors conventionality were analyzed to check if there was any pattern of metaphor conventionality and L2 development. To figure out the conventionality of metaphor used, the final section of the MIP was used. In this section, the closer the word meaning is to the top of the list of the dictionary meanings the more conventional the meaning is. Afterwards, a newspaper article in economy, supposing the same readership with our study's participants as a result of writing in the same genre, that is authored by a native speakers of English was analyzed looking for metaphors. Steps 1 and 2 in this list of methodology steps were repeated when analyzing this newspaper article. The metaphors resulting from the native speaker of English were also analyzed using step 5, which is stated above, to identify the conventionality of the metaphor used.

3.3 Results The numbers of the metaphor tokens in the data range from 28 to 63 per-newspaper article with an average of 47 metaphors for each newspaper article. The percentage of metaphors to the total number of words in every article range from 3.7 to 7.7 words for every metaphor with an average of 5.2 words for every metaphor. Table 1 gives the dates of publication, and the number of metaphors, the total number of words, the percentages for the words for every metaphor, and gives the average for them.

Table 1

Date	Metaphors	Total words	Percentage
13 May 2012	43	926	4.6
4 November 2012	49	873	5.6
5 May 2013	47	854	5.5
3 November 2013	56	997	5.6
5 May 2014	38	956	4.0
4 November 2014	59	984	6.0
12 May 2015	39	808	4.8
11 November 2015	36	786	4.6
28 April 2016	63	813	7.7
14 July 2016	28	748	3.7
13 November 2017	38	732	5.2
4 October 2017	57	892	6.4
26 February 2018	47	922	5.1
Average	47	869	5.2

In 2012 the participant used 43 and 49 metaphors in an article with a number of words 926 and 873 respectively. This shows a slight increase in the percentage of metaphors to the words in the second article when compared to the first one. In 2013 the numbers of metaphors were 47 and 56 and the total numbers of words were 854 and 997 respectively. The first article in 2013 shows a slight decrease in the percentage and the second shows a return to the last 2012 percentage. This was followed by a sudden decrease in the percentage of words to the total number of words in the first article in 2014 and an increase in the second article in 2014 with 38 metaphors and 59 metaphors for the first and second articles in 2014 respectively, with the total numbers of words of 956 and 984 respectively. In the following year, 2015, the percentages of the metaphors to the total numbers of words were 4.8 and 4.6 which indicate a decrease of more than one percentage in the both articles in that year compared to the preceding year. The numbers of metaphors in that year were 39 and 36, and the total numbers of words were 808 and 786 respectively. In 2016, the total number of words were 831 and 748, and the numbers of the metaphors were 63 and 28 respectively. This shows a major increase followed by a major decrease in the percentages of the metaphors to total words in this year compared to the preceding year. The 2016 increase and decrease of the percentages of metaphors to total words show the highest and lowest thresholds of all the percentages in all the data considered in this paper for the L2 participant. The first article in 2017 and the article in 2018 show similar percentages, 5.2 for 2017, and 5.1 for 2018 respectively. The numbers of the metaphors used in these articles were 38, 47 and the total numbers of words were 732 and 892 respectively. Finally, there was an increase in the percentage of metaphors to the total number of words in the second article in 2017 at 6.4 with a number of metaphors of 57 and a total number of words of 892.

Going through the numbers of metaphors and the percentages of the metaphors to the total numbers of words it is clear that there are no obvious patterns of increasing or decreasing usage of metaphors. Chart 1 gives a better picture about the lack of patterns throughout the six years of publication.

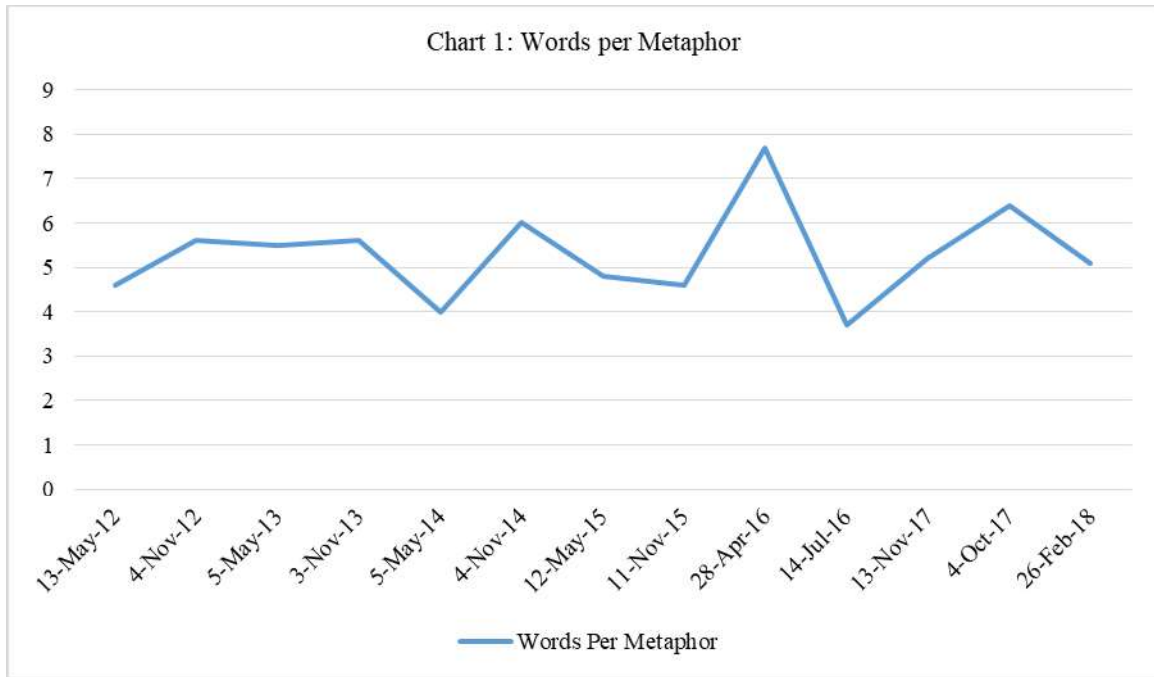


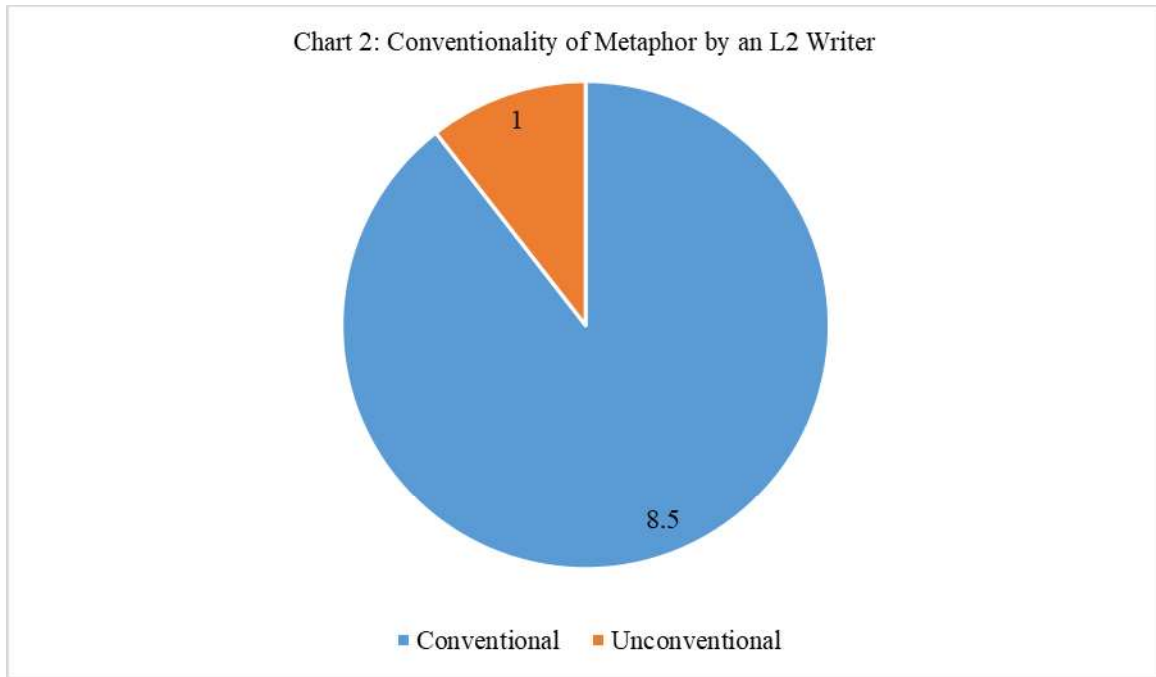
Chart 1 show how the percentage of metaphor to words does not go through a clear pattern through the six years period starting from 2012.

As for the conventionality of the used metaphors, metaphors of three articles were taken as samples. The articles chosen as samples are from the first, last, and middle year of publication. Table 2 gives a summary of the number of conventional metaphors, the numbers of the unconventional metaphors, and the percentage of the conventional metaphors to the unconventional ones.

Table 2

Year	Number of conventional metaphors	Number of unconventional metaphors	Percentage of conventional to unconventional metaphors
2012	39	4	10.3
2015	36	3	8.3
2018	43	4	9.3
Average	39	3.7	9.3

When comparing the numbers of the conventional metaphors used to the numbers of the unconventional metaphors we find that the participant uses much more conventional metaphors than unconventional ones. In general, the participant uses 8.5 conventional metaphors in average for every unconventional metaphor used. In the 2012 analyzed article, the participant uses 39 conventional metaphors and 4 unconventional metaphors with an average of 10.3 conventional metaphors to every unconventional metaphor used. In 2015, the participant uses 36 conventional metaphors compared to 3 unconventional metaphors. The average in that year is 8.3 conventional for every unconventional metaphor used. As for the year 2018, the conventional metaphors were 43 compared to 4 unconventional metaphors with an average of 9.3 conventional to unconventional metaphors used. Chart 2 demonstrates how much conventional vs unconventional metaphors are used by the participant in this study.



On the other hand, the native speaker used 15 conventional metaphors and only one unconventional metaphors in the article at hand. The total number of words is 1341 in this article. This shows a large gap in the total number of metaphors, and the conventional and the unconventional, compared to the numbers of metaphors used by the L2 learner participates in the case study used in my current study.

When taking the averages of the total number of metaphors used for both participants, the L2 and the native speaker, we get 47 (or 43) for the L2 user and 16 for the native user. In addition to this the average of the total numbers of words by the L2 learner is much less than the number of the total number of words for the native language user, 869 and 1341 respectively, with a gap of 472 words and a percentage difference of more than 35 percent. Chart 3 compares the metaphors and total numbers of words of the L2 and the native users.

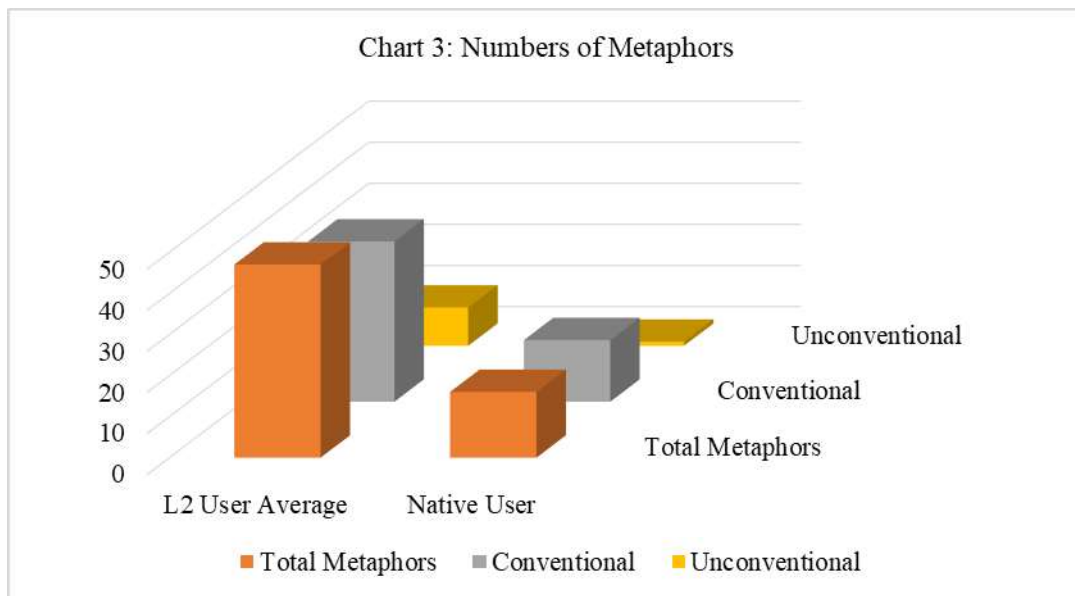
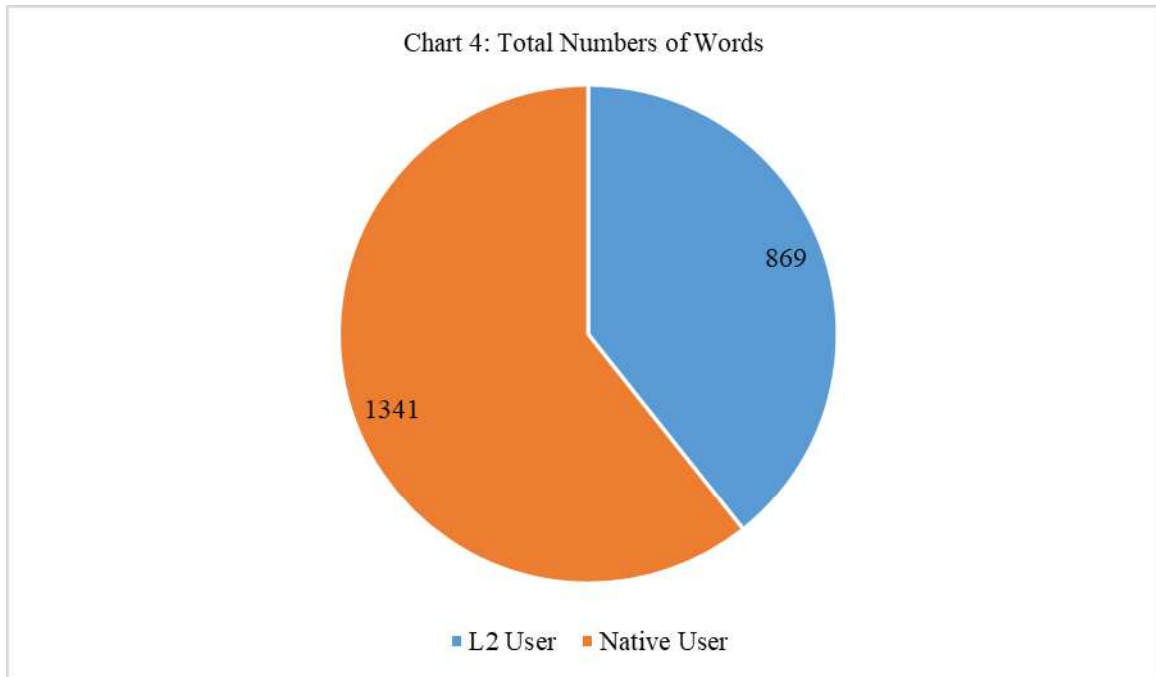
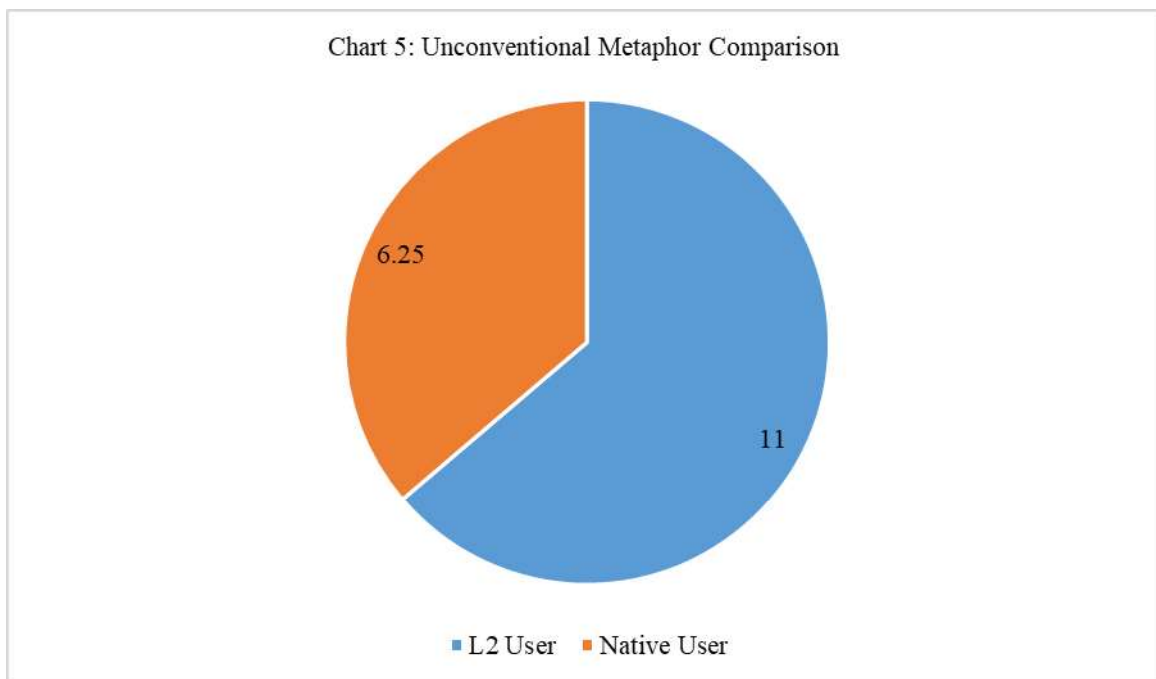


Chart 4 compares the total numbers of words for the L2 and the native users.



When comparing the percentage of the unconventional metaphors used by the L2 users to the unconventional metaphors used by the native user we get 11% compared to 6.25% respectively.



4 Discussion and conclusion

When generalizing the finding based on the data found in this study, it can be said that L2 users can reach a very advanced level of L2 which is indicated by the creativity of coming up with and using metaphors in the L2. In addition to this, L2 users cannot reach a native level of using the L2 as they reach a level of ultimate attainment of their L2 which is supported by the finding that L2 users use much more metaphors than the native speakers, 47 for the L2 user compared to 16 for the native user. Another support for this conclusion is that L2 users cannot get rid of being too creative in using the unconventional metaphors as the L2 user in this study used unconventional metaphors 11% of the time compared to 6.25% of the time using unconventional metaphor usage by the native user.

This study concludes that L2 users reach a level of metaphor fossilization and their language reaches an ultimate attainment state based on the finding that the L2 user uses much more metaphors than the native user would use. Another finding that allows us to conclude such level of metaphor fossilization is that my study participant created many metaphors that are not natively used in English. Creating and using such metaphors by an L2 user indicates the superior level of language proficiency that would allow the L2 user to maneuver expressions by creatively tuning them into innovative metaphors. However, showing creativity in using metaphors also indicates that the L2 user is not at a native level of language proficiency which I use as a support for the ultimate attainment hypothesis and the metaphor fossilization perspective. In relation to this, these findings only support extending the view of child mediation to adult L2 mediation when proposing that such mediation helps in L2 proficiency improvement within a sphere of L2; on the other hand, such improvement does not cross this sphere of improvement to reach the sphere of native language proficiency. More participants to be included in such a study from different field, ages, L1 background, etc. would result in better findings regarding metaphor development for second language learners.

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The Semantic Feature [Shape] in the Bamunka Noun

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1 Introduction

This paper will examine the semantic feature of [Shape] in the Bamunka language (Bantoid: South Ring) as it relates to cross-linguistic definitions of word classes and the presence of numeral classifiers. Rijkhoff's (2000, 2002) notion of *Seinsart*, and its connection with the presence or absence of an adjectival class will be investigated in particular. This research will further draw on evidence as to the presence of the [Shape] feature in Proto-Bantu (PB) noun class semantics along with research carried out by Kiessling (2018) and Dimmendaal (2011) and its connection with the emergence of numeral classifiers in related Bantoid languages such as Ejagham and Kana.

2 The Bamunka language

The Bamunka language is a member of the Ring subgroup of Grassfields Bantu (GB). The Ethnologue classifies Bamunka as follows: Niger-Congo, Atlantic-Congo, Volta-Congo, Benue-Congo, Bantoid, Southern, Wide Grassfields, Narrow Grassfields, Ring, South (Ethnologue, 2018). Located in the North-West province of Cameroon, the Bamunka village is located in the Ndop Plain and comprises just over 30,000 inhabitants. The word order of Bamunka is typically SVO. One of its distinct features is its clearly defined noun class system which is marked by a range of affixes attached to nouns and noun phrases. The noun phrase, in particular, will be examined in this research paper in light of questions surrounding cross-linguistic comparison of word classes, with specific reference made to the adjectival class.

2.1 *Bantu or Bantoid?* Grassfields Bantu (GB) is a cluster of over fifty languages spoken in the West and North-western Provinces of Cameroon. (Watters, 2003). While there has been some debate as to the relationship between Bantu and Bantoid, Nurse and Phillipson (2003:5) suggest that GB is probably the nearest relatives of the north-western Bantu languages in Cameroon known as Grassfields Bantu. Furthermore, even in light of Blench's (2015:5) proposed revisions for the subclassification of Proto-Benue Congo, Grassfields and Narrow Bantu remain close neighbours. Speaking on the Bantoid group and its relation to Narrow Bantu, Blench (2015:1) points out that, "they are a group of 150 to 200 languages geographically located between Nigeria and Cameroon and while they, do not form a genetic group, *are all are in some way more closely related than to Bantu than other branches of Benue-Congo*. The most well-known branches are Dakoid, Mambiloid, Tivoid, Beboid, Grassfields, and Ekoid (emphasis mine.)" Blench (2015:7) highlights that "in the absence of more extensive historical linguistics, it is assumed individual groups split away from a common stem and developed their own characteristics". Importantly, he highlights that, "the order in which this took place remains controversial". This is important as proposals related to the [Shape] feature of Bamunka nouns will draw on research relating to the semantic system of Proto-Bantu for diachronic insight.

* Special thanks to Jane Ingle for her in-depth work on the Bamunka noun phrase from which the data for this paper are drawn and for her feedback in personal correspondence. Many thanks too to Dr. Roland Kiessling for his insights and direction on the emergence of numeral classifiers and the features of shape and configuration in Isu and related Bantoid languages.

3 The notion of ‘Seinsart’

Rijkhoff (2000: 217) asked the question, “when can a language have adjectives?” He proposed that a language can only have adjectives if the nouns of that language are specified by the feature [+Shape]. Nouns can be used in relation to both discrete and non-discrete spatial entities in the real world, that is objects and masses, and may be defined by the two lexical features of Shape and Homogeneity. Rijkhoff (2000: 228, 2002: 59) refers to the covert lexical coding of each of these features as a type of “Seinsart” a mode of being, the nominal counterpart of “Aktionsart”, the verbal category which refers to a mode of action.

It is important to note that nouns in Rijkhoff’s (2000, 2002) approach are a *linguistic classification* of properties rather than an *ontological one*, that is to say that there is not necessarily a direct relationship between the noun type and the (real world) entity type. In some languages nouns seem to include the notion of spatial boundedness or discreteness, as is the case with English. In other languages, such as Thai nouns, do nouns do not refer to a discrete bounded object but act more as a concept label denoting particular properties. *Sortal numeral classifiers* are often diagnostic of [-Shape] nouns.

(1) **Thai**
 mal du mali
 horse two CL
 ‘two horses’ (Lee: 1989:55)

(2) **English**
 two horses
 ‘two horses’

Mal ‘horse’	+	mali
Concept Label – Unbounded	+	Numeral Classifier – Provides boundary i.e., makes countable

However, Rijkhoff (2000) notes that it is not so much the presence or absence of numeral classifiers that determines whether a language can have adjectives, but rather a lexical feature of the noun, that of [+Shape]. Thus, the morphosyntax of the [-Shape] language must somehow identify boundedness/discreteness of objects referred to by other means. Since only discrete entities can be counted, languages whose nouns lack the notion of spatial boundedness may use numeral (sortal) classifiers in order that they may be individuated.

4 Defining word classes

As this paper is working from a functional-typological perspective, we will examine some approaches that have been taken in defining a given word class crosslinguistically.

4.1 Dryer’s approach Authors such as Dryer (2007) have used largely semantic definitions suffice when it comes to cross-linguistic comparisons of categories such as adjective. Rijkhoff (2002) has challenged this, however, relating this to his theory that internal noun phrase (NP) ordering patterns iconically reflect the underlying semantic structure of the NP. He argues that, in such typological analyses, loosely defined linguistic categories such as adjectives or numerals render the theory unworkable. Rijkhoff (2002: 284) points out that Dryer (1988: 197, 198) himself acknowledges that many of the words in his study on word order which may semantically be understood as adjectives or “property terms” are really verbs or relative clauses. This is problematic for cross-linguistic analysis.

4.2 Dixon’s approach Dixon (2004:44), on the other hand, has taken the word class of adjective and defined it as grammatically distinct, containing words from some or all of the adjectival prototypical semantics and functioning as an intransitive predicate, as a copula complement, or a modifier of a noun in the noun phrase. Dixon (2004:3-5) has identified the following prototypical properties of the adjective; core

properties: dimensions, value, age, colour; peripheral properties: physical, human propensity, speed; additional properties: difficulty, similarity, qualification, quantification, position, cardinal numbers.

However, Dixon assumes that all languages therefore can identify such an adjectival class, and, while the semantic characteristics proposed by Dixon (2004) can a helpful criterion in identifying adjectival classes, the wide variation in language specific syntactic operations used to determine word class may be too loosely defined. The term ‘grammatically distinct’ may be so language specific as to lose functionality in a cross-linguistic typological comparison. As Rijkhoff and Van Lier (2013:8) note, “If lexical categories are language specific, the crucial question is how they may be compared across languages?” The current study will lean towards a definition of the word classes as one which takes into account the syntax-semantics interface as per Hengeveld (1992 a, b) and adapted by Rijkhoff (2002) rather than taking purely semantic or language specific definitions.

4.3 Hengeveld’s approach – parts-of-speech systems Hengeveld’s approach led him to develop a parts-of-speech (PoS) theory which allows for cross-linguistic variation in membership of the four major lexical classes; verb, noun, adjective, and adverb. In this approach, a word class is defined exclusively in terms of the function a lexeme may serve without any additional function-indicating morphosyntactic devices. Hengeveld (1992, a, b) speaks of “further measures” which refers to the morphosyntactic properties acquired or lost by a sign in a non-prototypical syntactic role. These properties can be used as diagnostics for the markedness of a lexical item in a given syntactic environment.

“A *verbal* predicate is a predicate which, without further measures being taken, has a predicative use *only*. A *nominal* predicate is a predicate which, without further measures being taken, can be used as the head of a term (NP).

An *adjectival predicate* is a predicate which, without further measures being taken, can be used as a modifier of a nominal head.

An *adverbial* predicate is a predicate which, without further measures being taken, can be used as a modifier of a non-nominal head (Hengeveld, 1992b: 58).”

Due to its typological as well as classificatory features this is the theory that will be utilised in this paper. Such an approach led to a 7-way typology of parts of speech systems which was later refined and extended to include intermediate groupings.

Table 4.1 Hengeveld’s PoS system with flexible word classes (Hengeveld, 2013:36)

PoS system	Head of Predicate Phrase	Head of Referential Phrase	Modifier of Head of Referential Phrase	Modifier of Head of Predicate Phrase	
Flexible	1	CONTENTIVE			
	2	Verb	Noun	NON-VERB	
	3	Verb	Noun	Adjective	Manner Adverb
Differentiated	4	Verb	Noun	Adjective	-
Rigid	5	Verb	Noun	Adjective	-
	6	Verb	Noun	-	-
	7	Verb	Noun	-	-

It has been argued by Hengeveld (1992a, b) and Hengeveld et al. (2004) that the arrangement of the functions of these word classes are not coincidental and reflect the PoS hierarchy seen in Figure 4.1.

Head of Predicate Phrase > Head of Reference Phrase > Modifier of Head of Reference Phrase > Modifier of Head of Predicate Phrase

Figure 4.1 Hengeveld’s implicational word class hierarchy (Hengeveld et al, 2004: 533)

The further to the left a function is on the hierarchy, the more likely it is the language has a specialised class of lexemes to express that function, and the more to the right, the less likely. It is an implicational

hierarchy in that a language with a specialized class for the head of a reference phrase will also have a specialized class for the head of a predicate phrase, for instance (Hengeveld, 2013:35). Rijkhoff has adapted this for the purpose of categorizing the verb, noun and adjectival classes only as follows:

Table 4.2 Rijkhoff's (2002:18) modified PoS systems

Type 1	V/N/A
Type 2	V – N/A
Type 3	V-N-A
Type 3/4	V-N- (A)
Type 4	V-N
Type 4/5	V (-N)
Type unknown	-

Within the frameworks of Hengeveld and Rijkhoff described, the following question will be addressed in the remainder of this paper: Does Bamunka have a distinct adjectival part of speech as per Hengeveld and Rijkhoff? If not, does it contain sortal numeral classifiers? i.e. an indication of a [-Shape] language? and, is there any further evidence of Bamunka having [-Shape] nouns?

5 Parts-of-speech in the Bamunka language

This section will examine the Bamunka language and suggest evidence for their belonging to a PoS 4 system (or, at least, an intermediate PoS 3/4 system) with a dedicated set of verb and noun classes, but lacking a large, closed specialised grouping of modifiers of the reference phrase, commonly deemed as “adjectives”.

5.1 Modifiers based on nouns The following will examine a selection of noun-based modifiers in Ring to assess their status in terms of parts-of-speech.

5.1.1 The associative noun phrase Before deciding on how best to represent adjectival-like modifiers in Ring it is important to look at the syntactic structure of the associative noun phrase (NP) construction and understand its semantics. The associative NP in the Ring languages has a general pattern of a head noun (N1) and the dependent noun (N2) along with an associative marker agreeing with the head noun. The marker usually occurs between the two nouns, while in Bamunka it occurs after (Ingle, 2013: 79).

- (3) **Bamunka**
N1: *ŋgòŋ -kǎ* ‘leaf-C7’ **N2:** *yú’- kǎ* ‘plantain-C7’
 ŋgòŋ kǎ-yú’ ↓kǎ
 leaf.C7 C7-plantain C7.AM
 ‘plantain leaf’ (Ingle, 2013:81)

In line with Pavey’s (2010) definition of such constructions, these may express possession or other genitive functions. Ingle (2013: 92) further elaborates on functions of the associative NP in Bamunka including ‘part-whole’ (wall of house), ‘product-material’ (bamboo fence), and ‘object-purpose’ (cooking pots). Many of what are deemed ‘adjectives’ in such cases take these associative structures.

5.1.2 Modifiers based on nouns in Bamunka When it comes to what are deemed adjectives in

Bamunka, it becomes clear that they are often noun-based, taking the related noun class affix and the place of the dependent N2 in an N1 N2 AM associative noun construction syntactically.

- (4) kyuú 'ká-mbuù tǎ
 pot.C13 C7-red C13.AM
 'red pots' (Ingle, 2013:70)

Ingle (2013:71) also notes that two attributive nouns from class 9 have diminutive and augmentative functions: vaǎ "child" (and plural vaá "children") and ŋkwē "mother" (and plural bə-ŋkwē "mothers"). These precede the noun they characterise. She notes that, while, in a semantic sense, they are modifiers preceding the head noun, grammatically they are the head noun in an associative construction, with the noun being characterised as the associative noun.

- (5) vaǎ bî
 child.C9 goat.C9
 'small goat' (Ingle, 2013:71)

5.2 Modifiers based on verbs A second set of modifiers in Bamunka are those derived from verbs. The first type are those which are a reduplicated form of the original verb stem as follows:

- (6) **Verb: chyúú 'be sharp' Adjective: chyú-chyú 'sharp'**
 nyî ↓chyúú-chyúú
 cutlass.C9 sharp-sharp
 'sharp cutlass' (Ingle, 2013:63)

The second type of modifier derived from verbs are stative verbs with verbal extensions (-hə, -nə) (Ingle, 2013:64, 65).

- (7) **sù'nə 'be sweet'**
 ó ↓nó kǒ ndú' sù'nə mé tó mǒ
 3SG PRT give wine.C6a be.sweet C6a.AM to 1SG
 'He gave me sweet wine'

By means of associative NP constructions, and verbal modifications through reduplication or verbal extensions, it appears that the adjective class in Bamunka may in fact consist of nouns and verbs upon which 'further measures' have been taken as per Hengeveld (1992a, b) and Rijkhoff (2002). This would place them in Type 4 of Rijkhoff's adapted system seen in Table 4.2. Or Type 3/4 based on Ingle's (2013: 67) assertion that there is one attribute meaning 'big' which does not occur in reduplicated form and does not appear to have a verb form. Its derivation is uncertain, though it may be a noun. Rijkhoff (2002: 143) points to Type 4 languages as those with sortal classifiers and thus, those with nouns carrying the feature [-Shape].

6 Further evidence for absence of adjectival class: Rijkhoffs [+/- Shape] theory

The lack of a distinct closed adjectival class in Bamunka suggests that, as per Rijkhoff (2000, 2002) we may be dealing with a language with nouns characterized by the semantic feature [-Shape]. As noted in section 3, one diagnostic provided by Rijkhoff (2002) for the absence of this feature is the presence of a sortal numeral classifier system which carries out the role of providing shape, boundedness and countability to the noun.

6.1 Numeral classifiers in Bamunka Bamunka does in fact have evidence of both sortal and mensural numeral classifiers, the former being in line with Rijkhoff's (2000) predictions that Type 4 have noun with the features [-Shape] of which numeral classifiers are a diagnostic. Numeral classifiers in

Bamunka are often used with count nouns, though this is not obligatory (Ingle, 2013: 57, 58). While this is not as clear-cut as we would hope regarding Rijkhoff's prediction it does point us in the direction of Bamunka nouns having the feature of [-Shape]. The numeral classifier is used in an associative construction and comes before the noun being counted, which occurs in its B-form (if one exists). This is followed by an associative marker agreeing with the numeral classifier (again, if one exists for the noun class in question), and then the numeral (Ingle 2013:57).

The most commonly used numeral classifier is the sortal classifier *mbyuũ/mbyuú-há*. This is a noun from gender 9/10 meaning 'unit/units'. It has to be used to identify one single element of a non-count noun. It is common in Bamunka, and in Grassfields Bantu languages in general, that certain categories, such as insects, fruits and vegetables, are perceived to be uncountable and are often non-count nouns (Ingle, 2013: 57, 58). The following examples (8-11) are sourced from Ingle (2013:58-60).

- nyuú-há* 'hair' (class 10)**
- (8) mbyuũ nyuú
unit.C9 hair.C9
'one hair'
- (9) mbuú nyuú hě i-buũ
unit.C10 hair.C9 C10.AM INANM-two
'two hairs'

Importantly for our theory of [-Shape] nouns, Ingle (2013: 58) points out that “*the same classifier is commonly also used with count nouns.*” She further points out that difference in meaning between *mbyuũ/mbyuú-há* is, as yet, unclear. But, in the case of singular count nouns, the classifier *mbyuũ* seems to be optional but preferred. While it is plausible that 'nyuú' *hair* could be seen as part of an uncountable mass, examples (11) and (12) point more clearly to the use of this numeral classifier with what would normally be perceived as countable nouns.

- One single item (with *mbyuũ*)**
- (10) mbyuũ kə-ghuú ì-mě'
unit.C9 C7-calabash bowl SG-one
'one calabash bowl'
- More than one item (with *mbyuú-há*)**
- (11) mbyuú bə-^hfɔŋ ^hhá ì-tiâ
unit.C10 C8-chair C10.AM INANM-three
'three chairs'

Thus, in line with Rijkhoff (2000, 2002) we see evidence for Bamunka as a PoS Type 4 or 3/4 language lacking a large, distinct adjectival class and containing nouns of the Seinsart feature [-Shape] as evidence by the use of sortal numeral classifiers with count nouns.

7 Evidence of the shape feature in Proto-Bantu semantics

Since the use of sortal numeral classifiers is not obligatory in Bamunka, we will look beyond this to noun class system to investigate whether information on shape, boundedness and countability may have, at least diachronically, been carried in the noun class marking system. Contini-Morava and Kilarski (2013) lend support to Rijkhoff's theory with regard to the presence of numeral classifiers pointing to nouns that are more like concept labels that individuated entities in a given language, “The idea is that nouns in classifier languages are like mass nouns in a non-classifier language in that they also need to be unitized in order to be counted. The function of unitizing or individuating is usually ascribed to the accompanying classifier, or to the pseudopartitive construction that includes one” (Contini-Morava and Kilarski, 2013:27) While it is a matter of debate, Denny and Creider (1986) have in fact made the claim that Proto-Bantu noun class affixes realized a semantic system in which each prefix was associated with a particular characteristic.

On the appropriateness of comparing the noun class system of Grassfields Bantu with that of Denny and Creider (1986) work on reconstructed PB we point to Watters (2003:240, 241) who asserts that, Hyman's (1980c:182) full set of reconstructed noun class formatives, specifically noun prefixes and concord affixes, for Proto-Eastern Grassfields, Proto-Momo and Proto-Ring pointedly make the claim that the GB noun classes correspond to the Proto-Bantu noun classes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, and 19.

Returning to the semantics of the PB noun class system, Denny and Creider (1986) argue that many of the noun class affixes were associated with configurational or shape meanings. This may provide further insights into the Seinsart or nominal aspect related phenomena being investigated in Bamunka. It may in fact follow that the noun class *affix* rather than the noun class *root* carried shape-based information in PB and, by implication, Proto-Ring, thus pointing to a class of noun roots characterized by the feature [-Shape], thus acting more as a concept label than depicting a unitized referent.

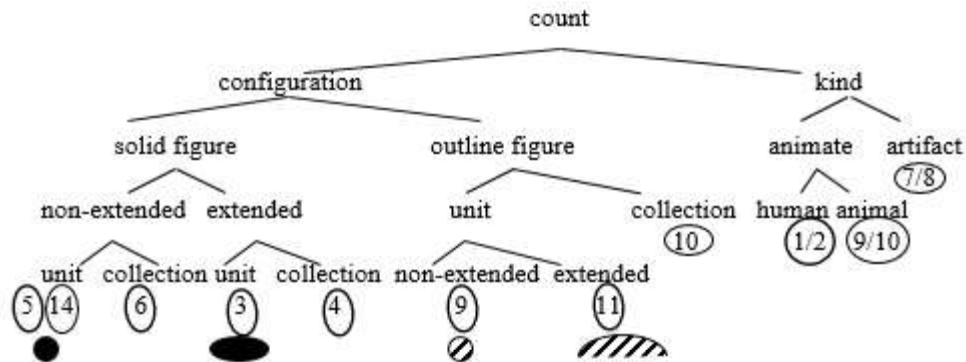


Figure 7.1 Proto-Bantu semantics of count nouns in Denny and Creider (1986: 219)

In light of the proposed shape-based semantics in PB and recent investigations into the emergence of numeral classifier systems in Bantoid and related languages, both Dimmendaal (2011) and Kiessling (2018) have suggested that shape and configuration appear to play a central role in their development. Dimmendaal (2011:137, 138) explicitly hypothesizes that the development of numeral classifier systems in place of noun class systems in related Bantu may “reflect a more deeply rooted cognitive basis (manifested in the mass/count continuum) where shape and form play a central role (emphasis mine).” In Bamunka, a number of these shape/configurational based noun classes from Denny and Creider’s (1986) approach have been lost; classes 5, 3 and 4. The more explicit use of sortal numeral classifiers in Bamunka may be connected to the obvious loss of shape-based noun class affixes when compared with languages such as Babanki, Mmen or Babungo where the use of sortal numeral classifiers are less obvious or absent (Akumbu & Chibaka, 2012, Möller, 2012, Schaub, 1985).

8 Further evidence: grammaticalisation patterns of numeral classifiers

Further insights may also be provided by looking at the grammaticalisation patterns in the development of numeral classifiers in related Niger-Congo languages, and particularly in Grassfields Bantu. We will investigate whether the grammaticalisation paths of numeral classifiers in Bamunka appear to follow those found in neighbouring languages which appear to be compensating for a loss in shape-based noun classes as per Kiessling (2018). Kiessling (2018) points out that, in their syntactic and semantic properties, numeral classifier constructions in Niger-Congo are similar to associative constructions which demonstrate dependency reversal. That is, that syntactic and semantic dependency are mismatched with N1, a type of qualifier, being the syntactic head while N2 denoting a more specific concept, is the semantic head.

Isu**Reverse dependency construction**

- (12) *fàḡàḡá* (19/6a) ‘small thing’
 ḡàḡá fə †ndáw
 C19.small.thing C19 C9.house
 ‘tiny house’ (Kiessling, 2018: 69)

Associative construction

- (13) *tá-ṽâw tá-fə-ḡwón*
 C13.wings C13.C19.bird
 ‘wings of a bird’

Numeral classifier construction

- (14) *tűw fiifəp fə mǝ?*
 C19.little.head AM.C19.C5.leaf AM.C19 one
 ‘one single leaf only’ (Kiessling, 2018 :52)

Bamunka**Reverse dependency construction**

- (15) **Diminutive: *vaǎ* ‘child’ (Ingle, 2013:71)**
vaǎ bî
 child.C9 goat.C9
 ‘small goat’

While there is no explicit associative marker in the above example as it comes from gender 9/2 (i.e., with a noun class marker), Ingle (2013:71) points out that *vaǎ* ‘small’ is indeed the head noun in an associative construction. Furthermore, both ‘child’ and ‘mother’ have been used as lexical sources for both numeral classifiers and nominal affixes in Niger-Congo (Güldemann, 2003:187, 188, Kiessling, 2018:38). Though they are currently used in an attributive sense, we do see the semantic bleaching common in the grammaticalisation from noun to classifier so it is possible we may be seeing an intermediary form of numeral classifier amidst its evolutionary process here.

Associative construction

- (16) **N1: *baá-†kǎ* N2: *nuǎ-†mǎ***
fufu-C7 bird-C6a
baá †mǎ-nuǎ kǎ
fufu.C7 C6a-bird C7.AM
 ‘fufu of the birds’

Numeral classifier construction

- (17) *mbyuú bə-†fǝḡ †hǎ ì-tiǎ*
 unit.C10 C8.chair C10.AM INANM.three
 ‘three chairs’

Here in Bamunka we see the same reverse dependency seen in Isu in which the agreement marker agrees with the syntactic head (the classifier) while the semantic head (the chairs) take the position of N2. Notice too, that *bə-†fǝḡ* the semantic head, occurs in its B-form (that is, its prefixed ‘out of focus’ form in other settings). As is the case with other Bantoid languages with emergent numeral classifier systems we do not see a full grammaticalisation of the numeral classifier and associative agreement marking is retained.

9 Conclusions and recommendations

The analysis above has worked towards defending the need for a cross-linguistic approach to word classes that takes both functional and morphosyntactic features in account in a manner that can be

compared typologically in a more effective manner. The argument that purely semantic or even grammatically language specific accounts of word classes, such as that of adjective, was challenged. Contra Dixon (2004) it was proposed that not every language has a distinct class that can be called ‘adjective’ for instance. An examination of Bamunka revealed it may be a [-Shape] language through its use of numeral classifiers with countable nouns in some cases. Evidence from neighbouring Bantoid and related languages suggest that apart from these noun class markers, the noun roots themselves may be cognitively conceived as concept labels that are [-Shape] and thus the loss of noun classes and their related markers require the development of a numeral classifier system to compensate for this. Bamunka appears to follow a grammaticalisation pattern of numeral classifier constructions from reverse dependency associative constructions in a similar manner to neighbouring languages as investigated by Kiessling (2018). Future research could examine noun roots in Bamunka as unbounded concept labels in light of these findings and as they relate to Denny and Creider’s (1986) shape-based interpretation of elements of the PB noun class system. While Rijkhoff (2002:143) has suggested that Type 3/4 languages do not employ sortal numeral classifiers which would identify [-Shape] nouns, further research could examine this in light of the ambiguity surrounding the source of at least one of the adjectives in Ingle’s (2013) as mentioned in Section 5.1.2 and in related Type 3/4 languages such as Babungo wherein the [Shape] feature may be carried in the noun class affix system rather than in sortal numeral classifiers (Rijkhoff, 2002: 142, Schaub, 1985).

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10 Appendices

10.1	<i>Abbreviations</i>	A	adjective
		AM	associative marker
		Cl, c2 etc.,	noun class 1, noun class 2 etc.
		CL	classifier
		INANM	inanimate
		N	noun
		SG	singular
		PRT	particle (meaning as yet unknown)

Double-Obviatives and Direction-Marking in Kutenai

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1 Introduction

Kutenai (also Kootenai, Ktunaxa, Ksanka) is a severely endangered language isolate spoken in British Columbia in Canada, and in Montana and Idaho in the US. Kutenai morphosyntax exhibits both direction-marking and obviation. Direction is a binary distinction that characterizes transitive clauses in terms of the relative rank of the clause's two arguments. Obviation is a binary distinction that characterizes noun phrases in terms of their relative rank insofar as it distinguishes the most highly-ranked NP in a sentence from any and all other NPs in the sentence. While recognized as distinct phenomena,² obviation and direction-marking are widely thought to interact as follows. The relative rank of arguments is determined by obviation status, and obviation status, in turn, is determined largely by pragmatic and semantic factors.³ Despite the widespread acceptance of this view,⁴ the central aim of this paper is to argue that there are good grounds for questioning it. I'll argue that there is a class of cases—double-obviative constructions—that the standard view does not account for. The import of these cases is not that they are exceptions *per se*, but that the attempt to account for them reveals that the received view is problematic even in the standard cases. In the first instance, accounting for double-obviative constructions leads to the conclusion that obviation status is not needed to mediate between discourse and semantic considerations on the one hand, and direction-marking, on the other. But closer examination shows that instead of simply being superfluous, the received view seems to fundamentally reverse the order of priority between discourse decisions that the speaker makes and the linguistic encoding of these decisions. While this paper deals exclusively with Kutenai, its conclusion may have implications for discussions of obviation and direction in Algonquian languages as well.

This paper is structured as follows. Sections 2 and 3 present overviews of direction-marking and obviation, respectively. Section 4 describes the standard view of their interaction. Section 5 explains the problem double-obviative constructions pose for the standard view, and section 6 explains how these problematic cases can be accommodated. In section 7, the implications of this resolution for the standard view are discussed, followed by a conclusion in section 8.

2 Overview of direction-marking in Kutenai

A language can be said to have direction if it encodes the relative ranking of the arguments in a transitive clause. In such languages, a clause is said to be direct if the more agentive argument, A, outranks the more patient-like argument P⁵; and inverse, if the more patient-like argument outranks the more agentive argument.

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² See, e.g., Bliss 2005, for a discussion of this distinction in the Algonquian language, Blackfoot.

³ In addition, third-person-possessed NPs are obligatorily obviative.

⁴ Rhodes 1990 and 2017 are notable exceptions.

⁵ Since the status of subjects in Kutenai is controversial (see Dryer 1996), I use the labels, A and P (see e.g., Comrie 1989), for the core arguments of a transitive clause.

In contrast to direction-marking in Algonquian languages, Kutenai encodes this distinction only when both arguments are third-person. Direct clauses in Kutenai are thus transitive clauses where both A and P are third-person and A outranks P. Inverse clauses are transitive clauses with two third-person arguments where P outranks A.

In direct clauses in Kutenai, the verb is unmarked:

- (1) tse_ikat-e· kławła-s [skun·ku·ts].⁶
 look.at-IND grizzly.bear-OBV [Coyote]
 "Coyote [PROX] looked at Grizzly Bear [OBV]." (Boas 2005: 142:37)
- (2) taḡa-s n-^ʔtk_i-ne· [kupi] [ne_i-s kcam·u-^ʔs]
 then-OBV IND-eat-IND [Owl] [the-OBV child-OBV]
 "Then, Owl [PROX] ate the child [OBV]." (Boas 2005: 58:40)

Inverse clauses are marked with the verbal suffix -(n)aps:

- (3) tse_ikat-aps-e· ne_i-s pa^ʔlke-^s
 look.at-INV-IND the-obv woman-OBV
 "The woman[OBV] looked at them [PROX]." (Boas 2005: 154:242,243)
- (4) taḡa-s n-tk_i-naps-e· kiakḡo-^ʔ-s
 then-OBV IND-eat-inv-IND fish-OBV
 "Then the fish [OBV] ate him [PROX]." (Boas 2005: 122:18)

3 Overview of obviation in Kutenai

While direction-marking applies only to transitive clauses, and is sensitive to the relative rank of the two NPs that occupy argument roles only, obviation applies to the NPs in both transitive and intransitive clauses and both simple and complex sentences. Moreover, it ranks all NPs in a sentence, whether argument or adjunct. However, no matter how many NPs in a sentence, it ranks them only insofar as it distinguishes the highest ranking NP from the others. If there are two NPs in the sentence, the higher-ranking one is identified as proximate and the lower ranking one as obviative. If there are more than two NPs in the sentence, the highest ranking is identified as proximate and all the others are simply marked as obviative. It is in this sense that obviation is a binary distinction: there are exactly two obviation values, proximate and obviative. Every NP in a sentence bears one of these two values, subject to the constraint that only one NP in a sentence may be marked as proximate. In the case where the sentence contains only a single NP, that NP is considered proximate.

Morphologically, proximate NPs in Kutenai are unmarked; obviative NPs are marked with the suffix -s.

Table 1. Proximate vs. Obviative Nouns in Kutenai

<u>Proximate</u>	<u>Obviative</u>	
skun·ku·ts	skun·ku·ts- ^ʔ	'coyote'
kławła	kławła-s	'grizzly bear'
ne _i palke·	ne _i -s palke- ^s	'the woman'

Proximate NPs outrank obviative ones, but what determines which NP in a sentence is most highly ranked? The ranking is subject to the following constraints: An NP possessed by another third-person NP is

⁶ With the exception of the sentence in (13) and (15) below, all example sentences come from Boas 2005 and, with minor changes, retain Boas' orthography.

⁷ A raised dot, representing lengthening, is often used instead by Boas in words ending with [s] or [ts].

obligatorily obviative, although such nouns will only be overtly marked as obviative if the possessor noun is also obviative.⁸

- (5) *t_inaḡam-ne· a_akitla-is-e·s ne_{-i}s naso_uk^ue·n-s ne_i nitstahał.*
 enter-IND tent-POSS-OBV the-OBV chief-OBV the youth
 "The youth [PROX] entered the chief's tent [OBV]." (Boas 2005: 30:5)

- (6) *Taxa-s tsłmiyit ła-e·t'qaoxaxa'm-ne· naso_ukue·n a_akitla-e·s.*
 then-OBV evening again-assembled-IND chief-PROX tent-3.POSS
 "Then, at night, they [PROX] again assembled in the chief's tent [OBV]." (Boas 2005: 138:254,5)

Additionally, although Kutenai does not have grammatical animacy (or other gender marking), obviation status is sensitive to a semantic animacy hierarchy in which NPs referring to animate entities are ranked higher than those referring to inanimate entities, and NPs referring to animate human entities are ranked higher than NPs that refer to animate non-human entities: *animate human* > *animate nonhuman* > *inanimate*. In a sentence with two NPs, if one refers to an animate entity and the other to an inanimate one, the NP referring to the animate entity will be proximate:

- (7) *tsuk^uat-e· a_aktsa'ma·ł-s nitsna'pku.*
 take-IND knife-OBV Moose
 "Moose [PROX] took a knife [OBV]." (Boas 2005: 10:9)

If both arguments refer to animate entities, but only one to a human entity, the latter NP will be proximate:

- (8) *kkanmiyit-s wułna·m-s mıtxa-ne· łu'kpu-s ne_i nuł'a'qana.*
 the.following.day-OBV early-OBV shot-IND cow-OBV the old.man
 "Early, the following day, the old man [PROX] shot a cow [OBV]." (Boas 2005: 29:8)

However, in folktales, animals are regularly anthropomorphized and treated as semantic equals of humans:

- (9) *n'upxa-ne· ne_i k'o·k^ue kiaq'ła ne_{-i}s ttqat-s*
 IND-saw-IND the one duck the-OBV man-OBV
 "The one duck [PROX] saw the man [OBV]." (Boas 2005: 98:220)

Inanimate objects are also sometimes treated as animate. For example, of the sentence in (10), Boas notes parenthetically "stone is here personified" (Boas 1926: 97).

- (10) *hułts'iname·ł ne· nok^ue·*
 "I'll go to that stone."

Finally, when two or more NPs have equally animate referents and no NP is third-person-possessed, obviation assignment is sensitive to discourse considerations. In such cases, the NP corresponding to the most discourse-prominent participant in a sentence will be proximate. In (11), *kławła*, 'Grizzly Bear', is viewed as more discourse prominent than *skin·ku·ts*, 'Coyote', so the former is proximate. The sentence in (12) occurs two lines later in the same story, but now *skin·ku·ts*, 'Coyote' is more discourse prominent and so, proximate.

- (11) *mityaxa-ne· [kławła] skin·ku·ts-·.*
 pursue-dir-IND [grizzly.bear] Coyote-OBV
 "Grizzly Bear [PROX] pursued Coyote [OBV]." (Boas 2005: 3:8)

⁸ The evidence that such nouns are nevertheless obviative comes from the fact that they may trigger obviative verbal agreement.

- (12) mityax_a-ne· skun·ku·ts klawla-s
 pursue-dir-IND coyote grizzly.bear-OBV
 "Coyote [PROX] pursued Grizzly Bear [OBV]." (Boas 2005: 3:10)

There is discussion about what discourse prominence itself consists in,⁹ but for present purposes, the important point is that whatever more precisely it consists in, it is a function of how the speaker chooses to convey the relative position of the referents in an utterance, or how the narrator of a story chooses to portray the relative salience of the characters at different points in a story.

4 The standard view of the interaction

Since proximate NPs outrank obviative NPs and direction-marking depends on the relative rank of the NPs occupying argument roles, the standard view of the interaction between obviation and direction-marking seems to follow unproblematically. On this view, a direct clause is one with a proximate A argument and obviative P argument, and an inverse clause is one with an obviative A argument and a proximate P argument.

As Dryer notes, "Clauses...in which the A is proximate I will refer to as 'direct' clauses and clauses...in which the P is proximate I will refer to as 'inverse' clauses." (1994: 65, 66).

Zúñiga is explicit about distinguishing substantive contributions to the determination of obviation status from contributions to the assignment of direction status, although when so doing, he references only the contribution of semantic animacy: "Note that it is not the opposition direct versus inverse but the assignment of proximate versus obviative that is governed by the animacy hierarchy." (2006: 136)

5 The problem of double-obviatives

Despite the seemingly inescapable conclusion that obviation status determines direction-marking, there is a class of cases not captured by this view. These are cases in which the arguments of a transitive clause are both obviative. Such double-obviative constructions may arise in one of two main ways. First, if the sentence contains a proximate NP which is not one of the core arguments of a transitive clause, both arguments will be obviative, as in (13).

- (13) malí ma-ʔis wu·kat·s·i misál-s
 Mary mother-3.POSS see-OBV.S.-IND Mike-OBV
 "Mary's [PROX] mother [OBV] saw Mike [OBV]." (Dryer 1991: 196,29(b))

In addition, both arguments may be obviative if the current clause is still considered within the scope of a proximate NP in a previous clause, as in (14).

- (14) n-ʔuʔpx_a-ne ʔkaʔm·uʔ-s n-ʔiʔk-s-e· aʔm·ak-s
 IND-see-IND child-OBV IND-eat-OBV.S.-IND earth-OBV
 "He [PROX] saw a child [OBV]; the child [OBV] was eating earth [OBV]." (Boas 2005: 17:9)

Though not frequent,¹⁰ clauses in which both arguments are obviative pose a problem for the traditional account of direction-marking. For as we have seen, on this view, direction-marking depends on a distinction between proximate and obviative arguments, and double-obviative constructions are precisely those clauses lacking a proximate argument.

Since the two arguments in double-obviative clauses have the same obviation status, an initial thought is to suppose that such clauses are simply unmarked for direction and that, morphologically, they are all direct. However, double-obviative constructions may be either direct (15) or inverse (16).

⁹ See Dahlstrom 1996 and references therein.

¹⁰ A preliminary search found 12 examples in Boas 2005.

- (15) malí ma-ʔis wu·kat-s-i misál-s
 Mary mother-3.POSS see-OBV.S.-IND Mike-OBV
 "Mary's mother[OBV] saw Mike [OBV]." (Dryer 1991: 196,29(b))
- (16) at qa-ʔitʰx_a-naps-ts-ne· kławła·ʔ-s [skin·ku-ts·]
 IMPV not-bite-INV-OBV.S.-IND bear-OBV [coyote-OBV]
 "Grizzly bear[OBV] never bit Coyote [OBV]." (Boas 2005: 142 52:51)

So, the difficulty posed by the existence of double-obviative constructions, is not the existence of two obviative arguments *per se*, but that the standard view presupposes arguments of unequal obviation status, while the obviation status of the arguments in these clauses is patently equal.

6 Resolving the problem of double-obviatives

Another strategy to account for the distribution of direct and inverse double-obviatives is to rank the obviative arguments using the same standards—semantic animacy and discourse salience¹¹—used to rank NPs as proximate or obviative. In other words, if the two NPs are of unequal animacy, the one higher in animacy will be considered the higher obviative. If the two nouns are equally animate, the more discourse prominent one will be considered the higher obviative. If one noun is animate and the other inanimate, the animate noun will be the higher ranked obviative. In such cases, the animate noun will usually be the A argument, so these sorts of cases will usually be direct, as in (17).

- (17) [tɪlnamuʔ-s] tsuk^uat-s-e· atsu-s.
 old.woman-OBV take-OBV.S.-IND dish-OBV
 "The old woman [OBV] took a dish [OBV]." (Boas 2005: 31:13)

In sentences where the two obviative arguments are of equal animacy, the clause will be direct if the A argument is more discourse prominent than the P argument at that point (18), and inverse if the P argument is more discourse prominent (19).

- (18) tsuk^uat-s-e· yawo-nikʔ-s [tɪlnamuʔ-e-s]
 take-OBV.S.-IND Yawonik-OBV [wife-3.POSS]
 "Yawonik [OBV] took his wife [OBV]." (Boas 2005: 40:29,30)
- (19) tsEmakʔ-kɪk-s-e· at qa-ʔitʰx_a-naps-ts-ne· kławła·ʔ-s [skin·ku-ts·]
 true-say-OBV.S.-IND IMPV not-bite-INV-OBV.S.-IND grizzly.bear-OBV[coyote-OBV]
 "It is true that Grizzly Bear[OBV] never bit Coyote [OBV]." (Boas 2005: 142:51)

7 Implications for the standard view

The above approach allows us to capture the distribution of direct and inverse clauses in double-obviative constructions. It does so by appealing directly to semantic and discourse considerations, bypassing the contribution of obviation status to direction marking. But the question then presents itself: *if we do not need to appeal to obviation status to rank arguments for purposes of determining direction in the cases where both arguments are obviative, why do we need to appeal to it in the usual cases where one argument is proximate and the other obviative?* I suggest that we don't, and that, in the usual one-proximate/one-obviative clauses, direction-marking can also be determined directly by semantic-animacy and discourse-prominence considerations. I think, in other words, that double-obviative constructions raise doubt about the standard view. On this revised view, semantic animacy and discourse considerations determine both obviation ranking

¹¹ I'm bracketing the issue of third-person-possessed obviatives here. In part this is because, as obligatorily obviative, obviation assignment doesn't depend on the relative status of the core arguments.

and direction-marking. The highest ranked NP in terms of obviation will be proximate, and most of the time, this proximate NP will be the more highly ranked argument in a transitive clause. But there is no grammatical requirement that the proximate NP appear in the transitive clause (as we have seen, it may be in a preceding clause, but still have scope over the current clause) nor that if it does, it must be one of the core arguments. These are choices that the speaker or narrator makes.

Now, one might maintain that double obviatives pose no threat to the standard view because their significance is mitigated by their infrequency (e.g., Dryer 1991; Dryer 1992; Dryer, 1994). However, the appeal to infrequency here seems to me to unfairly trade on the fact that infrequent examples may be evidence of production errors or otherwise bad data—unfairly, because, there are numerous differences between these sorts of cases and the case of double-obviative constructions. For one thing, the contexts in which double obviatives occur are not random. That is, they occur just where the proximate NP is not one of the arguments of a transitive clause or where there is a proximate nearby whose referent can reasonably be assumed to have scope over the NPs in the current clause as well. These contexts also provide an independent explanation for why such examples should be infrequent. It is not often that the most discourse-prominent referent does not figure in the main action conveyed by the clause. Moreover, double obviative constructions appear in other languages as well.¹²

Still, one might acknowledge that double-obviative constructions are genuine exceptions but argue that, as exceptions, they work differently from the standard cases and, as such, may be expected to have an explanation different from the standard cases. This is not the ideal position since general methodological considerations speak against it. Other things being equal, simpler is better, and accounting for the data with a single view is simpler than having one account for the standard cases and another one for the exceptions. In this regard, what Matthew Dryer (1991) says about double-obviatives is sub-optimal because he invokes precisely such a bifurcated approach. Speaking about the standard case—a clause with two participants, one of which is proximate and the other obviative—he says: "[I]f the notional subject is proximate, then the direct construction is used, but if the notional object is proximate, then the inverse construction is used" (1991, p.198). But then he continues: "But for clauses...in which both participants are obviative, *clearly other factors must be playing a role in determining the choice.*" (ibid, emphasis added).

Nevertheless, even if one accepts the above criticism of the standard view, there is a temptation to treat it as no more than a terminological clarification. This perspective acknowledges that we don't *need* to appeal to obviation status to determine direction marking, but highlights the fact that it is nevertheless convenient to do so. It is convenient because it is only in the relatively few cases of double-obviative constructions that the two methods of ranking arguments—in terms of obviation status or in terms of discourse/semantic considerations directly—yield different results. That is, in the usual cases, the most-discourse prominent NP will be the proximate NP. And it is more convenient to appeal to the morphologically encoded distinction between proximate and obviative than to appeal to semantic and discourse constraints for each sentence. So, from this point of view, it seems reasonable not to sacrifice the convenience of the morphologically perspicuous basic picture for the sake of a handful of cases where we have to dig a little deeper (i.e., to the factors governing obviation assignment rather than just the resulting assignment itself).

Tempting as this position is, I think it misses an important point. Irrespective of how often the highest ranked-argument and the proximate NP are co-referential, double-obviative constructions provide evidence that it is not *in virtue of* obviation status that direction is assigned. In other words, these examples invite us to distinguish what *causes* a clause to be direct rather than inverse, from what *correlates* with this determination. What causes a clause to be direct rather than inverse is that the A argument is more discourse-prominent (or more semantically animate or agentive) than the P argument. In the vast majority of cases, the more discourse-prominent argument will also be identified as proximate. But to conclude that this reduces the point to a terminological one is to conflate the epistemological question of how we *know* that one argument is more highly ranked than another, with the question of what *makes* one argument more highly ranked. We *know* which argument is more highly ranked in the usual cases by identifying the argument marked as proximate. But this does not imply that it gets to *be* more highly ranked because it is proximate. Argument marking *may* be in virtue of proximate morphology, but it may also be in terms of discourse and

¹² Double obviative constructions are found in multiple Algonquian languages. For examples in Ottawa and Plains Cree, see Rhodes 2017; for examples in Meskwakie, see Dahlstrom 1996.

semantic considerations. Based on ordinary transitive clauses having one proximate and one obviative argument, we can't tell whether morphology or discourse considerations are at work, since appeal to either makes the same predications about which clauses will be direct and which obviative. But double-obviative constructions provide disambiguating evidence, because, in such cases, obviation morphology is identical, while argument status differs. This doesn't prove that the standard view is wrong, but to insist that it is merely a matter of convenience whether we appeal to obviation status or directly to discourse and semantic considerations, is to fail to appreciate the difference between obviation morphology correlating with direction marking and determining it.

8 Conclusion

Double-obviative transitive clauses result from a mismatch between the number of morphological distinctions Kutenai makes with respect to obviation (i.e., two), and the number of discourse participants that can be viewed as more or less prominent at a given time (two or more). A transitive sentence encodes exactly two from the latter set. To the extent that these are the top two discourse-most-prominent participants at that point, the two arguments will be morphologically distinguished (proximate vs. obviative) and this distinction will correlate with the ranking of arguments for direction-marking purposes: a direct clause will have a proximate A argument and obviative P argument, and an inverse clause will have an obviative A argument and proximate P argument. But to the extent that the two arguments of a transitive clause don't include the most discourse prominent participant in a sentence (or given stretch of discourse), the two arguments won't be morphologically distinguished: they'll both be obviative. So, double-obviative constructions, though relatively uncommon, are important for the evidence they provide that proximate morphology does not confer discourse prominence, it reflects it...although imperfectly. If this view is correct, much remains to be worked out, but it represents a significant departure from the usual view of how obviation and direction-marking interact.

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Pathways of Change in Romance Motion Events: A Corpus-Based Comparison

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1 Introduction

This paper presents the results of two corpus investigations which focus on Medieval Spanish and Medieval French. This study aims to investigate to what extent Spanish innovated s-framed constructions during typological change and to what extent it follows the same trajectory as Medieval French; and quantify the usage of the s-framed innovations observed in Medieval French and the extent to which the structures seem to change according to a unified typological shift. This paper introduces a binary distinction between satellite-framed and verb-framed constructions, which differ in how they express Path in a motion verb. This paper also describes the results of two corpus analyses, which show that Spanish does not innovate s-framed constructions to the same degree that Medieval French does. The results also show that the satellite-framed innovations in French are not innovated at the same time nor are used to the same degree. The paper concludes with a discussion on the implications this study has on the understanding of this binary typological distinction, namely the impact of multidirectional change and free variation have on the understanding of these two language types.

2 Review

Talmy (1975, 2000) describes the difference between satellite-framed (s-framed) languages and verb-framed (v-framed) languages. S-framed languages are languages which conflate Motion and a Co-event, usually Cause of Motion or Manner of Motion, in the verb, and express Path in a satellite. Examples of satellites include verb particles in English, separable verbs in German, verb prefixes in Russian and Latin, etc. (Talmy 2000), which can be seen in examples (1 a-c) below, where the bolded satellite items convey Path information.

- (1) a. The rock slid/rolled/bounced **down** the hill.
- b. The napkin blew **off** the table.
- c. I pushed/threw/kicked the keg **into** the storeroom. (Talmy 2000)

Verb-framed (v-framed) languages are languages that encode Path in the main verb, rather than in a satellite (Talmy 2000). Examples of v-framed languages include Romance, Semitic, Japanese, and Bantu languages (ibid). Since v-framed languages do not express manner in the main verb, if they express Manner, it is in an adjunct (Slobin 1996), such as a gerundive, participle phrase, or adverb (Talmy 2000).

- (2) a. La botella salió de la cueva flotando. ‘The bottle exited the cave, floating.’
- b. La botella salió flotando de la cueva. ‘The bottle exited floating from the cave.’ (Talmy 2000).
- c. *la botella flotó de la cueva

The examples above illustrate how Spanish, a v-framed language, expresses Manner with the gerundive *flotando* ‘floating,’ but cannot express Manner in the main verb with *flotó* ‘floated’. The main

* This project was completed the generous help of my supervisor Rob Truswell and the author received support from the University of Edinburgh’s Student Opportunity Fund to attend this conference.

verb must encode Path (e.g. *salió* ‘went out, exited). Sections 2.1 through 2.4 describe s-framed constructions and innovations in the Romance languages relevant to this study. Section 2.5 describes another structure relevant to the study based on the literature.

2.1 *Verb particle constructions in Italian* Present-day Standard Italian has verb-particle constructions (VPCs), which are an s-framed structure (Italian; Iacobini & Masini 2007). These VPCs (particles are bolded) can have either locative meanings (*venire giù* ‘to come down,’ *portare via* ‘to take away’), idiomatic meanings (*mettere sotto* ‘to run over’), or aspectual meanings (ibid). If Italian is a v-framed language as Talmy claims, this does not account for why Italian uses s-framed structures so widely.

2.2 *Prefixed verbs* The verbal prefix system, which was robust in Latin, lost some of its directional meaning, and some verbal prefixes took aspectual meanings (3) (Acedo Matellán & Mateu 2013), where *a+pensa* (‘think’) became ‘realize’ and *ad+emplir* (‘fill’) became ‘carry out.’ Motion verbs with Path prefixes, whose directional meaning had faded, were being reanalyzed to have an aspectual meaning (Troberg & Burnett 2017).

- (3) a. Lors s’a-pensa Eve qu’ele n’avoï huche.
 ‘Then Eve realized that she didn’t have any coffer.’ (Queste du Graal, 116)
 b. Ad-emplir voeill vostre cumandement.
 ‘I want to carry out your orders’ (Roland, XXII, 30, Acedo Matellán & Mateu 2013)

2.3 *Bare goal-of-motion* Another innovation is the use of bare goal-of-motion verbs without a Path prefix, where the Path is instead expressed in the prepositional phrases. In (4) below, the preposition *en* ‘in’ has a reading of ‘into’. In (5), *sur* ‘on’ means ‘onto.’ In a v-framed language or construction, this reading would not be possible. All Medieval French examples are from Troberg and Burnett (2017) unless otherwise stated.

- (4) Et puy après nous troterons en guerre.
 ‘And then after we will trot into war.’
 (de La Vigne, La Ressource de la Chrestienté, 1494,133)
 (5) il vole sur les rainceaulx ou sur les branches.
 ‘he flies onto small tree limbs or branches.’ (Le Menagier de Paris, c.1392-1394, 163)

2.4 *Verb-particle constructions* One further innovation is verb-particle constructions (6), which Classical Latin did not have (Troberg and Burnett 2017). Examples can also be found in Medieval French, where the particle after the verb can indicate Path.

- (6) il sailly sus le plus tost qu’il peut
 ‘he gets up as fast as he can’ (Percef. III, R., t.2, c.1450 [c.1340], 233)

2.5 *Unselected object constructions* Unselected Object Constructions (UOCs) are constructions where the internal arguments are selected semantically by the verb, but not syntactically; nevertheless, they are not omissible in the construction (Acedo Matellán 2010). An important feature in UOCs is that the phrase does not make sense or have the same meaning without the prefix or preposition. An example of UOCs can be seen in (7) below.

- (7) [Serpentes] [ova] solida hauriunt, [...] atque putamina ex-tussiunt.
 ‘Snakes swallow the eggs whole and expel the shells through cough.’ (Latin; Plin. Nat. 10, 197, in Acedo Matellán 2010)

The eggshells are not being coughed, but rather being ‘coughed out.’ One example from English is ‘to eat oneself thin.’ It is not oneself that is being eaten, but oneself becoming thinner is the result of the action. In these examples, interpretation of the sentences depends on the prefixes in Latin. Coughing shells has a

completely different meaning to the sentence in (17) and is semantically deviant.

2.6 On typological change and multidirectionality In this review of the contrast between s-framedness and v-framedness, it is shown that languages can change types, as seen in the history of French and Spanish, where instead of slowly switching from s-framed constructions to v-framed constructions, Medieval French innovated more s-framed constructions before using almost exclusively v-framed constructions in their modern varieties. Moreover, Troberg & Burnett (2017) describe a U-shaped trajectory, where Latin is considered somewhat s-framed, Medieval French is considered more s-framed, and modern French is v-framed.

The typological change from s-framedness to v-framedness can be observed in the history of the Romance languages, where within French, Medieval French is s-framed and modern French is v-framed. If French can also innovate s-framed constructions, then this type of change is not unidirectional.¹

2.7 Summary Section 2 has defined the binary distinction between s-framedness and v-framedness, has described s-framed constructions which have either been found to be s-framed innovations in Medieval French or are structures which were investigated as potential innovations in Medieval Spanish. This section has also described theoretical implications of the innovations on the binary typological distinction. Section 3 will describe the two parts of the investigation. Section 3.1 describes a corpus study that investigates to what extent Medieval Spanish innovated s-framed constructions before switching to using mostly v-framed constructions in its modern variety. Section 3.2 describes a study that quantifies the usage of the s-framed innovations over time.

3 Methodology

3.1 Spanish corpus study The Spanish portion of the investigation was a qualitative study to see whether Medieval Spanish innovated s-framed constructions in a similar way and to a similar degree as French did in the Medieval Period. The Biblia Medieval corpus (www.corpus.bibliamedieval.es)² was used for this. Bibliamedieval.es is a corpus of different Spanish translations of the Bible, which includes a version in Hebrew and Latin for comparison, one Vulgar Spanish version circa 400 AD, three versions from the 13th century, and 10 versions from the 15th century. The earliest texts in the corpus were dated 1230 AD and the latest texts dated to the late 15th century, so this was the time frame for the corpus study. It is worth noting that the corpus was lacking any texts from the 14th century.

To search for prefixed verbs, verbs such as *andar* ‘to go, walk’, *saltar* ‘to jump’, *tirar* ‘to throw’, *salir* ‘to exit’, *marchar* ‘to march’, *montar* ‘to ride’, and *subir* ‘to go up’ were combined with prefixes identified in the literature, such as *de-* ‘down,’ *ex-* ‘out from,’ *co(n)-* ‘become,’ *in-* ‘into,’ *ad-* ‘to,’ and *ab-* ‘from.’ (Troberg & Burnett 2017). For example, *desaltar*, *e(x)saltar*, *ensaltar*, etc. were searched for, where those tokens might mean ‘to jump down,’ ‘to jump out from,’ ‘to jump into,’ respectively. The corpus was then searched for the verb root, refined to include only common conjugations such as 3rd person singular. This restriction usually eliminated irrelevant search results, such as nouns and adjectives. I looked at the verbs in the search results and checked for any prefixes on the verbs.

To search for examples of bare goal-of motion verbs, the same basic motion verbs used frequently in the literature were investigated. The search was restricted to eliminate irrelevant results as with the prefixed verbs, then I compared the sentences in the other versions in Medieval Spanish as well as the Latin text. This showed how the same meaning was conveyed over time in Spanish and how it compared to the s-framed expression in Latin.

Verb-particle constructions (VPCs) were searched for by looking for the equivalent directional words

¹ While the typology of the encoding of motion events in modern Mandarin Chinese is contested, Old Chinese is considered to be v-framed (Shi & Wu, 2014). Modern Chinese uses many more v-framed constructions and is considered by some to be v-framed (ibid) and by others to be equipollently-framed (Chen & Guo 2008). Nevertheless, it serves as an example of a language switching from using v-framed constructions to using more s-framed constructions.

² I also used some works of literature from the period, e.g. *Cantar de Mio Cid* (c. 1140-1207). In texts such as that, motion verbs were too rare to be able to find examples of the structures in question.

and roots to Italian and Medieval French attestations of VPCs. Italian very frequently uses the *via* ‘away’ verb particle, so a Spanish equivalent was searched for. After looking at *fuera*, *a*, and *de*, which can all be translated as ‘from, away,’ *fuera* was deduced to be the word which behaved analogously to Italian *via*. It was also found that *arriba* ‘up’ and *encima* ‘on top of’ had attestations in Medieval Spanish in the same contexts. The results of the corpus search were then analyzed the sentences to determine if they were acting as particles after a verb.

I used Acedo Matellán & Mateu (2013) as a model and looked for specific examples of UOCs listed in their study. These were used as reference to look for expressions in Medieval Spanish which would correspond to ‘wash away’ and ‘cut out (of),’ which were the examples from the literature. Whether this also applied to Medieval Spanish was also investigated. The limitation of this method is that it is much less likely to find examples of UOCs, even if they do exist, because NPs following V are much less likely to be true attestations of UOCs than items like *fuera* or *dentro* following V are to be VPCs.

3.2 French study The French part of the investigation focused on quantifying the usage of s-framed innovations in Medieval French already known to exist and modeling the usage of those constructions over time. The corpus used in the French investigation is the MCVF corpus³, which is parsed.

I created queries to search for two constructions: the use of *sus*, *jus*, and *hors* as verb particles (VPCs) and the use of *avant* and *arrière* as post-verbal adverbs. Once these queries found examples of these constructions without missing attestations or without returning tokens of other constructions, the number of each occurrence of these structures per text in the corpus was recorded in a table. These data were then analyzed in R to see what trends emerged.

The absolute value of instances per year or per text were divided by the number of tokens in the text to control for larger texts, whose large number of instances would have otherwise appeared as outliers. It was quite evident that the frequency of *avant* and *arrière* or *sus*, *jus* and *hors* were not the same. The total instances of each lexical item can be seen in Table 1.

Table 1: Total instances of lexical items in all contexts in MCVF corpus

Item	Total Instances
<i>avant</i>	1023
<i>arrière</i>	227
<i>sus</i>	1339
<i>jus</i>	118
<i>hors</i>	486

4 Results

4.1 Spanish results The search yielded two results for prefixed Manner verbs with a goal-of-motion reading, however these were excluded as irrelevant, because there was no semantic link between their prefixed and un-prefixed forms.⁴ In (20) below, *afluyere* also appears to be a prefixed Manner verb *fluir* ‘to flow’ with a goal-of-motion reading, however in modern Spanish, *afluir* has another, non-directional meaning: ‘to flow, discharge; to swarm, crowd’ (wordreference.com).

³ *Modéliser le changement : les voies du français*. I will also draw from the Dictionnaire du Moyen Français (1330-1500), <http://www.atilf.fr/dmf/>

⁴ *acorrer* appears to be a- ‘to, towards’ prefixed to the verb *correr* ‘to run,’ but it’s meaning is closer to ‘to help, be of service’ (wordreference.com). It is a verb composed of a prefix and a verb, however the verb has been analyzed as monomorphemic in modern Spanish and no longer has any directional meaning.

- (8) la Riqueza quando afluyere non pongandes enella el coraçon⁵

Similar words like *comer* ‘to eat’ in Spanish come from the Latin *edo* ‘to eat’ with the telic marker prefix added resulting in *comedo* ‘to eat up’ (Troberg & Burnett, 2017). Some of these changes happened before the period investigated in this study. I searched for all other combinations of prefixes and motion verbs used in Troberg & Burnett (ibid) in addition to a few additional verbs and I found no attestations of this structure in Medieval Spanish.

No attestations of bare goal-of-motion verbs with Path PPs in were found in the corpus investigation. The prefixed verbs found were followed by locative PPs, which is acceptable as a v-framed construction. The lack of data found in this part of the investigation suggests that Medieval Spanish did not innovate this s-framed construction.

Verb particle constructions seem to also occur in Medieval Spanish. Instances of *dentro* ‘inside’ (9) and *fuera* ‘outside’ (10) acting as verb particles were found in the corpus, a selection of which are below.

- (9) entro dentro⁶, entro de dentro⁷, veno adentro⁸
 introgressus⁹ (Lat.)
 ‘to go in’
- (10) a. enbiaronlos afuera¹⁰
 ejecerunt¹¹ (Lat.)
 ‘to send out’
 b. rresçebir fuera¹², rresçebir afuera¹³
 egressi sunt (Lat.)¹⁴
 ‘to go out’

There are several attestations of this construction. By the 13th century, Medieval Spanish had already adopted a different construction from Latin. Where Latin uses verbal prefixes, such as *intro-* ‘in(to)’ and *e-* ‘out’, Spanish has unprefixed motion verbs with a directional verb particle. This is similar to the findings in Troberg and Burnett (2017), which found that Medieval French innovated these structures, which were not present in Late Latin.

- (11) a. [si] abluerit Dominus sordem filiarum Sion¹⁵
 b. Sv lauara el señor la viscosidat delas fias desyon¹⁶
 c. Si lauare dios la suziedades de las fias de sion¹⁷.
 d. ‘If the Lord (had) washed away the filth of the daughters of Sion’

This example shows that Medieval Spanish did not carry over verbal prefixes for this type of structure. The equivalent morpheme in the Medieval Spanish versions of the sentence in (11) is *de* ‘from’, which differs from the Latin prefix and from the s-framed English structure, where Path is expressed in a particle after the verb. So, Medieval Spanish does not always use UOCs when Latin does.

5 Biblioteca Nacional de Madrid (1400-1430), Psalms 62:11

6 Prealfonsi (1250), Ezekiel 41:3

7 Biblia Escorial I.i.3 (1425-1450), Ezekiel 41:3

8 Biblioteca Nacional de Madrid (BNM, 1400-1450), Ezekiel

9 Ezekiel, 41:3

10 Biblia Escorial I.i.7 (1400-1430), Numbers 5:4(c)

11 Latin, Numbers 5:4

12 Biblia Escorial I.i.7 (1400-1430), Numbers 31:13

13 Biblia Escorial I.i.4 (1400-1430), Numbers 31:13

14 Latin, Numbers 31:13

15 Latin, Isaiah 4:4

16 Arragel (1433-1430), Isaiah 4:4

17 Prealfonsi (1250), Isaiah 4:4

In (12) below, it is ambiguous whether the sentence means ‘[he] cut (out) two stone tablets’ or ‘[he] cut out two tablets from the stone.’

- (12) a. e corto dos tablas de Piedra segunt las primeras¹⁸
 excidit ergo duas tablas lapides quales ante fuerant¹⁹
 ‘He cut out two stone tablets like the first ones’

This is a parallel to example (7) from section 2.6. Because UOCs, by definition, have objects that are not selected by the verb, the tablets are not actually being cut. They are the result of the cutting from the rock. These two examples are attestations of UOCs in Medieval Spanish. Because there is an element of ambiguity and the same sentences can produce two different interpretations, these constructions could be useful in the further study of how reinterpretation drove the evolution from s-framedness in Latin to v-framedness in the Romance languages.

In summary, Medieval Spanish did innovate verb particle constructions (VPCs) and Unselected Object Constructions (UOCs), but it did not innovate s-framed constructions to the same extent that Medieval French did (compare Tables 2 and 3). This suggests that there are at least two pathways between Latin and Romance: the French pathway, the U-shaped pathway, which innovates a several s-framed constructions; and the Spanish pathway, which innovates fewer s-framed constructions.

Table 2: The use of s-framed constructions from Latin to Modern French (Troberg & Burnett, 2017)

	(EARLY) LATIN S-FRAMED	MEDIEVAL FRENCH S-FRAMED ¹	MODERN FRENCH V-FRAMED
Directional/aspectual prefixes	✓	✓	✗
Goal-of-motion construction	✓ (prefix required)	✓	✗
Directional/aspectual verb particles	✗	✓	✗
Complex adjectival resultatives	✗	✓	✗

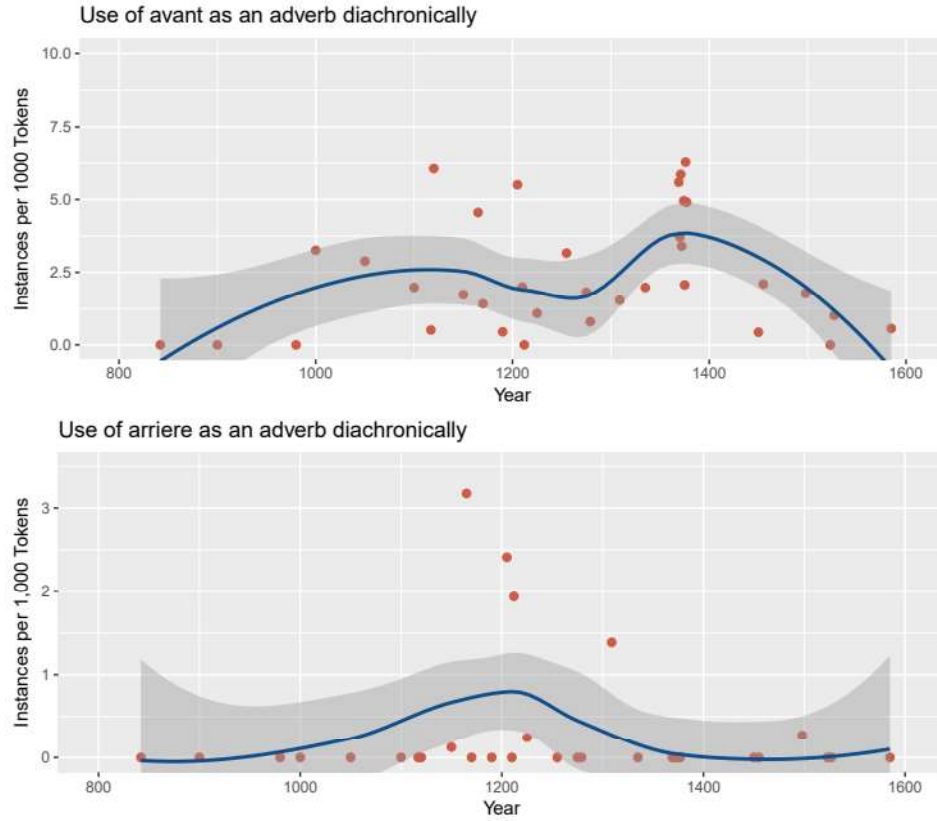
Table 3: The use of s-framed constructions from Latin to Modern Spanish

	(EARLY) LATIN	MEDIEVAL SPANISH	MODERN SPANISH
Prefixed Verbs	✓	✗	✗
Bare goal-of-motion	✗	✗	✗
VPCs	✓	✓	✗
UOC	✓	✓	✗

4.2 French results In the French study, when comparing the use of *avant* and *arrière* as adverbs (Figure 1), there are different patterns that emerge. *Avant* exhibits neither a bell curve nor an S-curve, but instead fluctuates with a dip in the mid- to late-thirteenth century, followed by its peak in the late 14th century, subsequently followed by its steady decline after 1400. Whereas *arrière* exhibits a relatively symmetrical rise and decline with its peak just after 1200. The use of *avant* and *arrière* are not equal, which can be seen in the y-axes of the graphs in Figures 1 and 2. At its peak the adverb *avant* is used six times per 1000 tokens and the adverb *arrière* is used at most around three times. This reflects the disparity of use as a lexical item generally (Table 1).

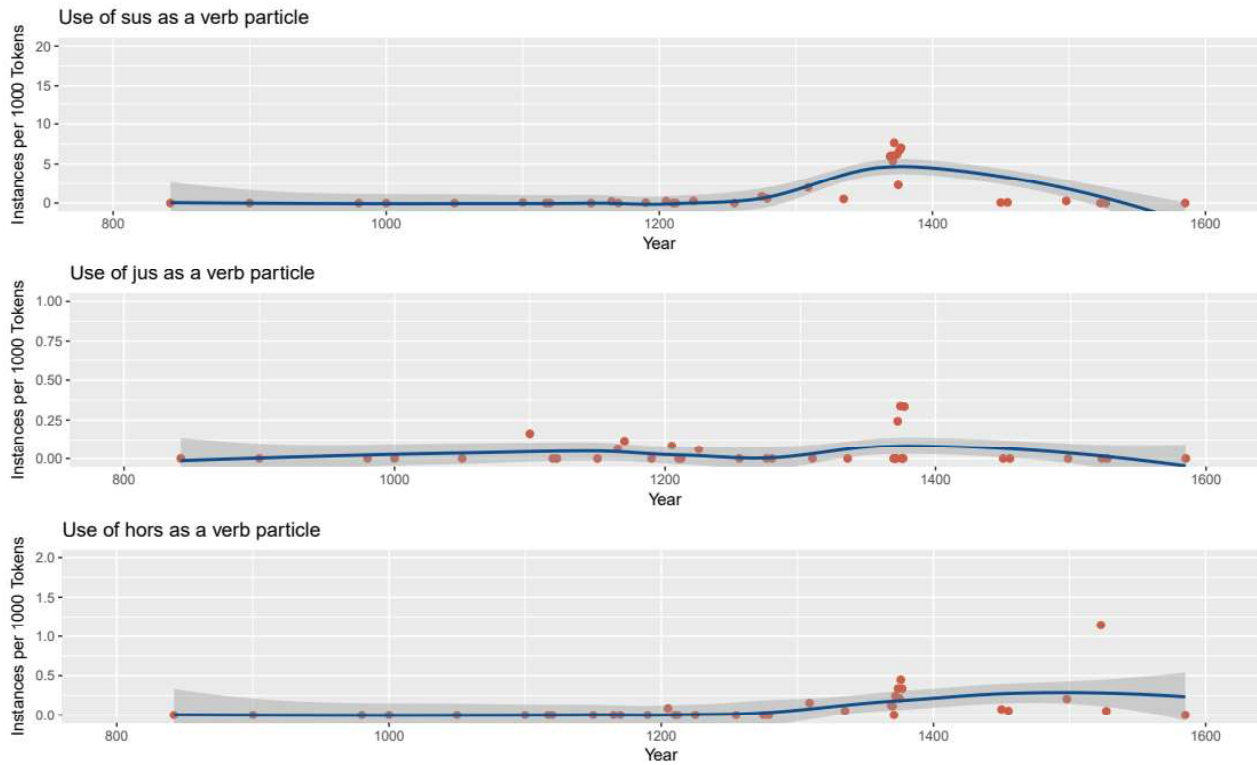
¹⁸ Biblia Escorial I.i.4 (1400-1430), Exodus 34:4

¹⁹ Latin, Exodus 34:4

Figure 1²⁰: the use of *avant* and *arrière* as adverbs diachronically

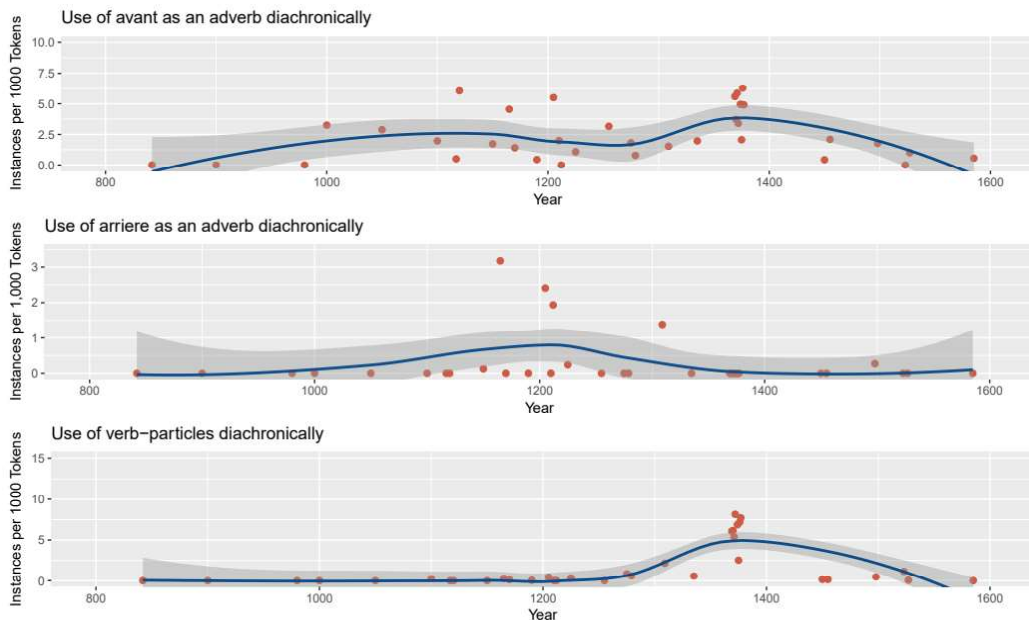
20 Different y-axes were used in the graphs for different verb particles. This is to emphasize the shape of the regression line, some of which are otherwise indistinct, e.g. Figure 6.

Figure 2: Use of *sus*, *jus*, and *hors* as verb particles over time



The use of the verb-particles *sus*, *jus* and *hors* show more regularity (See Figure 3). *Sus* and *jus* show a peak in the late 14th century, though the curve is the graph for than that of *jus*. Taking into account the frequency of *sus* is significantly higher than either *jus* or *hors*, with the particle *sus* occurring as much as eight times per 1000 tokens, whereas at their peaks, *jus* occurs .7 times per 1000 tokens (or 7 times per 10,000 tokens) and *hors* occurs up to .5 times per 1000 tokens (or 5 times per 10,000 tokens). This also reflects the disparity of use between *sus*, *jus* and *hors* across all uses (Table 1).

Figure 3: The usage of *avant*, *arri re*, and the verb particles.



In summary, there are differences in the usage of *avant*, *arrière*, *sus*, *jus*, and *hors*. The peak of use of *arrière* as an adverb occurs around the year 1200, whereas the peak of use of *avant* as an adverb occurs around 1370. This suggests that the typological does not occur uniformly across individual constructions/lexical items. This could indicate that, for example, this use of *avant* and *arrière* are underlyingly not the same construction. There are potentially unknown external factors that cause the changes in these structures to occur at different rates.

In the French data, there is a group of texts in the corpus by the same author, Froissart, in consecutive years. This creates a visible cluster of data in the figures above. While these were all controlled for number of tokens and show relative frequency, it is possible that those clusters are skewing the usage data, particularly with *avant* and the verb particles. In this study, I chose not to exclude those texts, but another option would have been to reformat the corpus so those texts appeared as a single text.

5 Discussion

As discussed in Section 2.7 these examples of typological change are neither unidirectional nor linear. Additionally, the results of this study indicate that the typological change is not uniform across Spanish and French. Where French has taken a U-shaped path, Spanish seems to have changed little with respect to v/s-framing since the 13th century. This indicates that there are at least two possible paths from Latin to modern Romance. Therefore, not only can the change be multidirectional, but it can take at least two different paths of change.

If languages can change from s-framed to v-framed and vice versa, and languages can have some structures of one type and some of another type, then there is nothing restricting completely free variation in motion verb constructions. What is known about the framing typology does not support free variation. Many languages represent the prototypical typologies, and many more languages fall closer to the extremes of the continuum than to the center, which is why the binary typology mostly works. If there is free variation for a language to use a mix of s-framed and v-framed constructions, there is no explanation of why languages do tend to use mostly one type rather than a more even mix of the types.

If this change is not only multidirectional but undirected with free variation, where a given language can use either an s-framed or v-framed construction in whatever context without reason or pattern, we would expect to see many more languages with roughly the same usage of s-framed and v-framed constructions. If there truly is free variation not only would this be theoretically problematic, but there is no understanding of how that would fit into our understanding of the framing typology and the encoding of motion events.

6 Conclusion

Spanish does not innovate s-framed constructions to the same extent as French. There is more than one way to change from s-framedness to v-framedness in the Romance languages. In Medieval French, the s-framed innovations are not innovated, used, and disused at the same time and rate. This could indicate that the typological shift from s-framedness to v-framedness isn't the only factor affecting the usage of these constructions. Languages have been shown to innovate structures and to change from s-framed to v-framed or vice versa. In the French portion of the study, it seems possible that the individual structures don't change at the same rate and time, but rather the structures have some degree of independence.

It is unclear why similar languages undergoing similar changes would take different trajectories and why even within one instance of typological change, structures may change at different times and rates. If multidirectionality and free variation play a role in these phenomena, it could have interesting implications for this binary typological distinction as well as typological change as a whole.

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Linguistic and Cognitive Temporal Representations in Traditional Negev Arabic

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1 Time-from-space in language and cognition

The impact of spatial orientation on our understanding of time has been largely considered as an obvious phenomenon, evident in grammars and lexica of many world's languages (Miller and Johnson-Laird, 1976; Lyons, 1977). Lakoff (1993) assumes that our metaphorical understanding of time in terms of space is biologically determined: "In our visual systems, we have detectors for motion and detectors for objects/locations. We do not have detectors for time (...). Thus, it makes good biological sense that time should be understood in terms of things and motion." A number of cognitive and psycho-linguistic experiences have been carried on ever since, supporting the vision that to represent time, people around the world rely on space (Boroditsky, Fuhrman, McCormick, 2011). Cross-linguistic and cross-cultural enquiry largely supports the 'space-to-time metaphor' hypothesis, stressing that the way people spatialize time differs across languages and cultures, depending on the available spatial representations, spatio-temporal metaphors, cultural artifacts, and on individual disposition, age and experience (Casasanto and Boroditsky, 2008; Fuhrman and Boroditsky, 2010). Across these studies, people from different cultures or groups have been shown to differ in whether they think of time as stationary or moving, as limited or open-ended, as horizontal or vertical, as oriented from left-to-right, right-to-left, front-to-back, back-to-front, east-to-west, and so on. For the grammatical marking of time on verbs, i.e. the domain of tense and aspect, there is a sizable body of cross-linguistic research which shows that the use of spatial periphrastic expressions is by no means geographically, genetically or typologically limited (Anderson, 1973; Traugott, 1978). Furthermore, a study conducted by Boroditsky and Gaby (2010) showed as Australian languages using cardinal directions to represent cognitive and linguistic spatial relations between objects, used cardinal directions (the east-west axis) in temporal representations, i.e. to express Anteriority and Posteriority ('before'/'after') between events. This was surprising as all previous studies in other cultures had found temporal representations derived from spatial representations relative to the ego of the observer/speaker. Nevertheless, the 'space-to-time', or 'space-first' hypothesis has been recently challenged by the empirical evidence that humans directly perceive and feel the passage of time (Evans, 2004). This new perspective evokes the insight of B.L. Whorf, who claimed that Hopi (a Uto-Aztecan language of Arizona and New Mexico) doesn't show the space-to-time metaphor (Whorf, 1956). This study tackles the question of how and how strictly spatial and temporal structures correlate, examining the applications of spatial FoRs in time in Traditional Negev Arabic (TNA). I propose that the attitude toward metaphorical processing – including the space-to-time transfer - may largely differ across languages and cultures.

2 Traditional Negev Arabic

Negev Arabic is classified as a branch of North-Western Bedouin Hijāzi Arabic (Henkin, 2010). It is spoken in seven main Bedouin towns, around the main city of BeerSheva, where Bedouins were settled starting in the Seventies, on a residual part of their original tribal land, definitely shifting from the semi-nomadic to the sedentary life style. Sedentarization caused noteworthy socio-cultural and cognitive changes (Kressel, 1975). I call the variety spoken by the elders, both women and men, over 70 years old, 'Traditional

Negev Arabic' (TNA), to distinguish it from the sociolects spoken by younger tribal members.

3 Frames of Reference from space to time

This analysis starts from spatial data related to the use of Frames of Reference (FoRs) in TNA, in order to compare them to the temporal uses of the same FoRs, i.e. treating temporal representations of Anteriority/Posteriority (English: 'before'/'after') as projective spatial relations between events instead of between objects. According to Levinson (2003), FoRs are cognitive and semantic strategies used to project coordinate systems onto spatial arrays in order to conceptualize and linguistically describe projective (or angular) spatial relations, i.e. relations entailing the criterion of 'direction'. Be F (Figure) the object to be located and G (Ground) the object with respect to which F is located, projective spatial relations occur when F and G are separated on the horizontal plane (not overlapping) and F is to be located in a certain direction of G (e.g. in front, behind, east, north, right). FoRs are of three types: Absolute, Intrinsic and Relative. The coordinate system of the Absolute FoR is derived from some environmental gradient or feature, such as the four cardinal directions or a known landmark, providing fixed bearing throughout space, as in Marc (F) is north of the house (G). In Intrinsic FoR the coordinate system is centered on G's facets: the coordinates of the spatial array are determined by 'inherent features' or certain 'properties' belonging to the G referred to in the utterance. In order to become the center of the coordinate system, G has to show some 'inherent' functional or geometric asymmetry, making clear where is its Front Region, or its Left Region, for example. Prototypically, the human body is an inherently faceted G. In the Relative FoR the body of the Observer (O) is the origin of the coordinate system. Relative FoR can be easily primed by faceless Gs such as ball/ tree/ stone/ pole, which lack intrinsic salient asymmetries, so that some salient asymmetry is mapped onto them from O. The Relative FoR can be applied by Reflection or by Translation. FoR's strategies are shown in Table 1:

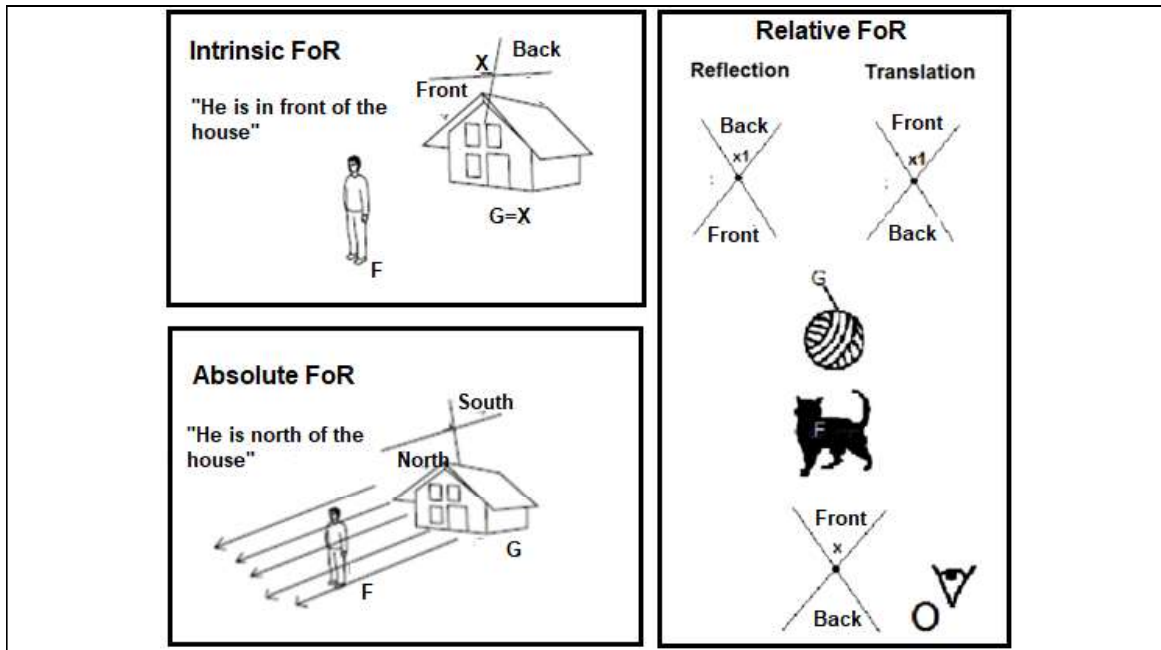

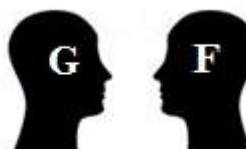


Table 1. Schematic Representation of Frames of Reference according to Levinson (2003)

In Table 1, F is Black Cat and G the Ball of Wool. According to **Reflection**, *Black Cat is in front of the Ball of Wool*. Reflection is called also CANONICAL ENCOUNTER, as O conceives the unshaped G facing him. **Translation** treats the X1 axial system as a direct replica of X, so now *Black Cat is behind the call of wool*, as O conceives the unshaped G preceding him in a row. Translation, rare in western languages, is generally called ALIGNED FIELD or HAUSA SYSTEM, after Hill (1982). Translation is the only way TNA applies the Relative FoR in spatial linguistic representations (Cerqueglini, 2015).

4 Linguistic and cognitive spatial FoRs in TNA

For comparative purposes, I first summarize TNA linguistic and cognitive spatial FoRs, moving then to the temporal data. As in Cerqueglini (2015; 2016), TNA shows a unique spatial system entailing Intrinsic, Relative and Absolute FoRs, based on a cultural-specific ontology, not detectable among younger speakers. In TNA, the Intrinsic FoR is applied when Gs are [+FAMILIAR] [+SHAPED] and [+CULTURALLY SALIENT], such as: man/ horse/ donkey/ camel/ dog/ small carnivore/ coffee pot/ tent/ knife. These Gs have their inherent Front Region (expressed by *giddām* or *gabl*, both meaning ‘before’) and Back Region (*wara*, ‘behind’), independently from O’s position (Cerqueglini and Henkin, 2017). In particular, *giddām* is used when FG are in a row, and *gabl* when FG face each other, as in Table 2:

	
F <i>giddām</i> G	F <i>gabl</i> G
Table 2. Prototypical Semantic Opposition of <i>giddām</i> and <i>gabl</i> .	

TNA uses the Relative FoR by Translation with [+FAMILIAR] [-SHAPED] Gs, such as tree/ stone and - surprisingly! - sheep/ goat, when FGO [+ALIGNED]. The predominant grammatical strategy in this case is the doublet: *F min G wjāy / F min G wgād*, meaning ‘F is from G and coming toward O’/ ‘F is beyond G with respect to O’, respectively. When [+FAMILIAR] [-SHAPED] Gs and FGO [-ALIGNED], the array is automatically described applying the Absolute FoR, i.e. by means of cardinal directions. In TNA cardinal directions are four: *šimāl*, ‘north’, *jinūb*, ‘south’, *šarg*, ‘east’, and *garb*, ‘west’. Intermediate directions are not lexicalized. So, *F šarg G*, ‘F is east of G’. The Absolute FoR is also used with all [-FAMILIAR] Gs (dinosaur/ key/ shoe/ computer), and to replace the Right/Left Axis of all Gs (Cerqueglini and Henkin, 2017).

As per the cognitive data, once requested to give non-linguistic but physical responses to visual stimuli (i.e. sketching maps, pointing, and reconstructing spatial arrays after rotating by 180 degrees, as proposed in Levinson, 2003), TNA speakers consistently and exclusively apply the Absolute FoR, anchored on the four basic cardinal directions available also in language.

5 Temporal representations in TNA language

TNA uses five temporal prepositions to indicate the axial opposition Anteriority/ Posteriority. Only part of them derive from basic spatial meanings. *Giddām* and *gabl*, both meaning ‘in front of’, are used also to indicate temporal Anteriority, in the meaning of ‘before’. *šugb*, ‘nape’, *zahr*, ‘horseback’, *wara*, ‘behind’, and *bašd*, ‘after’, indicate temporal Posteriority, in the meaning of ‘after’. Interestingly, the body parts *šugb*, and *zahr* have no spatial meaning, as well as *bašd*. *wara* is the only temporal prepositions used also in spatial representations, in both Intrinsic and Relative FoRs. According to the lexical material in which TNA temporal prepositions are rooted, time seems to be conceived according to the layout of the spatial Front/Back Axis, as in many other languages worldwide. Cardinal directions, dominant in spatial representations, are not lexicalized in the domain of time. As shown before, with reference to linguistic spatial representations, the front region, lexicalized by *giddām* and *gabl*, is attributed only to those Gs that are considered [+SHAPED], i.e. only according to the Intrinsic FoR.

Therefore, temporal events seem to be conceptualized in TNA as [+SHAPED] entities, and, more precisely, whose Front Region is associated with Anteriority, while their Back Region is associated with Posteriority.

In fact, TNA shows a clear pragmatic tendency to select different temporal prepositions for different uses: *giddām* and *šugb* represent Anteriority and Posteriority respectively in those series of events where O’s current position is not included in the message, while *gabl* and *bašd* are used in the same respective functions when O’s current position is included in the message. So, for example:

- (1) *šuft Maryam **gabl** yawmēn*, ‘I saw Maryam two days ago’
- (2) *šuft Maryam yawmēn **giddām** il-farħa*, ‘I saw Maryam two days before the marriage party’
- (3) *widdy ašūf Maryam **bašd** yawmēn*, ‘I will see Maryam in two days’
- (4) *widdy ašūf Maryam yawmēn **šugb** il-farħa*, ‘I will see Maryam two days after the marriage party’.

In examples (1) and (3), O refers to a past and a future event respectively, in reference to her/his ‘here-and-now’. In other words, her/his temporal position is relevant in understanding the message of the utterance. I call this strategy ‘deictic’, as the description entails O’s position. In this case, O’s temporal position is the Origin of the temporal coordinates, just as in deictic spatial representations (Relative FoR). TNA deictic temporal strategy is grammatically encoded by *gabl*, ‘before’, and *bašd*, ‘after’.

In examples (2) and (4), O’s current position during the utterance is not encoded, therefore I call this second temporal strategy, non-deictic. Indeed, *il-farħa*, ‘the wedding party’, is the G-event with respect to which the seeing-event (F) is located. TNA non-deictic temporal strategy is grammatically encoded by *giddēm*, ‘before’, and *šugb*, ‘after’.

Interestingly, *wara*, that is used in spatial representation as ‘behind’ in both Intrinsic and Relative FoRs, can be used in time, with the meaning of ‘after’, in both deictic and non-deictic representations. *Žahr*, lit. ‘horseback’, is used rarely, in the temporal meaning of ‘after’, only to express Posteriority among future events.

6 Temporal representations in TNA cognition

In the domain of cognitive temporal representations, I observed pointing gestures meaning ‘before’ and ‘after’, and I tested how Os order in sequence a set of given pictures representing a temporal progression (Casasanto and Borodisky, 2008). In pointing, the past corresponds to the direction ‘behind’ O, while the future is conceptualized in front of O, in both deictic and non-deictic cases, i.e. including or not O’s ‘here-and-now’ in the message. Translating TNA pointing’s data into referential strategies, TNA pointing system is based on a Relative FoR. The strategy according to which the Relative FoR is projected in this case can be conceptualized as Reflection, where events are thought of as entities approached by O. O ideally proceeds toward them face-to-face (Ego-moving metaphor, in Gentner, Imai, Boroditsky, 2002).

Beside pointing, TNA informants were also requested to put in sequence sets of pictures representing different phases of a same process, for example the infancy, youth, maturity and old age of the same person. In this task, their responses have been less homogeneous than in the pointing task, showing two strategies, depending on the type of stimulus.

Results are shown in Table 3:

	<p>N</p> <p>S</p>	
Relative Response (by Translation)		Absolute Response
Table 3. Relative and Absolute FoRs in Cognitive Temporal Sequencing (N=north; S=south)		

As a general rule, TNA informants sequence pictures starting from Past (infancy, Anteriority) to Present (old age, Posteriority), placing them in a row in front of them, from far (infancy) to close (old age). The old age is associated to the position closer to the present moment, i.e. to the region closer to O. This new schema can be conceptualized in terms of FoRs as the Relative FoR projected by Translation, the only Relative strategy used in TNA spatial representations. Indeed, Anteriority (past) is associated to the farther region in reference to O, while Posteriority is associated to the region closer to O. In other words, this sequencing is processed according to the Time-moving metaphor, representing temporal events as entities coming toward O, so that the past is in front of O, and the future is behind O (Gentner, Imai, Boroditsky, 2002).

Within this general rule, different types of stimuli, triggered two different kinds of responses: when the informants were requested to sequence their own pictures, they proceeded according to the Relative strategy by Translation described before. But when they had to arrange a set of pictures of somebody else, they first of all turned toward the north and established an Absolute anchor to the sequence. In this last case, TNA informants applied a mixed, Relative-Absolute, temporal strategy.

This Absolute orientation is probably due to the direction of the water flow in southern Israel, where the main hydrological system (the Jordan) flows along the eastern mountain chain from north to south. The Jordan hydrological system represents both a fixed reference and a moving element, whose origin, in the north, is associated with temporal Anteriority.

The distinction between temporal Relative and Absolute FoRs seems to reproduce in cognitive terms the basic distinction described in language between deictic and non-deictic temporal strategies. In the domain of time, in both language and cognition, TNA speakers keep a clear distinction between the representations that include or require O's temporal position and those that are independent from O's temporal position.

7 Conclusion

Linguistically, TNA spatial Front/ Back axis is treated according to a large set of FoRs, based on semantic properties culturally attributed to Gs and some axial constraints. In spatial cognition, the Absolute FoR (cardinal directions) is only applied. In spatial representations, the correlation between language and cognition shows aspects of discrepancy. It seems that language has evolved a very sophisticated set of strategies, that have not penetrated the Absolute cognitive bedrock (Cerqueglini and Henkin, 2017). Time is represented by TNA speakers along the Front/Back axis. In linguistic representations, two prepositional doublets are used, *gabl* 'before' / *baʕd* 'after' and *giddām* 'before' / *ʕugb* 'after' for deictic and non-deictic representations respectively. Cardinal directions, thought of as the original Pan-Bedouin spatial system and still considered as the 'default perspective' (Cerqueglini and Henkin, 2017), are not grammaticalized to express temporal meanings. Noteworthy, prepositions representing temporal Anteriority (*giddām* and *gabl*) have also spatial uses, both meaning 'in front of', yet in different situations (Table 2). *ʕugb*, representing temporal Posteriority ('after') in non-deictic representations, derives from a body-part (the nape), but has no spatial meanings in TNA dialects. Interestingly, the preposition *wara*, etymologically related to the idea of 'being hidden away, out of sight', is used in both space ('behind') and time ('after'), both in deictic and non-deictic strategies. TNA temporal pointing is organized according to the Relative FoR by Reflection, with Anteriority (past) behind O and Posteriority (future) in front of O, as in most Western languages and cultures. The Relative FoR applied by Reflection is completely absent from TNA spatial strategies, where the Relative FoR is applied only by Translation. In cognitive sequencing of progressive scenes, TNA informants react differently to different kinds of stimuli. In general, they use the Relative FoR by Translation, starting from Anteriority, the farther region from O, and arriving to Posteriority, the closer region to O. When they order their own pictures, from younger to older ages, they proceed according to the Relative FoR by Translation, in whichever position and orientation. When TNA informants order in sequence the pictures of somebody else, they establish an Absolute anchor to the row, where Anteriority coincides with north.

To summarize, TNA shows the entire set of referential strategies detected in Levinson (2003). Such complexity is expressed in a sophisticated system of G-based linguistic representations, while spatial cognition relies exclusively on the Absolute FoR. Temporal prepositions are partly independent from spatial ones, and do not include Absolute representations. Temporal pointing gestures show the Relative FoR applied by Reflection, not found in any spatial schema. Temporal cognitive sequencing resembles linguistic temporal

and spatial systems in distinguishing deictic from non-deictic strategies. Only in cognitive non-deictic sequencing the Absolute FoR appears in temporal representations.

According to TNA data, temporal representations are to a large extent independent from spatial ones, just as cognitive representations are from language.

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Alliteration and Rhyming in Mandarin Onomatopoeia

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1 Introduction

Mandarin onomatopoeia contains multiple forms, including AA, AB, ABB, ABAB, AABB, ABCD, as shown in (1). The trisyllabic and quadrisyllabic forms are generally derived from disyllabic forms through reduplication. For instance, the base of the reduplicated form *hua la la* ‘the sound of a crash’ is the disyllabic *hua la* ‘the sound of a crash’. The base of *hong long hong long* is *hong long* ‘rumbling sound’. The base of *di di da da* is *di da* ‘the sound of water dripping or clock ticking’. The base form of *pi li pa la* is *pi pa* ‘the sound of a crack, slap, clap, clatter etc.’ The derivation shows the importance of the disyllabic forms, since the formation of disyllabic onomatopoeic words must be defined before the formation of trisyllabic and quadrisyllabic onomatopoeic words.

- (1) Trisyllabic and quadrisyllabic onomatopoeia (data collected from (M.O.E. 2015))
ABB: *hua la la* [xwa.la.la] ‘the sound of a crash’ (B: *hua la*)
ABAB: *hong long hong long* [hoŋ.loŋ.hoŋ.loŋ] ‘rumbling sound’ (B: *hong long*)
AABB: *di di da da* [ti.ti.ta.ta] ‘the sound of water dripping or clock ticking’ (B: *di da*)
ABCD: *pi li pa la* [pi.li.pa.la] ‘the sound of a crack, slap, clap, clatter etc.’ (B: *pi pa*)

The present paper focuses on the formation of disyllabic onomatopoeia and gives an analysis of the AA and AB forms as in (2) under the framework of *Cophonology Theory* (Inkelas & Zoll 2007). In this view, it is proposed that there are co-existing phonological systems that generate forms with repeating syllables as well as non-repeating syllables in disyllabic onomatopoeia. One cophonology repeats the monosyllabic base—hence the AA form (e.g. *di di* ‘the sound of water dripping’). The other cophonology avoids repeating the monosyllabic input—hence the AB form (e.g. *di da* ‘the sound of water dripping or clock ticking’, *ka ca* ‘the sound of breaking or snapping’, *xi su* ‘a rustling noise’, *bi bo* ‘the sound of bursting’). Interestingly, in spite of the dominating force to avoid full copying in the AB forms, the two syllables in each AB disyllabic onomatopoeic word still preserve certain similarities with each other through alliteration (*di da*, *bi bo*) or rhyming (*ka ca*).

- (2) Disyllabic onomatopoeia (data collected from (M.O.E. 2015))
AA: *di di* [ti.ti] ‘the sound of water dripping’ (B: *di* ‘to drip/a drop’)
AB: *di da* [ti.ta] ‘the sound of water dripping or clock ticking’ (B: *di* ‘to drip/a drop’)
bi bo [pi.po] ‘the sound of bursting’ (bi-bo)
ka ca [k^ha.ts^ha] ‘the sound of breaking or snapping’ (ka-ca)
xi su [ci.su] ‘a rustling noise’ (xi-su)

2 Literature review

2.1 Introduction to Mandarin onomatopoeia Aside from its sound-symbolic function that makes it different from other vocabulary in the grammar, Mandarin onomatopoeia also constitutes a type of *lian mian ci*, which is a group of disyllabic words that have the following characteristics. According to Fang (1985), the two syllables in a *lian mian ci* only have meanings only when the two syllables are combined. The respective syllable does not have a meaning independently. Furthermore, unlike compounding, the two syllables are combined not based on their semantic function, but based on their phonological identity. The syllables share certain phonological identity, so *lian mian ci* always sound rhythmic. He classifies four kinds of *lian mian ci* based on different degrees of phonological identity, and the forms in (i) and (ii) are

the main focus of the present analysis:

- i. Alliterative but not rhyming: *di da* [ti.ta] ‘the sound of water dripping/clock ticking’
- ii. Rhyming but not alliterative: *hong long* [hoŋ.loŋ] ‘rumbling sound’
- iii. Alliterative and rhyming: *ku ku* [ku.ku] ‘sound of a dove’
- iv. Not alliterative and not rhyming: *ji ku* [tei.ku] ‘whisper’

2.2 Previous studies on Mandarin onomatopoeia Previous studies on Mandarin onomatopoeic words focused on the general patterns such as the distribution of high vowels and low vowels, as well as the fixed lateral consonant /l/, overlooking the phonological mechanisms that produce contradictory patterns (i.e. repeating syllables vs. not repeating syllables). Ran (2009) notices that in Mandarin onomatopoeia the first or former syllable(s) usually contains the high vowel /i/, and the second or latter syllable(s) usually contains low vowels such as /a/ or /u/, as in (3).

- (3) High vowel-low vowel pattern
 - a. *ji ku* [tei.ku] ‘whispering sound’
 - b. *di di da* [ti.ti.da] ‘the sound of water dripping/clock ticking’
 - c. *ping ling pang lang* [p^hiŋ.liŋ.p^haŋ.laŋ] ‘clashing sound’

Since high vowels have higher frequency than low vowels, he concludes that the high-low frequency pattern in onomatopoeic words mimics the beginning and ending of natural sounds. The beginning of natural sounds is more audible, so it is mapped to vowels of higher frequency. The ending of natural sounds is less audible, so it is mapped to vowels of lower frequency. However, this generalization does not include onomatopoeic words that begin with low vowels and end in high vowels, which amount to 30% of his collected data, as in (4).

- (4) Low vowel-high vowel pattern
 - a. *ku ji* [ku.tei] ‘whispering sound’
 - b. *ka zhi* [ka.ʒi] ‘cackling sound’

Ying (2012) points out that in the majority of AB Mandarin onomatopoeia the lateral /l/ is the onset of the second syllable. He analyzes the degree of sonority of the first and second syllables and finds that the sonority of the first syllable rarely exceeds the second syllable, because the stressed syllable, which is the second syllable in his regard, should be more sonorous. In other words, the sonority of the first syllable is either the same as the second syllable, or less than the second syllable. Therefore, the most sonorous consonant /l/ tends to occur in the onset of the second syllable. In addition, high vowels, which are less sonorous, do not occur in the second syllable most of the time; otherwise, the second syllable may be less sonorous than the first syllable. Then, there will be a mismatch between the stressed syllable and the more sonorous syllable. Similar to Ran (2009), Ying (2012) only gives a rough prediction on the common patterns of Mandarin onomatopoeia.

The first study to provide a theoretical analysis of the phonological systems of Mandarin onomatopoeia is Yeh (2011). She classifies disyllabic onomatopoeic words into three categories and presents an Optimality Theory analysis of the AB forms. Her classification is shown in (5). Based on different monosyllabic inputs, different AB forms are derived through reduplication. In the first category, the monosyllabic inputs with onset clusters are argued to originate from the onomatopoeia in ancient Chinese language. The input vowel is reduplicated, and the reduplicated form is produced. The monosyllabic inputs in the second category are grammatical words without onset clusters. The reduplicated form is produced by inserting a coronal vowel [i]. Other AB patterns that fall out of these two categories are considered to have disyllabic inputs.

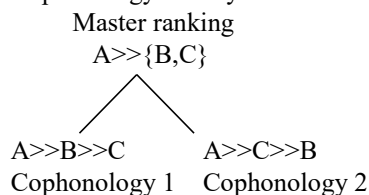
(5) Classification of AB onomatopoeia

Monosyllabic input	Consonant+/l/ onset cluster	Grammatical words
Examples	/p ^h la+RED/ [p ^h a.la] 'clashing sound'	/RED+ta/ [ti.ta] 'water dripping/clock ticking sound'

The present analysis differs from Yeh's (2011) in the following aspects. First, all the AB forms are regarded as having grammatical monosyllabic inputs, as the lateral onset of the second syllable is treated as the emergence of the unmarked (in terms of Mandarin) segment under Onset Sonority Condition, which prefers more sonority contrast between the onsets of the first and the second syllable. Second, Yeh (2011) treats [ta] in [ti.ta] as the base, and the coronal vowel /i/ emerges as the unmarked vowel in the reduplicant (RED), only because under her analysis /a/ is considered a back vowel. However, according to Lin (2007), the low vowel /a/ in Mandarin is not a back vowel. It only surfaces as the back vowel [ɑ] before the velar nasal /ŋ/. Therefore, the universal place markedness hierarchy proposed by Alderete et al. (1999) would predict /a/ to be the most unmarked vowel in the RED, rather than /i/. Therefore, the present analysis sees *ti* as the base (/ti+RED/), and the RED is suffixed just like the RED in the first category.

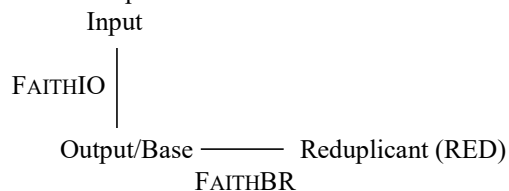
2.3 Theoretical framework The following analysis adopts Inkelas & Zoll's (2007) *Cophonology Theory* to account for the different ways to avoid repeating in Mandarin AB onomatopoeia. In this theory, different constraint rankings can be conditioned by different morphological constructions or word class in the same grammar. As shown in (6), in the master ranking $A \gg \{B, C\}$, there can be some unranked constraints $\{B, C\}$. Under the master ranking, there can be multiple cophonologies that specify the various rankings of the unranked constraints in the master ranking. Cophonologies can be suffix-specific ($A \gg B \gg C$ or $A \gg C \gg B$). The present analysis presents three cophonologies that are able to predict and describe Mandarin disyllabic onomatopoeia.

(6) Cophonology Theory



In explaining the form of the reduplicant, McCarthy & Prince's (1999) Base Reduplicant Correspondence Theory is used. In this theory, the corresponding relations between the input, output and the reduplicant is schematized as (7). FAITHIO requires everything in the input/output to have a correspondent in the output/input. FAITHBR requires everything in the base or the RED to have a correspondent in the RED or the base. When a markedness constraint is ranked between FAITHIO and FAITHBR, an unmarked element will surface in the RED. This phenomenon is called the emergence of the unmarked (TETU). In the AB forms, the fixed segments /l/ and /a/ are treated as the results of TETU ranking.

(7) BR Correspondence

**3 Analysis**

3.1 AA form The AA form falls into the alliterative and rhyming type of *lian mian ci*. Following Yeh

(2011), it is assumed that the AA form is derived through reduplication. Examples are given in (8). However, the constraints used in this analysis differ from those in Yeh (2011), because the present analysis simply treats the AA and AB forms as different degrees of phonological identity between the base and the affix. In the AA form, the reduplicant is required to repeat the phonological composition of the base, so the constraint FAITHBR must dominate *REPEAT, proposed by Yip (1995, 1998) The result is total reduplication. The definition *REPEAT is shown in (9), and the constraint ranking in (10).

- (8) AA forms
xi xi [ɕi.ɕi] ‘giggling sound’
ku ku [ku.ku] ‘dove’s sound’
di di [ti.ti] ‘the sound of water dripping’
- (9) *REPEAT (Yip 1995, 1998)
 Assign one violation mark for every pair of adjacent syllables that repeat each other.
- (10) Constraint ranking for the AA form
 FAITHBR >> *REPEAT

3.2 AB form As mentioned in 2.1, the AB forms of interest to this paper fall into two categories of *lian mian ci*: (i) alliterative but not rhyming (e.g. *di da* [ti.ta] ‘the sound of water dripping/clock ticking’), (ii) rhyming but not alliterative (e.g. *hong long* [hoŋ.loŋ] ‘rumbling sound’). In the AB form, it is obvious that the RED may not repeat the base, so the constraint *REPEAT dominates FAITHBR. It is also observed that although the affix may not repeat the base, there is always some phonological identity kept between the RED and the base. In type (i) the onset of each syllable must be identical. In type (ii), the rhyme of each syllable must be identical. Therefore, two constraints are needed to describe the different aspects of phonological identity, as in (11). In the following, analysis of the RED that rhymes with the base is given first, followed by that of the RED alliterating with the base.

- (11) Output identity constraints
 ALLITERATE (Yip 1999)
 Output must contain at least one pair of adjacent syllables with identical onsets.
 RHYME (Yip 1999)
 Output must contain at least one pair of adjacent syllables with identical rhymes.

The rhyming AB forms have the consonant [l] as the onset of the second syllable. Some examples are given in (12). The first syllable is assumed to be the base and the second syllable, the RED.

- (12) Input: /Base+RED/
ku lu [ku.lu] ‘the sound of drinking’
ga la [ka.la] ‘loud sounds’
ding ling [tiŋ.liŋ] ‘the sound of a bell or metal objects clashing’

To explain the existence of the fixed [l], we need to refer to the sonority scale, which is shown in (13). The most sonorous segments are ranked on the left, and the least on the right. It is found that rhyming reduplicants contain the most sonority difference from the base onset. This is expressed through a set of constraints called Onset Sonority Condition, as proposed in (14). The letter O in the constraints denotes obstruent. *O_{Ons1}O_{Ons2} forbids any pair of obstruent-obstruent onsets. *O_{Ons1}N_{Ons2} forbids obstruent-nasal onsets. *O_{Ons1}L_{Ons2} forbids obstruent-lateral onsets. *O_{Ons1}G_{Ons2} forbids obstruent-glide onsets. The set of constraints means that the more contrast in sonority between the first and second onset, the better. However, to keep the glides /w, ʋ, j/ in the Mandarin phonemic inventory from surfacing in the reduplicant, we need the constraints in (15). In this ranking, labial (e.g. /w, ʋ/) and dorsal sounds (e.g. /j/) are more marked than the coronal /l/. Through the ranking in (15), these glides can be ruled out despite that they differ more from the consonantal onset of the first syllable in terms of sonority than the coronal /l/. The constraint ranking in (16) is represented by a cover term ‘MARKEDNESS’ in the rest of the paper. Tableaux illustrations are given in

(17-18).

- (13) Sonority scale
Vowel>>Approximant (liquids & glides)>>Nasal>>Fricative>>Affricate>>Stop
- (14) Onset Sonority Condition (OSC)
*O_{Ons1}O_{Ons2}>>*O_{Ons1}N_{Ons2}>>*O_{Ons1}L_{Ons2}>>*O_{Ons1}G_{Ons2}
- (15) Universal place markedness hierarchy (Alderete et al., 1999)
*PL/LABIAL, *PL/DORSAL>>*PL/CORONAL>>*PL/PHARYNGEAL
- (16) Markedness constraint ranking (MARKEDNESS)
*PL/LABIAL, *PL/DORSAL>>OSC>>*PL/CORONAL>>*PL/PHARYNGEAL

Tableau (17) illustrates how the rhyming reduplicant [-lu] is selected. Candidate (17b), which has the unmarked onset and the unmarked vowel, violates the highest ranked constraint RHYME. Candidate (17c), which has an alliterating reduplicant with the unmarked vowel, violates RHYME as well. Candidate (17d), which has a rhyming reduplicant but a labial glide as the onset, is ruled out by *PL/LABIAL, so the winning candidate is (17a). Tableau (18) shows that the reduplicant with a palatal glide [j] in candidate (18b) is ruled out by *PL/DORSAL, so the constraint *O_{Ons1}L_{Ons2} is not active.

(17) *ku lu* [ku.lu] ‘the sound of drinking’

ku+RED	RHYME	ALLITERATE	*PL/LABIAL	*PL/DORSAL	OSC
→a. ku.lu		*	** u,u	* k	*
b. ku.la	*!	*	* u	* k	*
c. ku.ka	*!		* u	** k,k	*
d. ku.wu		*	***! u,u,w	* k	*

(18) *xi li* [xi.li] ‘patter of rain’

xi+RED	ALLITERATE	*PL/LABIAL	*PL/DORSAL	*O _{Ons1} L _{Ons2}	*O _{Ons1} G _{Ons2}
→a. xi.li	*		* ɕ	*	
b. xi.ji	*		***! ɕ,j		*

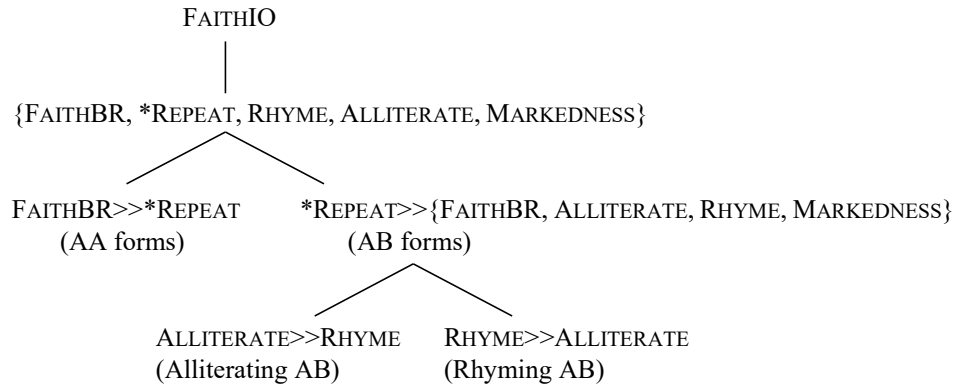
For the alliterating reduplicants, the ranking of ALLITERATE is above RHYME, so all candidates that do not alliterate are eliminated. The vowel of the reduplicant [a] is selected via the universal place markedness ranking in (15) because of its neutral place in the oral cavity compared to other vowels in the Mandarin inventory. In the case of *pi pa* ‘clashing sound’, candidates (19b-d) are ruled out due to violation of ALLITERATE. Candidate (19e) violates *PL/DORSAL, so (19a) wins. The final ranking for the AA and alliterating and rhyming AB forms is given in (20).

(19) *pi pa* [p^{hi}.p^{ha}] ‘clashing sound’

p ^{hi} +RED	ALLITERATE	RHYME	*PL/LABIAL	*PL/DORSAL	OSC
→a. p ^{hi} . p ^{ha}		*	** p ^h , p ^h		*
b. p ^{hi} .la	*!	*	* p ^h		*
c. p ^{hi} .li	*!		*p ^h		*
d. p ^{hi} .ja	*!		* p ^h	* j	*
e. p ^{hi} .p ^{ha}			** p ^h , p ^h	*! a	*

The final ranking contains three cophonologies, representing the co-existing systems that produce the AA, alliterating AB and the rhyming AB onomatopoeic forms. In the cophonology of AA forms, FAITHBR dominates *REPEAT, RHYME, ALLITERATE and MARKEDNESS, so that the reduplicant is identical to the base. In the cophonology of alliterating AB forms, *REPEAT dominates ALLITERATE, which then dominates RHYME and MARKEDNESS, so that the reduplicant is not identical to the base, but still alliterates with it. In the cophonology of rhyming AB forms, *REPEAT dominates RHYME, which dominates ALLITERATE and MARKEDNESS, so that the reduplicant is not identical to the base, but still rhymes with it. Onomatopoeic words following these three patterns are considered to be more well-formed and natural than those that do not. When new onomatopoeic words are added to the lexicon, they are conditioned by any one of these cophonologies. Although there are still words that do not belong to any of the patterns, they are considered less natural and used less frequently in natural speech, and that they are more often seen in written contexts. Examples are given in (21).

(20) Final ranking



(21) Residual onomatopoeia

xi su [ɕi.su] ‘a rustling noise’
keng qiang [k^həŋ.tɕ^hiaŋ] ‘the echoing sound of musical instrument’
ku dong [ku.tɔŋ] ‘a splash/the sound of heavy things falling down’

4 Conclusion

This study gives an optimality theoretic analysis of mandarin disyllabic onomatopoeia, which is produced by co-existing phonological systems. The AA forms are selected by the ranking of FAITHBR over *REPEAT. The AB forms, on the other hand, are selected by the opposite ranking of these two constraints. Furthermore, the alliterating and rhyming AB patterns are derived from reverse rankings of ALLITERATE

and RHYME. The constraints ALLITERATE and RHYME also reflect the catchiness of the onomatopoeic words. The fixed segments (i.e. [l] and [a]) of the partially reduplicated AB forms are attributed to place markedness constraints and Onset Sonority Condition. The opposing rankings of constraints are the co-existing systems in the grammar. They are represented under Cophonology Theory. The residual onomatopoeic words are considered less natural and more often observed in written contexts.

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A Factorial Typology of Codas in the Prosodic Hierarchy

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1 Introduction

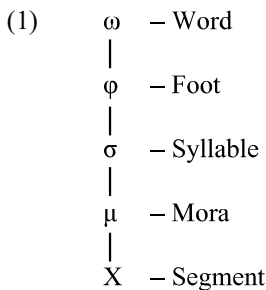
Across languages, closed syllables have three basic behavioral patterns. In some languages, codas make syllables heavy and attract stress. These types of codas, known as moraic codas, also contribute to satisfying word minima, allowing word shapes like (C)VC. Nonmoraic codas are exactly the opposite; they have no bearing on syllable weight or stress assignment and do not satisfy word minima. Less common than moraic and nonmoraic codas are final extrasyllabic consonants, which can violate the Sonority Sequencing Principle (SSP, Selkirk 1984).

While a great deal of effort has been put into constructing diagrams of the structure of moraic codas, nonmoraic codas, and extrasyllabicity, there is very little work dedicated to deriving these types of final consonants theoretically. With limited exceptions, the structure of closed syllables is the visual representation of an observation that moraic codas, nonmoraic codas, and extrasyllabic consonants behave differently from each other. Moreover, the standard convention for diagramming the structure of moraic and nonmoraic codas fails to present a meaningful distinction between each type of coda as moraic codas and nonmoraic codas are both dominated by a mora (Hayes 1989). Using these conventions moraic and nonmoraic codas differ only by how many moras the syllable contains.

I propose that the varied behaviors of final consonants are the result of structural dissimilarities dependent on which level of the prosodic hierarchy directly dominates the coda and ultimately argue against Hayes' (1989) structure of closed syllables in favor of the structure put forth by McCarthy & Prince (1986). Furthermore, using an Optimality Theoretic (OT, Prince & Smolensky 1993/2004) approach, I show that extrasyllabic consonants are generated by the same factorial typology that produces moraic codas and nonmoraic codas. This yields a unified account of the differing behaviors of final consonants, which is principled and predicted in a modern theoretical framework.

2 Literature review

The prosodic hierarchy, first introduced by Selkirk (1978, 1980, 1981) and further developed by Nespor & Vogel (1982), is shown below in (1).

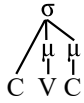


* Thanks to Chris Golston, Zachary Metzler, John Simonian, and the attendees of WECOL 2018 for their insights and comments. All errors are my own.

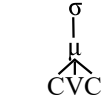
Although there are phrasal levels above words and features below segments, they have been omitted above as they are irrelevant to the discussion at hand. This paper will focus specifically on the portion of the prosodic hierarchy shown in (1).

A number of structures have been proposed for closed syllables, though some are less controversial than others. While the structure of heavy CVC syllables shown in (2) is universally agreed upon, (3) presents conflicting structures that have been posited for light CVC syllables.

(2)



(3)



Hyman (1985)



McCarthy & Prince (1986)

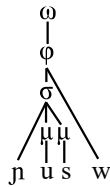


Hayes (1989)

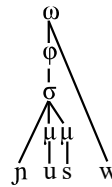
Hayes' structure of light CVC in (3) is considered standard. When compared to heavy CVC in (2), the only difference is the number of moras in the syllable. Contrary to what their names imply, moraic codas and nonmoraic codas are both dominated by a mora in conventional syllable structure. I return to discuss this issue in greater depth in §3.2.

There is a similar debate about the attachment site of final extrasyllabic consonants; it has been argued that extrasyllabic consonants are attached to either the prosodic word or the foot level of the prosodic hierarchy.

(4)



Hagstrom 1997, Green 2003, Kiparsky 2003

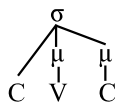
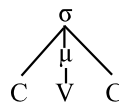
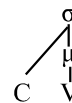


Rubach & Booij 1990

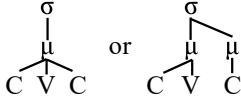


The structures I will argue for in this paper are McCarthy & Prince's (1986) model of light closed syllables and Rubach & Booij's (1990) model of final extrasyllabicity.

Rosenthal & van der Hulst (1999) propose an OT account for deriving moraic and nonmoraic codas, but this analysis is problematic as it contains internal inconsistencies that predict widely rejected syllable structures. Rosenthal & van der Hulst utilize ad-hoc constraints **μ/CONS* (no moraic coda consonants) and **APPEND* (no nonmoraic syllable appendix) and claim that **APPEND* » **μ/CONS* results in the structure in (5a), **μ/CONS* » **APPEND* yields (5b), and **APPEND*, **μ/CONS* produces (5c).

(5)

a. **APPEND* » **μ/CONS*b. **μ/CONS* » **APPEND*c. **APPEND*, **μ/CONS*

These outputs are selected because onsets were not considered to violate **APPEND*, even though onsets are syllable appendices which are not dominated by a mora. If **APPEND* is applied consistently, this factorial typology predicts the structures shown in (6a)-(6c).

- (6) a. *APPEND » *μ/CONS
- 
- or
- b. *μ/CONS » *APPEND
- 
- c. *APPEND, *μ/CONS¹
- 

This immediately reveals a number of issues with Rosenthal & van der Hulst's analysis. One is that it does not serve the intended purpose of the proposal. It fails to identify a constraint ranking that can only produce bimoraic CVC. (6a) shows that *APPEND » *μ/CONS yields ambiguous results; both of these structures fully satisfy *APPEND and only violate *μ/CONS once. With the same number of violations for each constraint, both structures are considered legal syllable structures. Second, each of the optimal candidates predicted by their factorial typology require that onsets form a constituent with nuclei, a notion which has largely been abandoned by the field. The most troubling example of this is (6b): a structure for light CVC which is absent from the literature, and one for which there is little, if any, evidence. The purpose of this paper is to fill these gaps in the literature.

3 Codas and extrasyllabicity

In this section, I discuss moraic codas, nonmoraic codas, and extrasyllabic consonants and propose that a final consonant's behavior is determined by its relationship to superordinate structures in the prosodic hierarchy. I argue that moraic codas are directly dominated by moras, nonmoraic codas by syllables, and extrasyllabic consonants by prosodic words. Under this analysis the differences in behavior are motivated by structural dissimilarities. I propose an approach that utilizes a set of four constraints, defined below in (7a)-(7d).

- (7) a. WEIGHT BY POSITION (WBP) – Codas must be dominated by a mora (Hayes 1989)
 b. SONORITY SEQUENCING PRINCIPLE (SSP) – Onsets must have a rising sonority contour and codas must have a falling sonority contour (Selkirk 1984)
 c. WEAKEDGE – the right periphery of PCat should be empty; assign a violation for every level of structure that dominates the rightmost segment (Spaelti 2002)
 d. MAX – no deletion (Prince & Smolensky 1993/2004)

A factorial typology of these constraints manipulates the structure of syllables and places restrictions on their contents. The upcoming subsections address the structure of each type of final consonant and the constraint ranking that produces it.

3.1 Moraic codas As mentioned before, key attributes of moraic codas are that they contribute to word minimality and attract stress in quantity-sensitive languages. In languages such as Maithili, (C)VC syllables are heavy because the coda is a viable host for its own mora (Jha 1958). Such syllables are bimoraic, which makes them acceptable prosodic words as well. The structure of closed syllables in languages that exhibit these properties is not controversial, but it is important to be able to derive such a structure theoretically. As the defining property of moraic codas is their contribution to syllable weight, there is a strong implication that moraic codas have a direct relationship to the mora level of the prosodic hierarchy. Such a relationship can be produced by high-ranking WBP.

¹ I follow Rosenthal & van der Hulst in considering deletion a viable option only when *APPEND ties *μ/CONS, although MAX should be included in the factorial typology proper as deleting codas would satisfy *μ/CONS in any constraint ranking. The only way to prevent deletion in (5a) and (6a) is if MAX » *μ/CONS while MAX » *APPEND would prevent deletion in (5b) and (6b).

(8) Structure of heavy CVC

	jusw	WBP	SSP	WEAKEDGE	MAX
a.				****	*
b.		*!		***	*
c.		*!	*	*	
d.			*!	**	
e.			*!	*	
f.			*!	****	

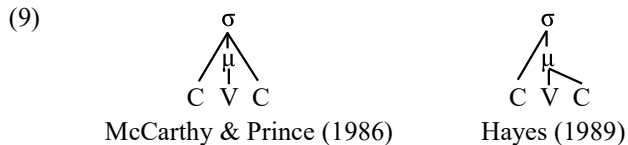
The primary constraints in effect here are WBP and SSP. Candidates (b) and (c) are eliminated for violation of WBP as the coda /s/ is attached to the syllable rather than the mora. In (d) and (e), /w/ does not violate WBP because they are dominated by levels of the prosodic hierarchy above the syllable, and therefore cannot be part of the coda. (d)-(f) violate SSP due to the increase in sonority from /s/ to /w/. Despite (a)'s violations of low-ranked WEAKEDGE and MAX, it is the optimal candidate since the other competitors are all eliminated by WBP and SSP.

Note that in (8) syllable structures such as those predicted by Rosenthal & van der Hulst (1999) where onsets and nuclei are dominated by the same mora were not considered in the tableau. This is because none of the constraints regulate the behavior or structure of onsets. While a syllable in which an onset is dominated by a mora may incur the same number of violations as candidates (a)-(f), the notion that syllables are separated into an onset and a rhyme is widely (if not universally) accepted. Structures such as those presented in (6) are not supported by modern theories of syllable structure, whereas (a)-(f) are, and

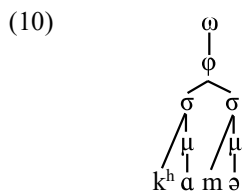
therefore they are omitted from (8) and future tableaux.

While this result does not present a groundbreaking revelation about the theory of syllable structure, it is nonetheless important because it provides a much needed theoretical account of the structure of moraic codas.

3.2 Nonmoraic codas In contrast to moraic codas, nonmoraic codas play no role in a syllable's weight. Unlike the structure of closed syllables with moraic codas, the structure of light closed syllables is a topic of debate. The most commonly used light CVC structures are those proposed by McCarthy & Prince (1986) and Hayes (1989), shown again in (9) for convenience.



There are two key reasons for which I argue that the structure of light CVC proposed by Hayes (1989) is problematic: the first based is on consistency with principles in phonology and other fields both in and outside linguistics; the second is based on the predictions of the theoretical machinery I propose in this paper. To address the issue of consistency, let us consider the prosodic structure of a word like 'comma.'



Based on the structure and relationships presented in (10), it is reasonably interpreted and understood that the prosodic word consists of a foot, the foot consists of two syllables, and (momentarily ignoring moras) each syllable consists of two segments. We further implicitly acknowledge that each of the syllables contributes equally to the makeup of the foot and each segment equally contributes to the content of its respective syllable. By the same token, Hayes' structure in (9) implies that in a light closed syllable, the nucleus and coda play an equal role in the syllable's moraic weight. However, because (C)V and (C)VC in languages with nonmoraic codas are both considered monomoraic, it is clear that the nucleus is solely responsible for the moraic content of light syllables. This problem is not present in the structure proposed by McCarthy & Prince (1986) as nonmoraic codas have no relationship with moras.

Furthermore, there is a well-established principle in a number of physical sciences that a system or organism functions in a particular way as a result of its structure. This concept applies to branches of linguistics as well, such as the syntax-semantics interface. The subject of predicates such as 'love' are assigned a thematic role of either agent or experiencer depending on the argument structure of the verb. This in turn determines how a proposition is interpreted semantically. It is no way unreasonable to think that this notion may translate to phonology as well, especially given the resemblance between the hierarchical structure of syntax and that of the prosodic hierarchy; by analogy, the source of different behaviors such as those exhibited by moraic and nonmoraic codas can be attributed to a structural dissimilarity. The structural uniformity of Hayes' (1989) light and heavy CVC syllables counterintuitively produces two distinct patterns, whereas the differing structures for light and heavy CVC syllables proposed by McCarthy & Prince (1986) provide a principled explanation for the contrasts observed between moraic codas and nonmoraic codas.

The second reason for which I argue against light CVC syllables as proposed by Hayes is that they fall short in their ability to satisfy the set of constraints laid out in this paper. Nonmoraic codas observe the SSP much like moraic codas, but they are dominated by fewer levels of structure. To that end, I posit the constraint ranking in (11).

(11) Structure of light CVC

	jusw	SSP	WEAKEDGE	WBP	MAX
a.			****!		*
b.			***	*	*
c.			****!		*
d.		*!	*	*	
e.		*!	**		
f.		*!	*		

The constraint ranking in (11) differs from (8) in that it requires minimal structure at the right edge as long it does not result in a violation of SSP. As before, the faithful candidates (d)-(f) violate SSP. The final consonant in (a) and (c) is dominated by four levels of structure, yielding four violations of WEAKEDGE. The coda in (b) is attached to the syllable rather than the mora, receiving one fewer violation of WEAKEDGE. (b) is therefore selected as the optimal candidate.

This constraint ranking produces the desired structural contrast between moraic codas and nonmoraic codas which I have argued for above. This analysis provides an OT account to motivate and support the structure of light CVC proposed by McCarthy & Prince (1986).

3.3 Extrasyllabicity Final extrasyllabicity is typically considered an issue unrelated to moraic and nonmoraic codas, though I argue here that it is simply another type of final consonant whose behavior is determined by its structure. As such, I see no reason why it cannot be included in a unified account of final consonant behaviors with moraic codas and nonmoraic codas. Like the structure of nonmoraic codas, there

is debate about the attachment site of extrasyllabic consonants, the primary candidates being the foot (Hagstrom 1997, Green 2003, Kiparsky 2003) and the prosodic word (Rubach & Booij 1990). The most salient property of extrasyllabic consonants is their ability to violate the SSP (though see §4 for further discussion of other types of evidence for extrasyllabicity). I propose that this violation of SSP occurs to satisfy WEAKEDGE.

(12) Structure of final extrasyllabicity

	πusw	WEAKEDGE	MAX	SSP	WBP
a.		**!***	*		
b.		**!*	*		*
c.		*		*	*!
d.		**!			
e.		*			
f.		**!***			

High-ranked WEAKEDGE requires all outputs to have minimal structure at the right edge of the word while high-ranked MAX ensures that final consonant clusters are not simplified in order to satisfy SSP. These two constraints eliminate (a), (b), (d), and (f). Foot-level attachment of extrasyllabic material as proposed by Hagstrom (1997), Green (2003), and Kiparsky (2003) fails here for a needless violation of WEAKEDGE. The remaining competitors (c) and (e) differ by whether the coda is dominated by a mora. (c) is eliminated for violating of WBP as the coda /s/ is attached to the syllable. (e), where extrasyllabic consonants are dominated by the prosodic word and codas are dominated by a mora, is chosen as the optimal output.

Using this approach, extrasyllabic consonants attached to the foot and word-level attachment with nonmoraic codas are harmonically bounded. These predictions uphold Rubach & Booij's (1990) model of extrasyllabicity and overall support the idea that the varying behaviors of final consonants can be attributed to structural differences. The factorial typology for moraic codas, nonmoraic codas, and final extrasyllabicity is summarized in (13).

(13) Factorial typology

Final Consonant Type	Ranking	Language
Moraic Codas	WBP » SSP » WEAKEDGE, MAX	Maitihili
Nonmoraic Codas	SSP » WEAKEDGE » WBP, MAX	Malayalam
Extrasyllabic	WEAKEDGE, MAX » SSP, WBP	Russian

As WEAKEDGE interacts with other constraints, it produces three possible attachment sites for final consonants, thus accounting for the three distinct behavioral patterns of final consonants.

4 Typological predictions

The results of this factorial typology have implications for the behavior of codas in languages with final extrasyllabicity. Recall from (12) that candidate (c) is harmonically bounded by (e). The difference between these outputs is whether the coda /s/ is moraic, as in (e), or nonmoraic, as in (c). The selection of (e) over (c) predicts that codas are moraic in languages with final extrasyllabic consonants. However, testing the validity of this prediction has proved challenging. One source of the problem is that there is disagreement about what constitutes evidence for extrasyllabicity. Scheer (2004:417) presents a presumably nonexhaustive list of conditions that are used as arguments for extrasyllabicity:

- (14) Situations that give rise to extrasyllabic interpretations
- internal Codas react, but final Codas do not
example: l-vocalisation in French
 - vowels in internal closed syllables react, but they show no effect in final closed syllables
example: Icelandic Closed Syllable Shortening
 - word-initial #RT sequences
example: Czech *řty* 'lips', *lhát* 'to lie' etc.
 - heavy word-final clusters
example: English *sixths* [siksθs], German *Herbst* [heχpst] 'autumn'
 - [s]-called "trapped" consonants (chapter 1,10 §240)
example: the [r] in Polish *trwać* "to last", the [n] in Polish *czosnku* 'garlic GEN.sg'

Three of the five phenomena laid out by Scheer are violations of SSP (c-e). The other two (a and b) are observations that phonological changes occur in word-medial codas but not word-final codas. A possible rebuttal to Scheer's claim could be that the prosodic edges of syllables and words are fundamentally different; as a result the right edge of the word domain could yield different effects than the right edge of the syllable domain, even when these edges coincide, thus accounting for differences between word-medial and word-final codas. As violation of SSP is the most consistently accepted evidence for extrasyllabicity, I will focus only on these cases. Final extrasyllabicity can be found in English, German, Polish, and Russian.

- (15)
- | | | |
|--------------------------|----------|-----------|
| English: <i>strength</i> | [stɛŋkθ] | |
| German: <i>Herbst</i> | [heχpst] | 'autumn' |
| Polish: <i>zmarł</i> | [zmarw] | 'he died' |
| Russian: <i>tembr</i> | [tɛmbr] | 'timber' |

There is clear evidence that codas are moraic in English and German as minimal words can take the shape of CVC in both languages and closed syllables attract stress in German (Alber 1997). Determining the

effect that codas have on syllable weight in Polish and Russian is more difficult; stress is lexical in Russian (Gouskova 2010) and Polish stress is assigned on the penultimate nucleus irrespective of syllable weight (Gussmann 2007). The issue is further complicated because minimal words are monomoraic:

- (16) Polish: *gra* [gra] ‘game’
 Russian: *sto* [sto] ‘one hundred’

The conventional methods of evaluating what effect codas have on syllable weight do not indicate whether codas in Polish and Russian are moraic. Because these facts neither support nor refute the predictions made by the factorial typology, further investigation on this topic will be required.

5 Conclusion

I have argued here that the behavior of moraic codas, nonmoraic codas, and final extrasyllabic consonants are the result of dominance relationships in the prosodic hierarchy which are generated by interaction of constraints regulating sonority and structure. The outcomes of the factorial typology I have proposed support the works of McCarthy & Prince (1986) and Rubach & Booij (1990) and predict that codas are moraic in languages with final extrasyllabicity. My proposal provides a unified OT account of final consonant behaviors that is grounded in principles about the relationship between structure and function.

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A Method for Depicting Vowel Sounds in Three Dimensions

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1 Introduction

All physical phenomena can be observed and measured. As an example, sound travels at an average velocity of 343 meters per second in air and this has been observed, measured, and calculated. As a physical force, sound has the properties of frequency, time, and energy.

This project performed precise physical measurements of sound to project the results into three dimensional planes for vowels, thus allowing the corresponding depiction to be plotted. The three dimensional representation affords the examiner a better and more informed visualization of sound information superior to that of the traditional two-dimensional plots. New methods for examining vowel sounds have created a better understanding of sound properties. A sound experiment was designed to observe and measure specific vowel sounds, and to determine the frequency of its formants, energy, and time, and finally, calculate three-dimensional depictions..

2 Literature and concept review

Phoneticians know when a person speaks, air and sound is forced through the glottis between the vocal folds and the larynx to the three main cavities of the vocal tract, the pharynx, the oral and the nasal cavities. The vocal cords vibrate at a fundamental frequency (F0) from 80 to 400 Hertz (Bäckström, 2015) and cause a sound from which vowels and semi-voiced consonants are produced. The fundamental frequency is defined as pitch. Voiced sounds consist of the fundamental frequency F0 and its formant frequency harmonic components produced by the vocal folds. Vowels are classed by the manner and place of articulation and the open or close shape of the mouth. When consonants are produced, the vocal folds are completely open. Vowels are periodic and consist of repeating sound waves that are generated by the vocal folds. Consonants may have an aperiodic quality and can be voiced or voiceless. The conventional understanding is that unvoiced sounds do not contain a fundamental F0 and that the sound signal contains only white noise. Speech perception plays a role in shaping phonology and researchers have proposed perceptual explanations for phonological patterns (Liljencrants & Lindblom, 1972, Lindblom, 1986, Ohala 1993).

The spectrogram is a time-frequency presentation of a signal. Spectrogram shows differences between vowels and consonants. Vowels have more energy focused at lower frequencies. Unvoiced consonants have considerably less energy and are focused at higher frequencies.

The act of speaking produces intensity regions which can be seen in a spectrogram of the sound as dark bands of concentration. The physical attribute of this intensity is perceived psychophysically as loudness. The auditory mechanism is thought to be sensitive to consistent concentrations of frequencies at particular bands, known as formants (F1, F2, F3, etc.) (Johnson, 2012; Ladefoged and Maddieson, 1990; Lindblom, Diehl and Creeger, 2009). The use of the spectrogram for phonetic research has been established by Ladefoged (2005) and Ladefoged and Maddieson (1996).

To illustrate, as a vowel is analyzed by a computer program, a listing of F1 and F2 values is computed. These vowel values are often plotted on an inverse scale F1 - inverse scale F2 plot. For the various languages, F1 has a formant range of 300 to 1000 Hz and F2 has a formant range of 800 to 2500 Hz.

Nasals involve a vocal tract constriction as seen in this example of the word 'gone', spoken by one of the authors. Information is contained in the formant transitions between the vowel and the nasal /n/, as seen in Figure 1. The spectrum shows which consonant is being said. The formants can be seen to converge from the voiced /g/ and combine to produce the vowel, which are then separated at the end of the word. An analysis

of the spectrogram of the transitions show that F2 may rise or fall depending on environment (Ladefoged, 2003).

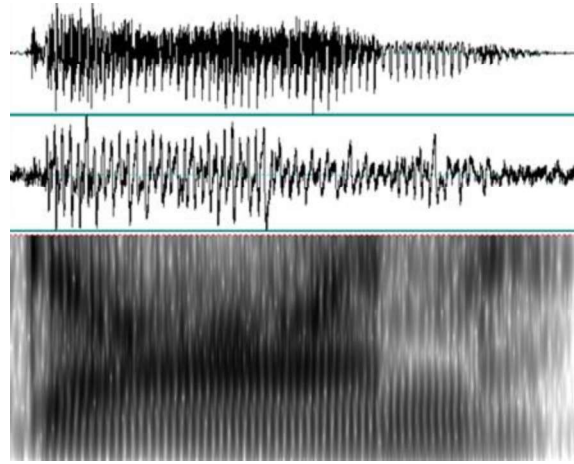


Figure (1). Waveform (top) and spectrogram (bottom) of the English word ‘gone’, as displayed in *PRAAT*. Notice that the waveform on the top shows two waveforms. The double waveforms is accounted for in section 9, Findings.

3 Procedure

An 8-inch diameter metal refracting sound tube was constructed and enclosed with heavy dampening material to remove possible vibrational interference. The general design of this experimental apparatus was applied from various engineering sources (Deller, Proakis and Hansen, 1993; Furui, 1989; Gold and Morgan, 2000; Naify, Guild, Rohde, Calvo and Orris, 2015; Pain, 1993; Parker, 1988; Quatieri, 2002; Sek, 2018; Styler, 2012; Wood, 2005). Naify, Guild, Rohde and Calvo (2015) also provide insights into the designs of a sonic system.

The interior surface was smooth with an 8-inch, 8-ohm high quality speaker sealed to one end of the tube for transmission of sound. It contained an internal collimator section to induce a parallel sound signal which propagated through the length of the tube. A refractive cone at the other end from the speaker enclosed the tube. A narrow window, with an impermeable membrane, was imbedded in the cone to dispersed sound through air in predictable directions in accordance with Snell’s Law; thus, the sounds of various frequencies would be refracted in a prismatic manner by the sonic components. These components were posited to be formants as recorded by a microphone.

In order for the refractometer to function, it is necessary to change the density of the air in the tube. This was accomplished by hermetically sealing the apparatus, and replacing the air with Tetrafluoroethane; a gas which is about four times denser than air. As the sound signal passes through the Tetrafluoroethane it increases in velocity. The accelerated signal passes through the membrane on the cone which slows the sound as it is refracted into a sound ‘spectrum’. The spectrum would represent all the formants.



Figure (2). (above, previous page). Sonic refractometers, devices for determining the location and strength of sound formants. The configuration on the left uses a Helmholtz resonator, a Wurlitzer speaker configuration with a five-octave range, and a prism angle of 45 degrees. The configuration on the right uses a prism angle of 0.7 times width. This was the configuration utilized by this study.

This study employed a series of experiments that were designed to observe and measure the formants of sounds in space, specifically the locations in three dimensional space. Sound is a transference of energy through air. It was hypothesized that regions of sound frequency and energy measured would concurrently define formant locations and boundaries at distances from the refracting prism. This information would be used to verify that dark bands in the spectrum speculated as formants.

Several minutes of 0, 100, 110, 220, and 440 Hz signals were recorded individually on a HP computer and examined to assure the integrity of the sound signals (i.e., that they did not contain extraneous noise). The 440 tone was selected for the primary analysis, but any tone could have been used. In theory, this 440 tone, a pure sinusoidal sound signal, travels through the membrane to be refracted and the spatial location and angle of refraction should be locatable and measurable at a predictable area with a Røde NT-USB microphone (pressure gradient, cardioid, 20 Hz – 20k Hz). The apparatus was also checked with sound signals of mixed tones for subsequent locations. It was expected that no variance in the pitch (fundamental frequency, the F0) would be observed and that singular frequency sine waves would not have a second formant.

The second objective of this investigation was to measure the frequency of formants and develop descriptive equations to use in evaluation of vowel properties. Formants have been described and computed using various computer algorithms, and this set of experiments was designed to improve or verify the calculation methods. Current methods of sound analysis uses binning or bandwidth assumptions that may be accurate, but also are often based on perceptual information and not measured data. Advances in technology, especially speech and face recognition, artificial speech production, and the analysis of error, must be used to inform understandings of speech analysis methods, and thereby improve the analytical capabilities of this field. Advances in computer architecture and integrated circuit technology have created an environment that has limitless opportunities for innovation in digital speech communication applications (Rabiner and Schafer, 2007:1).

4 Experimental results

The test signal, a pure sine wave 440 Hertz tone, was used to test and calibrate the experimental apparatus. A pure sine wave is defined by a precise equation which plots as a single line (Sek, 2007). A pure sound signal has the advantages of predictability in terms of eigenvalues, performance, energy, loudness, frequency, equational depiction, and time. For a perfectly sinusoidal sound wave, the intensity (energy per square meter) is proportional to the amplitude squared (P^2). The pure sine wave lacks confounding variables that might come from speech or interference. The process of manually computing formant values is greatly simplified for such a harmonic oscillations. Spectral analysis methods are accurate for smooth functions such as sine waves.

The sound signal was recorded at various distances orthogonal to the surface of the tympanic membrane producing 24 sets of empirical data. The data was evaluated using the *PRAAT* (Boersma and Weenink, 2019)

computer program. The first step of any laboratory procedure is to calibrate the experimental apparatus using a pure sound source of 440 Hz with known properties. The precise 440 Hz sound wave allowed us to manually calculate the F0 for the signal. It should have been impossible to find a second formant as created by harmonics of the F0, or a second formant produced by the concentration of energy and harmonics of the F0.

The results of the calibration tests did not match to the calculated values, and the computer program, PRAAT, could not be adjusted to produce single, smooth, invariant pitch F0 values for a single, invariant 440 Hz sound. Further, the computer program produced second, third, and fourth formant values that should not exist. The purpose of using a sinusoidal 440 Hz signal was to remove the variables that would come with a speech sounds that are not sinusoidal. The results of these experimental tests are shown in third figure.

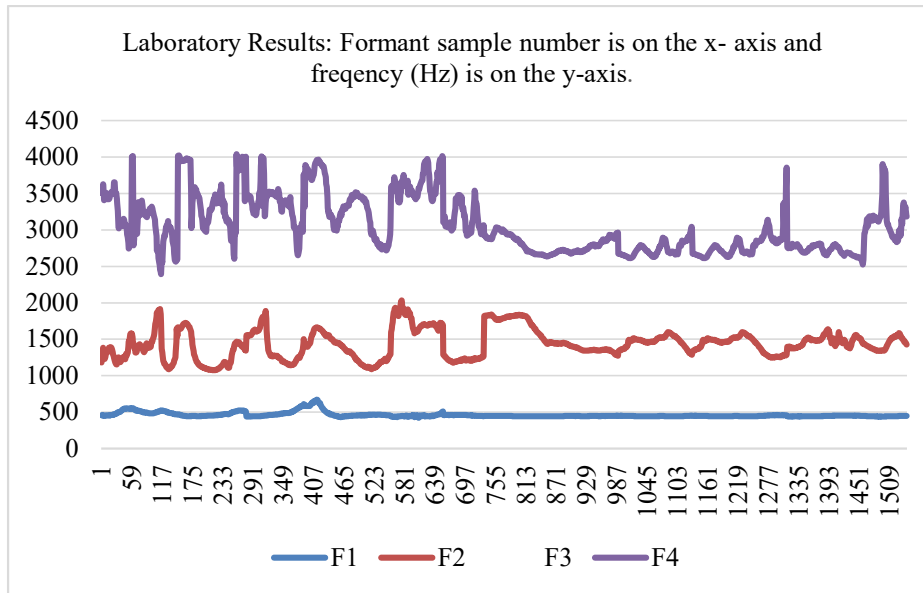


Figure (3). This data was taken from the formant listings of PRAAT. This is a compilation of all the individual tests. While time is not shown, it may be correlated with the sample number (x-axis) using the frequency sampling rate. The average values for the formants: F1 at 460 Hz, F2 at 1438 Hz, F3 at 2206 Hz, and F4 at 3059 Hz.

5 Analysis of data problem

The F1 and F2 values were plotted on a log-log two-dimensional space to determine if the data could be described and analyzed using linear algebraic techniques. The simplicity of the single 440 Hz signal allowed an investigation of the underlying relationships. A mathematical relationship was not determined.

Additional tests using vowel sounds failed to produce results that could be mathematically defined, and hence reverse-computed to the original values. It was found that the data indicated that the sounds were not linear or base 10 as is most commonly used in linear functions, but that the data system was somewhere between base 2 and 3. This discovery led us to examine the possibility that the numbers exist in the natural log space. This is validated by the fact that the Fast Fourier Transform, used to analyze sound signals, is also in the natural log space. The main analysis tool of the computer program is the Fast Fourier Transform, which performs best with single pitch sound, such as the 440 Hz and other signals that were used.

The Fast Fourier Transform (FFT) was examined to determine if the algorithm was introducing variance or error into the results of the experiments. A FFT computes the discrete Fourier Transform (DFT) of a sound signal. More, the FFT should function best with a pure sinusoidal signal, and perform less than optimally with complicated speech sounds. The FFT converts the sound signal from a time domain to a representation in the frequency domain. There are several variations of the FFT equation, but this equation was used in the analysis:

$$X_k = \sum_{n=0}^{N-1} x_n e^{-i2\pi kn/N} .$$

The factor, e , in the equation is the reason for the base 2 to base 3 data representation.

Additionally the FFT, when converting the sound signal into the frequency domain introduced values in the complex dimension which were observed in our own program. A sound signal can be represented as a rotating propagating signal that has three dimensions in the x, y, and z axes. Therefore the frequency is actually a two-dimensional depiction of a three dimensional phenomena. The FFT converts the signal to the frequency domain and, consequently, time is removed from the depiction. The time is installed on the graphical plot by binning the FFT values and showing these bins as time increments on the x-axis. Some of the anomalies that were observed in the 440 Hz test could be due to this binning. Also, it appears that the numerical values from the complex (z) domain are not being used and that negative values may be converted to positive values, further modifying the data.

Additional evaluations into the nature of the data analysis were done. It was necessary to explain why changes in formant settings result in changing the formant frequency values. Formants should be computed and should be constant. Second, the experimentally determined formants do not necessarily plot in a harmonic fashion as seen in the 440 Hz test. Third, sine waves should plot nearly perfectly and do not. Fourth, it was found that silence (0 Hz) also contains four formants: how is this possible? Fifth, the data manipulation removes the complex components, and the negative values and which leaves this data unaccounted for and possibly allows for the introduction of error or overlooking of potential phenomena.

6 Review of technology

Several sound analysis programs were reviewed for their applicability to the research needs. The purpose of this review was to locate a program or algorithm that would provide the answers to the research question (determine the frequencies of formants, calculate energy, measure time and calculate three-dimensional depictions) and produce data that could be verified and checked by back-calculating the data to the original readings. The methods of speech analysis and the algorithms employed by these programs were reviewed. Flowcharts of the algorithms were made in order determine the mathematical functions and the logic and technology that was employed in these programs.

A Graphical User Interface (GUI) uses icons, menus, and graphics to display information. A GUI for speech and image processing analysis was created at Rutgers University (Rabiner and Schafer, 2015). This GUI can be obtained from the Matlab Central file exchange. Speech can be represented in time, frequency, spectrogram, cepstrum pitch, formant estimation, and linear prediction domains. Other algorithms are available from Matlab file exchanges such as, 'complex cepstrum_fir_GUI25.m', and 'formant_estimation_GUI25.m' which estimates formants from LPC roots, and the graphical output shows these values. Matlab also has an open source program, 'time_domain_features_GUI25.m' which measures the linear/log energy, magnitude and time features. Deng, et al. (2005) produced a Matlab GUI that computes vocal tract resonances (formants) to create a standard database in order to evaluate various formant extraction techniques.

Khulage and Pathak (2012) created a linear technique which they named *TEO-CB-Auto-Env* for pitch, formant frequencies, and duration analysis that employed Matlab programming. This program includes a programmed Mel-Frequency Cepstral Coefficient process, which positions frequency bands logarithmically on the Mel scale to match the auditory response of listeners. Welling and Ney (1998) discuss a method for formant estimation based on decomposing the power spectrum into segments. Their application is oriented toward speech recognition. Zahorian and Hu (2008) designed the *YAAPT* program, which operates in MATLAB, at the Speech Communication Laboratory at SUNY. *YAAPT* evaluates input parameters and matches routines to the data. Sathe-Pathak and Panat (2012) report a speech analysis algorithm in Matlab that windows the data, converts the data to frequency using FFT, takes absolute values of the data, and then the logarithm of the signal. *STRAIGHT* (Seo 2004, 2005) is a speech analysis program produced at Wakayama University. *STRAIGHT* selects multiple F0 candidates based on a source filter model and decomposes sounds into source and resonator (or filter) information. Many of these programs and procedures give a margin of error, which is essential in expressing the confidence that the analysis is correct and could indicate if problems were present in the data.

Evaluations of technology and their performances have been made as well. Strömbergsson (2016) evaluated *PRAAT*, *STRAIGHT*, *RAPT* and *YIN* against state-of-the-art ground truth reference (reference pitch

contour). *PRAAT* and *YIN* use similar autocorrelation functions. *RAPT* uses cross-correlation and *STRAIGHT* uses a source-filter model. It was concluded that for these programs, F0 calculations are generally less accurate for female speakers as produced by various pitch extraction algorithms. Babacan, et al. (2013) report that *RAPT* outperforms other approaches on clean speech signals in their series of experiments. The Deng et al. (2005) product was used to evaluate the formants values produced by *WaveSurfer* (<http://www.speech.kth.se/wavesurfer>) which uses the same algorithm. It was found that both programs produce formant tracking errors when compared to manually computed data.

WinSnoori (Laprie, 2010) is an interactive program that produces a time and frequency spectrogram, accurate harmonics, fundamental frequency manipulation and speech synthesis. This program does not compute formants, but rather finds them through a filtering process. An analysis showed that this technology was viable for our purposes.

7 Technology and approach in this experiment

After reviewing the 11 programs and procedures mentioned above, it was decided that the best approach would be to duplicate *PRAAT* functions and examine the technology as it is used. Additional programs and functions would then be added to meet the requirements of the research question. This approach would provide the ability to compare methods, to examine the data, and plot the data as it is developed. Available technology and the variety of analysis programs and methods were employed in various combinations to accurately portray the speech signal.

8 Model of speech analysis

A speech analysis model was created from the descriptions of functions and mathematical concepts of the programs described in the previous section 6 and from the descriptions from Boersma (2013). This model was used to organize algorithms and create flowcharts.

MATLAB was selected to implement the speech analysis program. *MATLAB* (2018) fourth-generation program from Mathworks is a mathematics and engineering tool that can perform advanced calculations, matrix calculations, data visualization, and simulations. The sponsored website claims that there are one million users worldwide, there is an abundance of shared files, textbooks, college-level courses, and sponsored websites is evidence. One of its most useful functions of this program is the performing of many different types of data analysis, plotting, and calculating the best-fit slope from a group of data points. The versatility of *MATLAB* can be seen in its ability to convert speech into a set of linear prediction coefficients, using a variety of methods such as the Autocorrelation Method, the Covariance Method, and the Lattice Filter Method, among others. This versatility allows the user to compare the results of various methods, to examine the data, and employ other methods in the process of experimentation.

9 The algorithm

The general computer algorithm begins with a word or vowel sound that is read into the computer as an analog signal. This analog signal is a representation of the electronic response of the microphone to the impulses of the incoming sound. The analog signal is converted to a digital signal. The sampling rate is also encoded into the analog signal to calculate the frequency and signal characteristics by sampling at a suitable rate and then quantizing the data.

The waveform depiction does not represent the sound in the frequency space (Hz). The signal is converted into frequency by using a mathematical modeling equation, the Fast Fourier Transform (FFT), which projects the sound signal into the frequency domain. Rabiner and Schafer (2007: 39) report that a Hamming window and a Fourier transform are optimal for signal processing where the sound signal, is periodic. A window is necessary parse the data into units and the Hamming window is often used to segment the data for the FFT to function and then resolve sound into frequency and time domains. The Fourier representation of speech is fundamental to our thinking about the speech signal (Rabiner and Schafer, 2007: 53). It was also noted that the Fourier process can also create small spurious oscillations, collectively known as the Gibbs' Phenomenon (Boyd, 2001).

When the FFT is applied to the data, the time dimension is lost. To recover time, the data is binned into

a specific number of points which in most cases is 256, or 2 to the 8th power and is the size of a Hamming Window. Since the sampling frequency is constant and known, it is possible to determine the band of time represented by these bins by multiplying the number of points by the sampling frequency (samples per unit time) and applying this progressively along the entire signal. The drawback to the use of the 256-point bins arises because the time of the peak occurrence is only determined over a time frame and not associated with the exact time of incidence.

Using the FFT values, the logarithm of each value is calculated and then used to determine the Linear Predictive Coefficients (LPC) for use with the cepstrum spectra. The Linear Predictive Coding (LPC) method is a predictive calculation of the most likely equation that represents and predicts the behavior of the data. This method strongly assumes well behaved data, but often speech may not have smooth, even waveforms. The prediction coefficients of LPC can be susceptible to quantization errors. The roots of a polynomial are highly sensitive to errors in its equation structure. This equation structure is a function of the order of the predictive equation and all the roots are a function of the equation order. Thus, formant values change with a call for increased formant numbers, as this modification changes the order of the LPC calculation. This variability leads to doubts about the accuracy of formant computations.

The cepstrum function determines the fundamental frequency or pitch of speech. Cepstral analysis is used by first windowing and making a Discrete Fourier Transform (DFT) for the signal, logarithmizing power spectrum and then transforming it back to the time domain using the inverse DFT. Computing the cepstrum can be done using the *MATLAB* Signal Processing Toolbox function *cceps*, and FFT computations.

In this algorithm, pitch frequency (F0) and formants are computed separately. *MATLAB*'s pitch command, `f0 = pitch(audioIn, fs)` delivers values of the fundamental frequency.

This algorithm also computes the margin of error. This technology, how to determine the accuracy and how to compute error, was obtained from Trefethen (2000). The structure of the program also allows various methods and mathematical concepts to be applied as functions in various sequences. It is necessary to create an operating practice, a series of algorithms, and a flowchart to examine the data. Without the basis of a standard practice, it is difficult to truly grasp if the data is valid or if the model could be improved.

10 Findings

The process of data analysis was able to produce waveforms, spectrograms, fundamental frequencies and formants. Comparing the values of time, frequency, and energy provides the ability to verify accuracy. The ability to examine and evaluate data as it developed also helped to design a robust program. The sound is three-dimensional and three-dimensional depictions can be drawn of any sound. These depictions allow for complete representations of sounds and show differences that may not be obvious in spectrograms alone. For this set of evaluations, F0, energy, and time were used for the plots. Plotting the frequency values of second and third formants was reserved for later work.

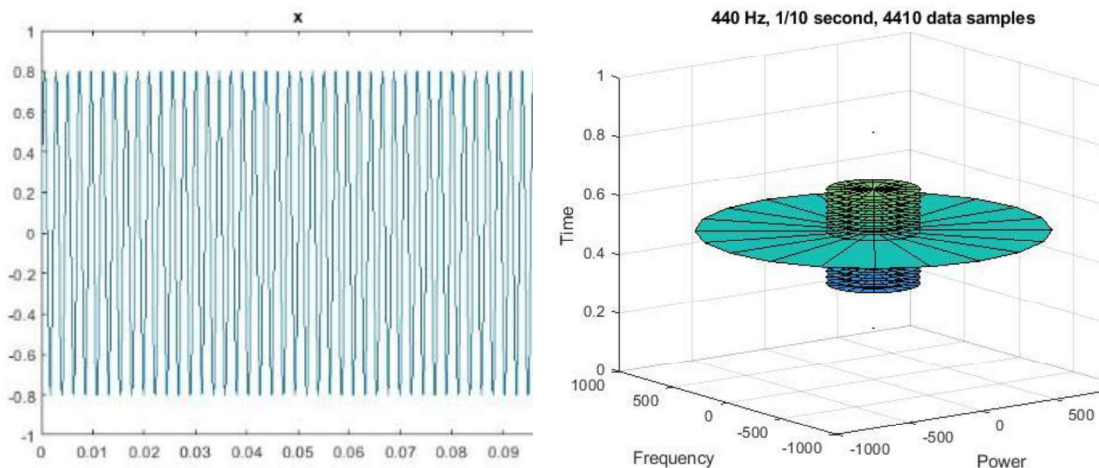


Figure (4). The 440 signal shown on the left as a waveform and on the right as a cylinder plot, one of many 3-dimensional plot-types possible with the data. The y-axis represents sound, and the energy and frequency are shown in the shape of the cylinder. This sound was used to attempt to calibrate the equipment and the computer program.

An improved method of pitch detection was found. It was found that consonants have an effect on vowels and that there are two fundamental frequencies (F0) which combine to form vowels. The presence of a second F0 illustrates how the voice is coordinated. The production of a word begins with the air being forced through the glottis. The glottis begins to vibrate and the two sounds are coordinated to create a vowel. In the case of each word plotted, it was found that the formant progressed through the entire time of the word. This figure shows that consonants have regular F0 values.

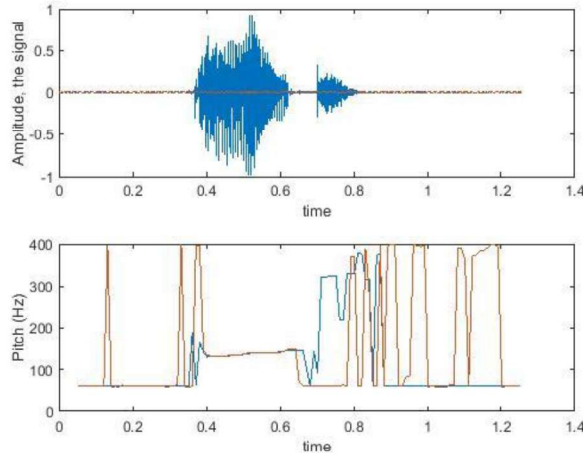


Figure (5). This figure shows the waveform of the English word ‘boat’ spoken by a male speaker on the top half of the diagram. The bottom half shows the F0s of the same word. The first F0, F0₁ is shown in blue and the second F0, F0₂ is shown in orange.

There are two F0s, and it appears that one is produced by the pulmonary system and one produced by the mouth and vocal cords. They are coordinated to produce the vowel sound. The numerical values can be separated as F0₁ and F0₂ as seen below.

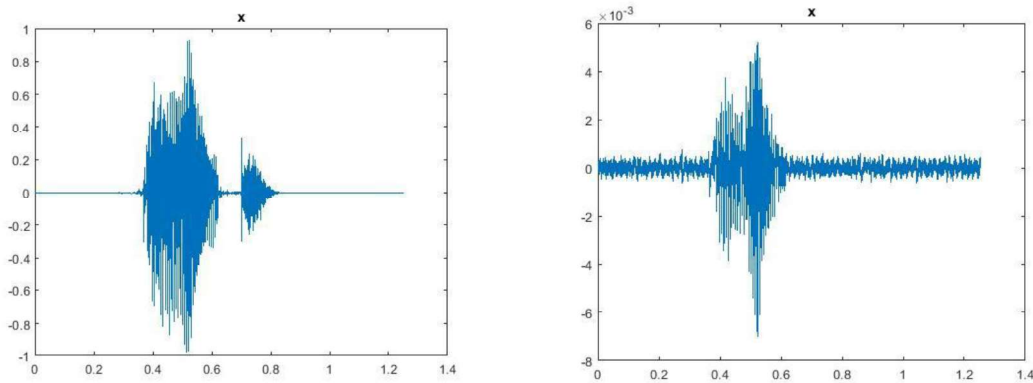


Figure (6). The plot of the values of the two F0s. On the left is the first F0 waveform, and on the right is the second F0 waveform. They are taken from the word ‘boat’.

Further evidence of two F0 values comprising this word can be seen in the plots below.

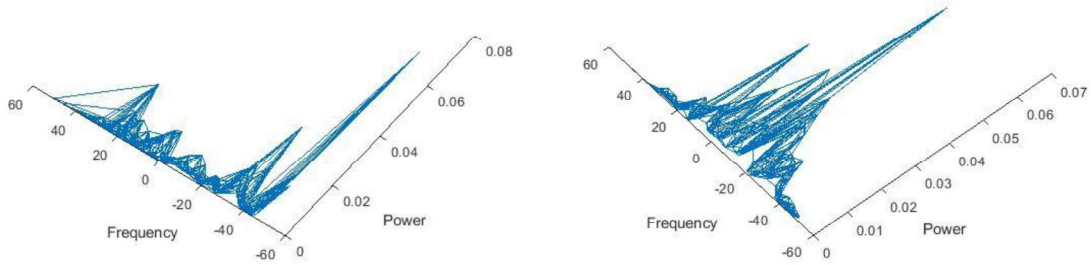
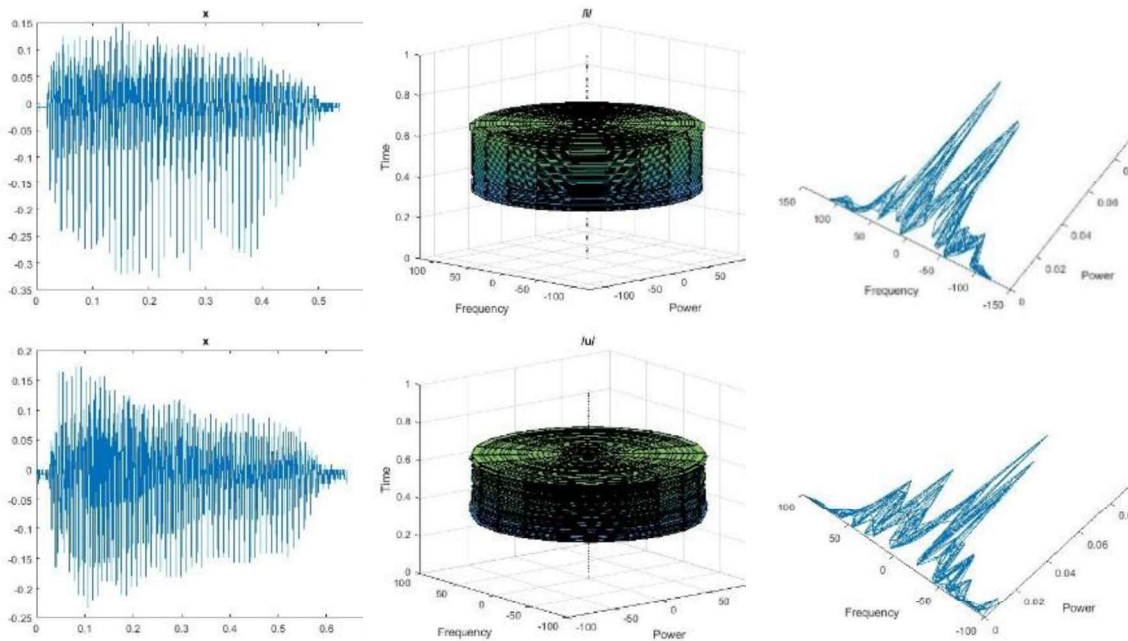


Figure (7). Again, these are representations of the English word ‘boat’. The first F0 value is seen on the left and the second F0 is seen on the right. These are 3-dimensional plots of frequency, energy and time that have been rotated to only show frequency and energy for the same space of time.

It is clear that the formants represent different sounds that are spoken together. A possible clue to what is happening comes from Gold and Morgan (2000:25) who state that speech is a response to the way the vocal tract responds to the excitation signal and the vocal tract acts as a filter. Vowels from German, French, Kanada and Chinese were also examined and the dual quality of the F0 was found. In the examples below, taken from the UCLA Phonetics Lab Data (<http://www.phonetics.ucla.edu/course/chapter1/vowels>). The vowels are the close front /i/, back /u/, and open /a/. The leftmost figure is the waveform of the vowel, the middle is the three-dimensional depiction using a cylinder plotting function, and the right picture in each set represents the frequency-power spectrum of the vowel.



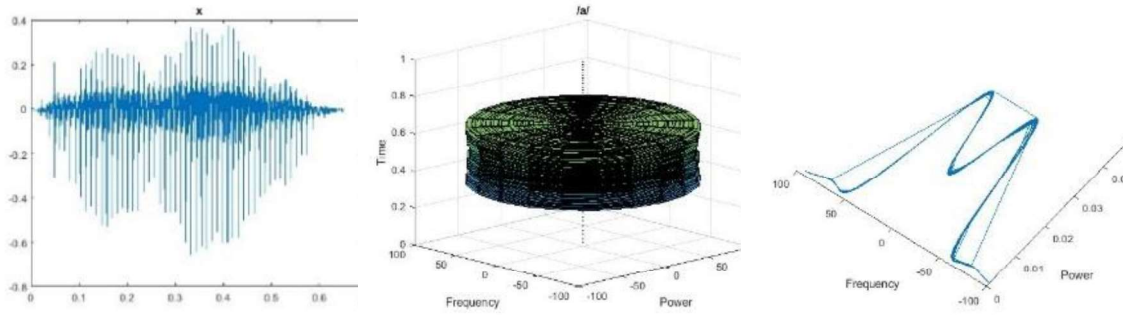


Figure (8). These plots show the waveforms for the vowels, top to bottom: /i/, /u/, and /a/. The left set of plots shows the plots of the incoming signals. In the center, the three-dimensional cylinder plots for the corresponding vowels are shown. On the right are the plots of energy vs. frequency, which show the formant values for the vowels. The center and right plots are, in fact, depictions of spectrum information.

Figure (9) below shows screenshots of *PRAAT* edit pages. The Turkish back unrounded vowel /u/ is seen on the left, and the Vietnamese back unrounded /u/ is seen on the right. These vowel examples were taken from the UCLA Phonetics website (<http://www.phonetics.ucla.edu/course/chapter1/vowels>). The differences between the vowels can be seen, and the formants and the fundamental pitch (F0) demonstrate dissimilar characteristics. The Turkish formants are shifted and the F0 ceases after the phonation of the vowel. The Vietnamese formants commence one-third of the way through the vowel but the F0 continues through the entire utterance.

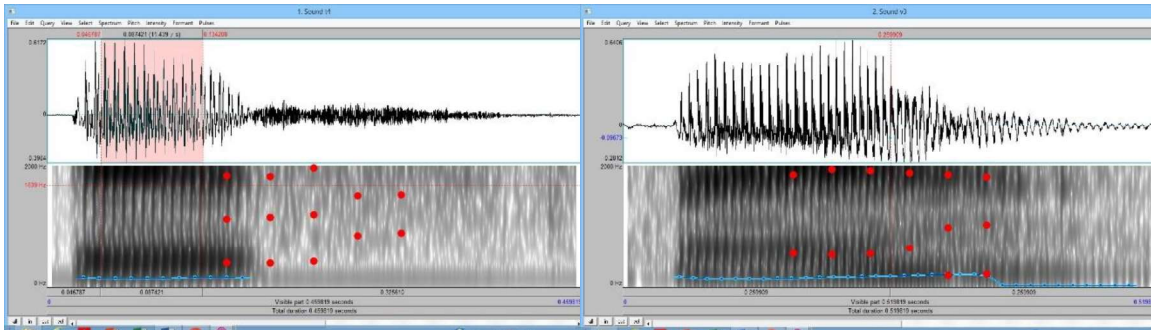
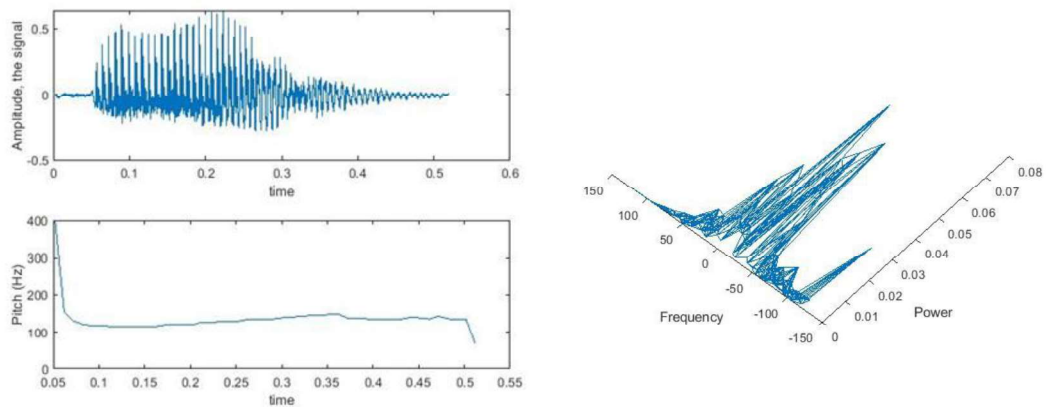
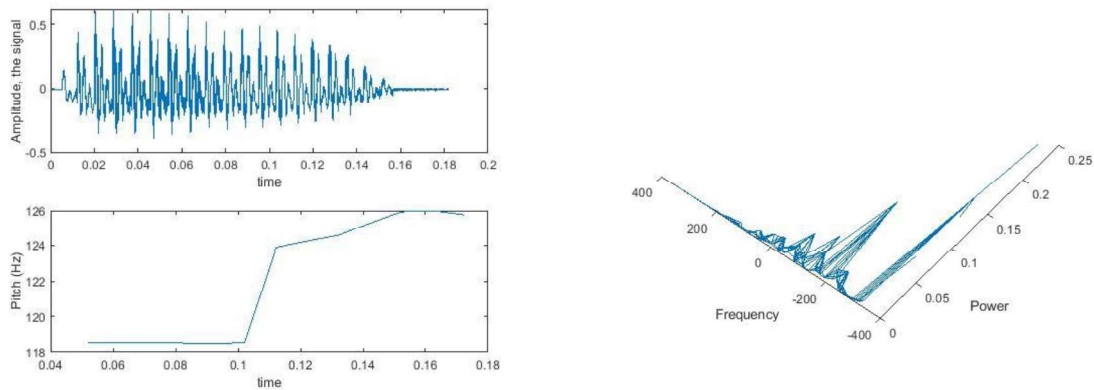


Figure (9). Above, the Turkish /u/ is seen on left, and the Vietnamese /u/ is on the right.



Vietnamese



Turkish

Figure (10). The plots above show the waveforms for the /u/ vowels and the corresponding F0 plot. On the right are the plots of energy vs. frequency for the same vowel of the language. The top set of plots are the Vietnamese /u/ and the bottom are the Turkish /u/.

The strength of the three-dimensional analysis method shows distinct differences in the /u/ vowels. The right plots show the effects of the energy and frequency working in combination. The frequency-energy plots show the characteristics of the sound, specifically the formant peaks and their intensity. Formant peaks can be measured, and it is obvious that the vowels are not identical, but do have some similarities.

11 Conclusion

Our algorithm and computer program was able to account for the data that was being lost, or unused. We found that the FFT does provide the numbers, but that some of the data was also not being used. We were able to view the numerical data and prepare an analysis of the FFT process. For some vowels, we estimate that up to 30% of the data is unused.

The ability to view the data as it is processed is a substantial strength that leads to a more careful analysis of the algorithms and the mathematical theories of speech analysis. The ability to apply functions and observe changes in the data sets and plots is a tool that affords versatility to our programs. This ability is a powerful tool in creating and comparing mathematical routines.

Time, frequency, and energy are represented in three columns making 3-D plotting possible. These plots include various pictorial depictions. Examples of these plots are shown in this report. These illustrations show that vowels have distinct shapes and we found that vowels have their own equations that are distinct.

The two F0s indicate that sound is the coordination of two types of physical efforts to produce vowels. For the individual words that were examined, both F0s had a duration that lasted through the entire word. This information could be used to study how consonants and vowels are produced, with the coordination of sounds and the blending from consonants. The depictions clearly show vowel boundaries and also that the time of phonation can be accurately measured, opening possibilities for prosody research.

12 Future directions

New technology is currently being tested for a method that does not produce the FFT complex components and so would not need to manipulate time and which would therefore provide more accurate visualizations of sounds. The more values can be measured without the need for statistical processing, the more accurate the data will be.

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Cross-linguistic Patterns in the Argument Structure of Posture Verbs in English and Spanish

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1 Introduction

In this paper I investigate the differences in the encoding of Path and causation in English and Spanish posture verbs (1-4), that is, verbs which describe the spatial location and configuration of the human body (e.g., *sit, lie, stand*). Specifically, I argue that the variation attested between these two languages is due to cross-linguistic differences pertaining to Path and causation encoding.

According to Levin and Rappaport Hovav (1995), it is possible to identify four meanings for posture verbs: a causative sense, an assume position sense, a simple position sense, and a maintain position sense. The causative sense (1a, 2a) selects two arguments and describes a caused change of state brought about by an agent or causer on a theme. The assume position sense (1b, 1c, 2b) describes an event of change of posture and necessarily involves a single animate entity to bring about the event. The simple position sense (3, 4) describes a state of location of an entity. Finally, the maintain position sense (3) is identical in form to the simple position sense, but it additionally implies that there is a deliberate “effort” in maintaining the state (3). Here I concentrate on the causative and assume position senses, and briefly discuss the simple position sense.

English, a satellite-framed language, can encode Path information by means of a satellite (1c), while Spanish, a verb-framed language, encodes this information in the verb (2) (Talmy 2000). On the other hand, the encoding of causation is pertinent to the explanation of the properties of posture verbs as well, inasmuch as these languages represent two different poles of the typology of causation encoding, namely, English follows the labile strategy and Spanish uses the anticausative strategy (1, 2b).

- (1) a. I sat the child (*on the chair)
b. The child sat (*on the chair)
c. The child sat down (on the chair)

- (2) a. Yo senté al niño (en la silla) (Spanish)
I sat to-the child on the chair
b. El niño se sentó (en la silla)
the child CL. sat on the chair

These differences will help shed light on the aspectual properties of these verbs in English, which some linguists have controversially singled out as a special class of state (Dowty 1979, Maienborn 2005, Rothmayr 2009) (cf. 3-4).

- (3) a. John sits on the floor (for an hour)
b. John is sitting

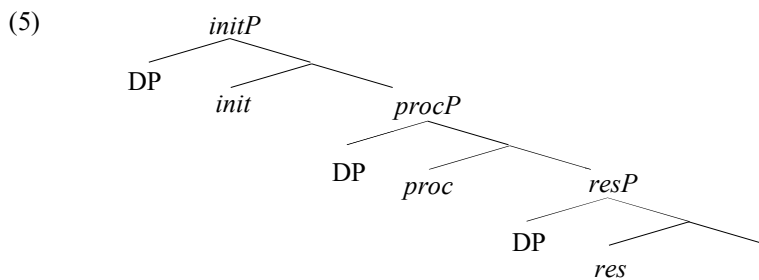
* This paper was presented at the Arizona Linguistics Circle 12, Tucson, 2018, and WECOL, Fresno, 2018. I would like to thank the audiences for their comments and remarks. I would also like to thank Jaume Mateu for his comments on a previous version of this paper. I alone remain responsible for any errors or omissions.

- (4) a. *El niño sienta en el suelo (Spanish)
 the child sits on the floor
 ‘The child is sitting on the floor’
 b. El niño está sentado en el suelo
 the child is sat on the floor
 ‘The child is sitting on the floor’

This paper is organized as follows. In §2 I outline the theoretical framework within which the present proposal is articulated. In §3 and §4 I discuss the properties of posture verbs in English and Spanish. In §5 and §6 I briefly discuss the aspectual properties of these verbs and conclude.

2 The theoretical framework

I assume Ramchand’s (2008) syntactically represented event-structure decomposition framework (5), in which the VP is divided into several verbal projections, each of which contains relevant Type-A information, namely, the category labels *initP*, *procP*, and *resP*. In turn, these correspond to subeventive projections identifying the subevents of a macro-event, that is, a causative subevent, a process subevent, and a result-state subevent, respectively. Following Mateu (2002), Acedo-Matellan (2010), and Ramchand (2014), I surmise that the different Path encoding patterns are a consequence of a language’s choice of lexicalizing Path in verbs or satellites, which in Ramchand’s (2008) framework instantiate *resP*. In short, each lexical item contains a rigid set of category labels identifying subevent components and participants (Type-A information), along with lexical encyclopedic content (Type-B information) (Ramchand 2014).



3 Cross-linguistic variation in the encoding of causation

In this section I present the cross-linguistic variation pertaining to causation in English and Spanish and argue that it can help pinpoint the syntax and semantics of posture verbs. In particular, in the assume position sense Spanish posture verbs appear with a “reflexive” pronoun, which allegedly deletes or demotes the Initiator of the event as it is considered an instance of anticausativization. In opposition to this view, I contend that the pronoun has an expletive-like function as it fills the empty Spec,*initP* and is bound with the lower DP in Spec,*procP* and Spec,*resP*.

3.1 Causativity from a typological view According to Haspelmath (1993), languages vary in the way they mark the relation between inchoative and causative verb pairs that share the same meaning. An inchoative/causative verb pair is defined as follows:

- (6) “[A] pair of verbs which express the same basic situation (generally a change of state, more rarely a going on) and differ only in that the causative verb meaning includes an agent participant who causes the situation, whereas the inchoative verb meaning excludes a causing agent and presents the situation as occurring spontaneously.”

(Haspelmath 1993:90)

In the case of Romance languages such as Spanish, French, and Catalan, the relation holding between them

is directed, that is, they use an anticausativizing strategy to create the inchoative and causative verb pairs. This is the strategy used with posture verbs (7-9). The causative and assume position sense of posture verbs is mediated by the appearance of a “reflexive” pronoun in the assume position sense. Germanic languages such as Swedish and German follow the same strategy (10-11). By contrast, English uses the labile strategy (12), that is, the intransitive verb is used to build the causative sense, the assume position sense, and the simple position sense as well.

- (7) a. Yo senté al niño en la silla (Spanish)
 I sat to-the child on the chair
 b. El niño **se** sentó en la silla
 the child CL. sat on the chair
- (8) a. El pare va asseure el nen a la cadira¹ (Catalan)
 the father past at-sat the child on the chair
 b. El nen **es** va asseure a la cadira
 the child CL. past at-sat-down on the chair
- (9) a. J’assieds l’enfant sur une chaise pour le faire manger (French)
 I at-sit the-child on a chair for him make eat
 b. Je **m**’est assis dans le fouteil
 I CL.is at-sat in the sofa
- (10) a. Peter satte babyn i stolen² (Swedish)
 Peter sat baby-the in chair-the
 b. Peter satte **sig** upp i sängen
 Peter sat CL. down on chair-the
- (11) a. Der Vater setzte das Kind auf den Stuhl (German)
 the father sat the child on the chair
 b. Das Kind setzte **sich** auf dem Stuhl
 the child sat-down CL. on the chair
- (12) a. I sat the child on the chair (English)
 b. The child sat down on the chair

What sets apart English from the rest of languages is its labile nature, namely, the same verb root is used for both causative and anticausative structures. The rest of the languages in the sample follow the anticausative pattern creating their assume position sense by means of a “reflexive” pronoun. Thus, each language’s choice has a bearing on the Type-A information codified in verbs. The labile behavior of English can be accounted for following Ramchand’s (2008) causativization approach, which assumes the existence of a null *init* head merged on top of the structure to introduce an initiational subevent that brings about the process (13a). In order to causativize, *init* cannot be specified in the lexical entry of the verb. In contrast, the rest of the languages mentioned will already include an *init* head in their lexical entries, which is exemplified below using Spanish *sentar* ‘sit’ (13b).

- (13) a. [[sit]] = < sit, <proc>, λeλe_{proc}[e=e_{proc} ∧ sit(e_{proc})] >
 b. [[sentar]] = < sentar, <init, proc, resi>, λeλe_{init}λe_{proc}λe_{res}[e=e_{init} → [e_{proc} → e_{res} ∧ sentar(e_{init}) ∧ sentar(e_{proc}) ∧ sentar(e_{res})]] >

The lexical entry for English *sit* (13a), exemplifying the labile strategy, denotes a process, whose only participant is the Undergoer of the event. By contrast, the lexical entry for Spanish (13b), and any other

¹ Examples provided by Jaume Mateu (p.c.).

² Examples obtained from Viberg (2013:141).

language using the anticausativizing strategy, specifies that this verb contains the category labels *init*, *proc*, and *res* in its argument structure. As a consequence, the subject is not only the Undergoer of the process subevent, but also the Initiator and Resultee in the assume position sense.

3.2 A plea for autocausative meaning The fact that these verbs use a “reflexive” pronoun in the assume position sense and the additional fact that the event denoted by these predicates expresses a caused change of state (see §5) brought about by an Initiator on a Resultee, whose references are identical, should not be considered conclusive evidence for a reflexive analysis. By the same token, I argue that these pronouns should not be considered an instance of anticausativization either. First, I will qualify the latter claim with the pair of examples in (14-15), which compares the differing behavior of true anticausatives in (14) and posture verbs in (15). While anticausatives are incompatible with an adverbial phrase indicating the purposeful involvement of the subject, posture verbs in both the causative and assume position sense legitimate this element, which clearly sets apart these constructions.

- (14) a. El cristal se rompió (*deliberadamente) (Spanish)
 the glass CL. broke deliberately
 ‘The glass broke’
 b. El niño rompió el cristal (deliberadamente)
 the child broke the glass deliberately
 ‘The child broke the glass’
- (15) a. La niña se sentó en la silla (deliberadamente)
 the child CL. sat on the chair deliberately
 ‘The child sat on the chair’
 b. La madre sentó a la niña en la silla (deliberadamente)
 the mother sat to the child on the chair deliberately
 ‘The mother sat the child on the chair’

Secondly, the idea that reflexivity might be relevant for this construction has arisen in the proposals of authors such as Wierzbicka (1976), Kemmer (1988), and Geniušienė (1987); however, there is compelling evidence against such an analysis. As shown below, constructions with posture verbs (16b) are not readily interpretable as reflexive (16a), that is, as an action performed by an entity on itself that allows clitic doubling by means of an anaphor.³

- (16) a. Los niños se lavaron a sí mismos (Spanish)
 the children CL. washed.3PL to themselves
 ‘The children washed themselves’
 b. *Ana se arrodilló a sí misma (en el suelo)
 Ana CL. at-knelt to herself on the floor
 ‘Ana knelt herself on the floor’

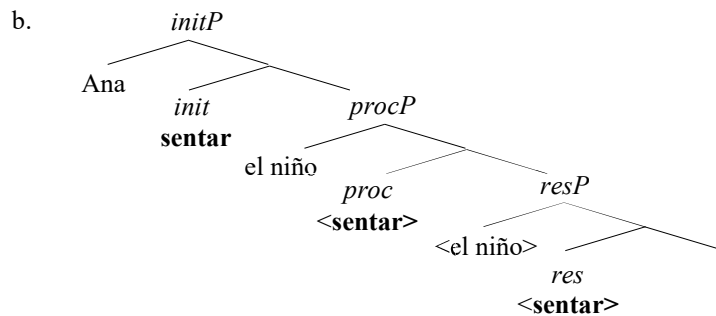
³ The potential difference between (canonical) reflexives and posture verbs, or what Geniušienė (1987) labelled *autocausative* reflexives, must lie in their having different argument structures. Specifically, I propose that reflexive constructions contain a low ApplP (see Pylkkänen (2008) for a typology of ApplPs). Following Cuervo (2003), this ApplP would instantiate a static possession transfer relation, in which the dative argument is understood to be the (inalienable or alienable) possessor of the object.

- (i) a. Pablo le besó la frente a Valeria (Spanish)
 Pablo CL.DAT kissed the forehead to Valeria.DAT
 ‘Pablo kissed Valeria on the forehead’
 b. Pablo le lava el auto a Valeria
 Pablo CL.DAT washes the car to Valeria.DAT
 ‘Pablo washed Valeria’s car’

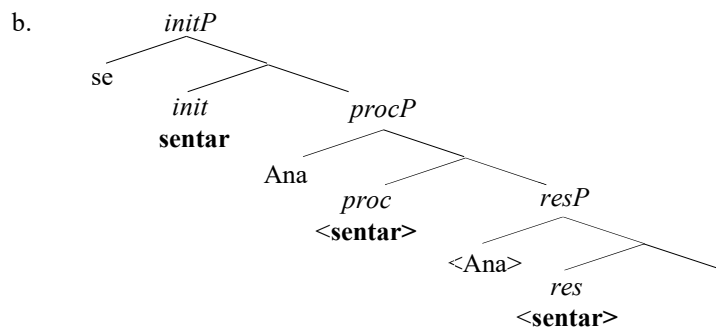
(Cuervo 2003:77-78)

As an alternative to these proposals, I would like to argue that the pronoun *se* in the assume position sense in Spanish has the function of satisfying the selectional requirements of *initP* to project a specifier. I adopt Pujalte and Saab's (2012) view on clitic insertion as a repair strategy occurring in the PF branch whenever a required external argument has not been merged in the syntax. Rather than deleting or demoting an argument, the clitic's function is to prevent the derivation from crashing when sent to the interfaces. Following Pujalte and Saab (2012), if a transitive verb with a D feature lacks a specifier in the external argument position, it will lead to a crash in the PF branch, since the verb's selectional requirements wouldn't have been met. Thus, the clitic is inserted post-syntactically to meet the D feature requirement of the head. The clitic that appears in this construction has expletive-like characteristics, since it enters the derivation with unvalued phi features that are later valued against a full-fledged DP in the structure through a probe-goal relation. The lexical entry proposed for Spanish *sentar* 'sit' (13b) renders a syntactic structure consisting of an *initP*, *procP*, and *resP* in both the assume position sense and the causative sense, but they differ fundamentally in the element lodged in *Spec,initP*: in the causative sense (17), the element in *Spec,initP* is different from the element lodged in the specifier of *procP* and *resP*, whereas in the assume position sense (18) the element occupying the specifier of *initP* is the reflexive clitic *se*. Thus, in the causative sense, one DP realizes the role of Initiator and another DP takes on the roles of Undergoer and Resultee. In the assume position sense, a single DP realizes all three roles by means of the reflexive pronoun, whose reference is determined to be identical with the reference-bearing DP below in the argument structure.

- (17) a. Ana sentó al niño en la silla (Spanish)
 Ana sat to.the child on the chair
 'Ana sat the child on the chair'



- (18) a. Ana se sentó en la silla
 Ana CL. sat on the chair
 'Ana sat down on the chair'



4 Path expression in Romance and Germanic languages

Another important source of typological divergence is the encoding of Path information. The verb-framed nature of Spanish allows the encoding of Path information in the verb root, identified here with the result portion of the event (*resP*) (Ramchand 2014). Following Mateu (2002) and Acedo Matellán (2010), the acquisition of a property can be conceived of as a Path; therefore, in the lexical entry of posture verbs the result portion of the event, if available, can be identified with the property of being *seated*. By contrast, the satellite-framed nature of English allows the presence of an additional element to codify the Path information of the event. These particles, or satellites, will be argued to identify the result portion of the event using Ramchand's (2008) *Result Augmentation*.

4.1 *The verbal nature of resP in Spanish* To check whether Spanish codifies result information in the posture verb, a temporal complement can be attached to elicit a result state-related interpretation which allows the length of the result state to be measured, as shown below:

- (19) a. Elisa se sentó (en la silla) durante una hora (Spanish)
 Elisa CL. sat-down on the chair for an hour
 'Elisa sat down on the chair for an hour'
 b. Elisa se acostó (en el sofá) durante una hora
 Elisa CL. at-lay-down on the sofa for an hour
 'Elisa lay down on the sofa for an hour'

In addition to this interpretation, it is possible to obtain an eventuality-related interpretation which measures for how long the event was repeated, over and over again. The ambiguity can only happen if the temporal complement appears with verbs, or constructions, with a result state (Piñón 1999). Additionally, verb roots may contain specific Path information indicating whether the movement is directed towards the Ground or away from it (20-21) (cf. Stefanowitsch and Rohde 2004).

- (20) a. Se sentó {en/*de} la silla (Spanish)
 CL. sat-down on/from the chair
 b. Se acostó {en/*de} el sofá
 CL. at-lay-down on/ from the sofa
 c. Se puso {en/*de} el escalón
 CL. put on/ from the step
 d. Se escondió {en/ *de} los matorrales
 CL. hid in/ of the bushes
 e. Se quedó {en/*de} la oficina
 CL. stayed in/ from the office
 f. Se acurrucó {en/*de} la cama
 CL. curled-up on/ from the bed
 g. Se arrodilló {en/*de} el suelo
 CL. at-knelt-down on/from the floor
- (21) a. Se levantó {*en/ de} la cama
 CL. got-up on/ from the bed
 b. Se quitó {*en/de} la entrada
 CL. moved-away in/from the entrance

To sum up, the Spanish posture verb consists of a conglomerate of subeventualities instantiating the causation, process, and result subevent. No additional element is needed or permitted to fill in these meaning components, since all three of them are lexicalized by the verb root (13b).

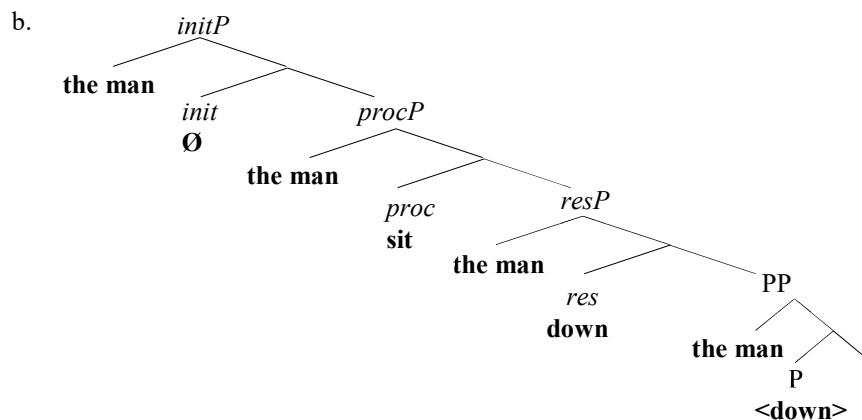
4.2 *Result Augmentation in English* Due to its satellite-framed nature, English can express the Path of motion by means of a satellite, that is, an element morphophonologically independent of the verb.

Posture verbs in English count with a satellite, *up* or *down*, to express the Path of motion in posture verbs:

- (22)
- a. sit down
 - b. bend down
 - c. lie down
 - d. kneel down
 - e. bow down
 - f. get up
 - g. stand up
 - h. curl up

This element can be integrated in the verb composite by means of Ramchand's *Result Augmentation* operation, which allows the combination of a pure process (posture) verb and a particle. The verb meaning is built compositionally by the addition of a small clause-like structure containing the particle, *up* or *down*, which can further identify the *res* head in the verbal ensemble, since it is lexically specified with a *res* feature and allows the presence of a subject. This is shown in the tree below (23), which also includes a null *init* head on top of the structure to introduce the causation subeventuality, as argued for in the previous section.⁴

- (23) a. The man sat down



In addition to introducing a result state, the *res* feature of particles can turn intransitive process posture verbs into a transitive verb complex inasmuch as the subject of *sit* would not only be the Initiator and Undergoer of the event but also the Resultee. This satellite-framed transitivity is also at play even if a transitive verb with similar lexical-conceptual information, or Type-B information, exists such as in the case of *lie* and *lay*. I assume that the lexical entries of these verbs differ in complexity, that is, while *lie* is an intransitive process verb, *lay* is a full-fledged transitive verb containing initiation, process, and result subeventualities.

- (24)
- a. $[[\text{lie}]] = \langle \text{lie}, \langle \text{proc} \rangle, \lambda e \lambda e_{\text{proc}} [e = e_{\text{proc}} \wedge \text{lie}(e_{\text{proc}})] \rangle$
 - b. $[[\text{lay}]] = \langle \text{lay}, \langle \text{init}, \text{proc}, \text{res} \rangle, \lambda e \lambda e_{\text{init}} \lambda e_{\text{proc}} \lambda e_{\text{res}} [e = e_{\text{init}} \rightarrow [e_{\text{proc}} \rightarrow e_{\text{res}} \wedge \text{lay}(e_{\text{init}}) \wedge \text{lay}(e_{\text{proc}}) \wedge \text{lay}(e_{\text{res}})]] \rangle$

⁴ Following Ramchand (2008), since the particle can identify the *res* head in the structure, and the DP can remain in Spec,PP, the verb-particle order is possible for these verbs as well, giving rise to sequences such as those below:

- (i)
- a. The man sat himself down
 - b. The man sat down himself

A search in *Google Books* gets several examples of these verbs in combination with the particle *down*:

(25) If I **lie myself down** in a snow-drift.

(26) I had to go and **lay myself down**. I felt like I was going to have nervous breakdown.

In the case of *lie*, *Result Augmentation* allows the combination of the verb and the particle to create a verbal complex with a result subevent, whereas *lay*, a transitive verb, already contains a *resP* in its lexical entry. Thus, if *lay* is used in combination with a satellite, some of its category features, that is, *resP*, will necessarily be *underassociated* (27) (Ramchand 2008) to allow the appearance of the satellite realizing the *res* phrase (28).

(27) *Underassociation*

If a lexical item contains an underassociated category feature,

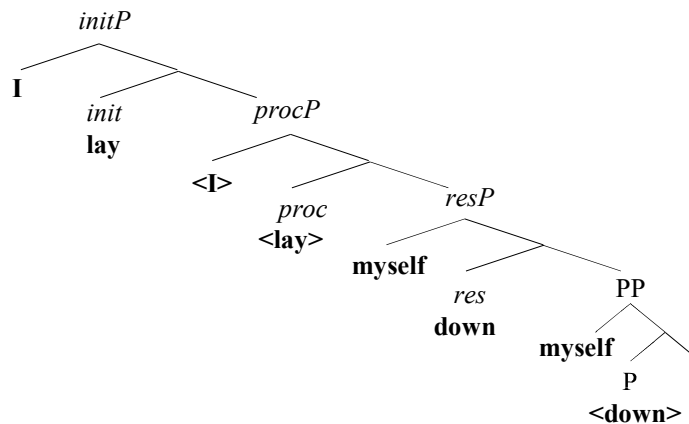
(i) that feature must be independently identified within the phrase and linked to the underassociated feature, by Agree;

(ii) the two category features so linked must unify their lexical-encyclopedic content.

(Ramchand 2008:136, (61))

(28) a. I lay myself down

b.



5 The internal aspect of posture verbs

To conclude, I review the internal aspect properties of English intransitive posture verbs and compare them to the transitive default forms of Spanish, which do not allow the expression of stative events. Posture verbs in English have been argued to constitute an aspectual class of their own (29), since traditional descriptions of states and activities seem unsuitable for them.

(29) a. John sits on the floor

b. John is sitting

Dowty (1979) noticed that English posture verbs behave unlike canonical states as they are acceptable with the progressive, which should only be possible with events, that is, activities, accomplishments, and (some) achievements. These non-dynamic verbs, since they do not involve change, bypass this restriction (30). In the same way, they are ungrammatical with the phrase “*what x did was...*” when the event has an inanimate entity as subject, thus behaving as proper states. Their problematic behavior grants them the label *interval states*.

(30) a. The socks are lying under the bed

b. Your glass is sitting near the edge of the table

- c. The long box is standing on end
 d. One corner of the piano is resting on the bottom step
 (Dowty 1979:173, (62))
- (31) a. *What the socks did was lie under the bed
 b. *The glass is sitting near the edge, and the pitcher is doing so too
 c. *The box is standing on end, which I thought it might do
 d. *The piano did what the crate had done: rest on the bottom step
 (Dowty 1979:173, (62'))

Similarly, Maienborn (2005) notices that German (intransitive) posture verbs and other verbs such as *wait*, *sleep*, or *shine* in German seem to instantiate a different type of state, denominated D(avidsonian)-state. These verbs are set apart due to their passing eventuality tests aimed at identifying events such as perception reports (32-35).

- (32) a. Ich sah Carol am Fenster stehen
 I saw Carol at.the window stand
 b. Ich sah Carol warten / schlafen
 I saw Carol wait / sleep
 c. Die spanischen Eroberer sahen überall Gold glänzen
 The Spanish conquerers saw everywhere gold gleam
 (*D-states* (German)
 (Maienborn 2005:284, (10))
- (33) a. *Ich sah Carol müde sein
 I saw Carol tired be
 b. *Ich hörte das Radio laut sein
 I heard the radio loud be
 c. *Renate sah Eva auf der Treppe sein
 Renate saw Eva on the stairs be
 (*copula+SLP*
 (Maienborn 2005:283, (7))
- (34) a. *Ich sah Carol blond sein
 I saw Carol blond be
 b. *Ich sah Carol intelligent sein
 I saw Carol intelligent be
 c. *Ich sah Carol Französin sein
 I saw Carol French be
 (*copula+ILP*
 (Maienborn 2005:283-4, (8))
- (35) a. *Ich sah die Tomate 1 Kg wiegen
 I saw the tomatoes 1 Kg weigh
 b. *Ich hörte Carol die Antwort wissen
 I heard Carol the answer know
 c. *Ich sah meine Tante Romy Schneider ähneln
 I saw my aunt Romy Schneider resemble
 (*states*
 (Maienborn 2005:284, (9))

Conversely, these verbs do not pass other eventuality tests such as being embedded in the phrase “what happened was...” (36-38). This surprising behavior leads Maienborn to conclude that D(avidsonian)-states are an aspectual class of their own, since they pattern with events in perception reports and, at the same time, pattern with states, that is, stative verbs and copula predicates, when they are embedded in the abovementioned phrase.

- (36) *Das geschah während ... / This happened while ...* *process verbs*

- a. Eva spielte Klavier
Eva played piano
- b. Die Wäsche flatterte in Wind
The clothes flapped in.the wind
- c. Die Kereze flackerte
The candle flickered
- (Maienborn 2005:285, (11))
- (37) **Das geschah während ... / This happened while ...* *D-states*
- a. Eva stand am Fenster
Eva stood at.the window
- b. Heidi schlief
Heidi slept
- c. Die Schuhe glänzten
The shoes gleamed
- d. Eva wartete auf den Bus
Eva waited for the bus
- (Maienborn 2005:285, (12))
- (38) **Das geschah während ... / This happened while ...* *states*
- a. Eva besaß ein Haus
Eva owned a house
- b. Eva kannte die Adresse
Eva knew the address
- c. Eva ähnelte ihrer Mutter
Eva resembled her mother
- d. Eva hasste Mozart-Arien
Eva hated Mozart arias
- (Maienborn 2005:286, (13))

While Dowty proposes to treat these predicates as a special class that is only true if predicated of an interval, Maienborn assumes that they are a special type of state that contains the Davidsonian event argument (Davidson 1967). One of the problems posed by Maienborn's proposal is that, while in English and German it can account for the particular properties of these predicates, in Spanish it would incorrectly predict that the equivalent stative construction with posture verbs (42b) would be Kimian states, that is, properties, which are not predicated of the Davidsonian event argument, but rather of a Kimian event argument, following Kim (1969), that is, an ontologically different type of entity, as Maienborn considers copula sentences as Kimian states, whether they use *ser* or *estar* 'be'.

I would like to put forward that it is not necessary to introduce additional types of events in our ontology such as D(avidsonian)-states or interval predicates to account for the properties of these verbs; but rather, their basic aspectual make-up, that is, their having a single process subevent (*procP*) and the labile nature of English can explain their properties. On the one hand, I hold that intransitive posture verbs are better characterized as non-dynamic atelic events. In Silvagni (2017), it is argued that events and states differ in regard to the existence of a spatio-temporal point, or stage, exclusively, in the former. States are merely properties over individuals, hence spatio-temporal notions are not relevant to them. In his view, dynamicity should be considered an epiphenomenon of events rather than their defining property. Events can only be said to be dynamic if there is a sequence of stages, or spatio-temporal points, as a result of an action fulfilled by an entity able to produce such an event. Therefore, dynamicity derives from the idea that an action is applied over a stage. The property of being acted on belongs to events rather than subjects, thus, an action is fulfilled by an actant, be it intentionally or unintentionally, as long as such entity meets the requirements to generate such an event. I will identify this property of verbs with Ramchand's (2008) *initP*, which is only applicable to events that can be caused. Tentatively, I will assume that events that include this node in their first-phase syntax tree will be interpreted as dynamic. Once dynamicity is no longer considered a defining property of events, two main classes of eventualities arise:

- (39) a. States: *love, know, be yellow, be intelligent*, etc.
 b. Events:
 i. Non-dynamic events: *sit, lie, be ill, be tired, hang, smell*, etc.
 ii. Dynamic events: *wait, sleep, run, write, work, build, paint, clean, eat, sing, iron*, etc.⁵

As a consequence of this reconception, a change in Ramchand's (2008) basic types of events (40) is necessary to accommodate the assumptions about what defines an event. Since Ramchand's definition of process includes the notion of dynamicity (40b), I will redefine the denotation of process as a subevent containing a spatio-temporal unit to which an initiation event may be attached if the event is the result of an action carried out by an entity able to fulfill such an event.

- (40) a. State (e): e is a state
 b. Process (e): e is an eventuality that contains internal change

(Ramchand 2008:44, (6))

The reconception of the internal aspect of eventualities results in the following first-phase syntax configurations for posture verbs in English:

- (41) a. causative sense: *init, proc, res*
 b. assume position sense: *init, proc, res*
 c. simple position sense: *proc*
 d. maintain position sense: *init, proc*

Finally, note that Spanish *sentar* 'sit' cannot be used in the same configurations as English (cf. (29) and (42a)), since its lexical entry contains all three subevent components (*init, proc, res*) (13b). This explains why a stative sense of these verbs can only be created through the resultative construction with the copula *estar* 'be' (42b). I assume with Ramchand (2018) that the participle instantiates the *res* subevent of the verb allowing, thus, a stative interpretation.

- (42) a. *El niño sienta en el suelo (Spanish)
 the child sits on the floor
 'The child is sitting on the floor'
 b. El niño está sentado en el suelo
 the child is sat on the floor
 'The child is sitting on the floor'

6 Conclusion

The properties of posture verbs in English and Spanish have allowed me to identify the sources of the observed cross-linguistic variation and conclude that it stems from the powers and limits of the syntactic information languages encode in lexical items, making sense of how that information is unfolded in the syntactic derivation.

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⁵ The examples in this classification of eventualities are based on Silvagni (2017).

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Taming Free Merge Further – Sub-Extraction and its Kin

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1 Introduction

To ensure *discrete infinity* and *displacement*, the most basic properties of human languages that any linguistic theory has to capture, Generative Grammar (GG) has assumed the simplest combinatorial operation called *Merge* (1) (Chomsky 1995 *et seq*):

$$(1) \quad \text{Merge}(X, Y) \rightarrow \{X, Y\}$$

Merge is just a combinatorial operation that “takes two objects X, Y already constructed and forms a new object Z” (Chomsky 2013: 40), having two cases: *External Merge* (EM) and *Internal Merge* (IM) (Chomsky 2004).¹ EM is a case in which X and Y are taken from the lexicon or a separate workspace (but see Chomsky et al. 2019) independently (2a), and IM is a case in which either X or Y is taken from the inside of the other in the course of the derivation (2b) (where Y is taken from the inside of the set of {X, Y}):

$$(2) \quad \begin{array}{ll} \text{a. } \text{EM}(X, Y) \rightarrow Z = \{X, Y\} & \text{(cf. \{like, what\})} \\ \text{b. } \text{IM}(X, Y) \rightarrow Z = \{Y_1, \{X, Y_2\}\} & \text{(cf. \{what}_1, \{C(do), \{you, \{like, what_2\}\}\})} \end{array}$$

Discrete infinity is captured by applying Merge (EM, IM) recursively, and displacement by IM that leaves two copies in situ (i.e., an interpretation site, Y_2 in (2b)) and a landing site (i.e., a pronunciation site, Y_1 in (2b)), in accord with the *No-Tampering Condition* (NTC), one of the third factor principles of minimal computation (MC): “Merge of X and Y leaves the two SOs unchanged (Chomsky 2008: 138).”² Although Merge is subject to the third factor principles of MC, Merge per se applies freely (so that it has been called “Free Merge” since Chomsky 2004).³ Since Merge is literally unconstrained, once we accept it in the computational system of human language (C_{HL}), it follows that any SOs are generable, and C_{HL} allows “overgeneration” (Chomsky et al. 2019: 11; cf. *Move α* in Lasnik & Saito 1992).

A theoretical advantage of the Free Merge system is that it has a great potential to make it easier to approach problems of “acquirability” and “evolvability” that any linguistic theory has to answer in the end (Chomsky et al. 2019: 25): If Merge is free, not constrained by features of lexical items, the heterogeneity and diversity of acceptability and deviance can be attributed to various factors of the interface systems in conjunction with third factor principles. But if Merge is not free, constrained by features or cartographic hierarchies, a deep conceptual problem arises: (a) these features cannot have been learned and (b) if they are innate, this gives rise to a practically

* We would like to thank the audience of WECOL 2018 for feedback. The usual disclaimers apply.

¹ Chomsky et al. (2019) clarify the concept workspace WS and reformat Merge as MERGE, an operation on WS (not on a particular SOs): MERGE maps $WS = [X, Y]$ to $WS' = [[X, Y]]$. For purposes of presentation, the discussion will proceed under the formulation of Merge (1). But nothing would essentially change if we assumed the formulation of MERGE.

² Along with NTC, another MC principle that has long been assumed to govern Merge is the *Inclusiveness Condition* (IC): that “bars introduction of new elements (features) in the course of computation: indices, traces, syntactic categories or bar levels, and so on” (Chomsky 2001: 2-3).

³ Chomsky (2017a, b) and Chomsky et al. (2019) suggest that Merge would be subject not only to the NTC and the IC but also to other principles such as the following (which he calls “Seven Desiderata”) ((i)-(vii) are referred to Kitahara 2018):

- (i) *Descriptive Adequacy* (a good guideline to proceed)
- (ii) *Strong Minimalist Thesis* (e.g. NTC, IC, phase-impenetrability)
- (iii) *Determinacy* (accessible terms only appear once in WS)
- (iv) *Restrict Computational Resources* (MERGE should never expand WS)
- (v) *Stability* (SO can't change its interpretation (or status) in the course of a derivation)
- (vi) *Recursion* (SO, once generated in WS, remains accessible to further application of MERGE)
- (vii) *Strict Binary* (i.e. two and only two SOs can be affected by MERGE)

For relevant discussion on (iii), see Goto & Ishii (2018), and for relevant discussion on (vii), see Goto (2016) and the discussion below.

insolvable problem: How could this rich and articulated faculty of language have evolved? (Cf. Chomsky et al. 2019: 10 ff. for this argument.) Thus, for the minimalist program that GG has developed, particularly since Chomsky (1995), with the aim of clarifying the concept “simplicity” of human language by eliminating stipulations, redundancy, and other complications of C_{HL} , the Free Merge system can be a promising approach to dealing with the unavoidable problems of human language.

The Free Merge system presents us with the theoretical advantage, but at the same time it leaves us an important empirical challenge: How does C_{HL} distinguish perfectly acceptable linguistic expressions from strongly deviant ones? For example, although extraction, a subcase of displacement, is just an instance of IM (Chomsky 2008: 147), the extraction possibility is severely bound. For instance, in English, while extraction out of objects (3a) is possible, extraction out of subjects (3b) and adjuncts (3c) is impossible (a well-known paradigm called the *Condition on Extraction Domain* (CED); see Huang 1982; Chomsky 1986; among many others):

- (3) *English*
- a. Who_i did you believe [that John saw t_i]?
 - b. *Who_i did [pictures of t_i] please you?
 - c. *Who_i did they leave [before speaking to t_i]?

On the other hand, in Japanese, while extraction out of objects (4a) and subjects (4b) is possible, extraction out of adjuncts (4c) is impossible (a well-known fact since Saito 1985):

- (4) *Japanese*
- a. Dare-ni_i John-ga Mary-ga t_i atta koto-o mondai-ni siteru no
 who-DAT J.-NOM M.-NOM met fact-ACC problem-DAT making Q
Lit. ‘Who, John is making an issue out of the fact that Mary met t_i .’
 - b. ?Dare-ni_i John-ga Mary-ga t_i atta koto-ga mondai-da to omotteru no
 who-DAT J.-NOM M.-NOM met fact-NOM problem-is that think Q
Lit. ‘Who, John thinks that the fact that Mary met t_i is a problem.’
 - c. *Sono hon-o_i John-ga minna-ga t_i kau node tigau hon-o katta
 that book-ACC J.-NOM all-NOM buy because different book-ACC bought
‘Because everyone buys that book, John bought a different one.’

Also, in German, while extraction out of embedded non-V2 (verb second)-clauses (5a) is possible, extraction out of embedded V2-clauses (5b) and subjects (5c) is impossible (the contrast between (5a) and (5b) is taken from Blümel 2017: 270; and (5c) from Müller 2011: 104. According to Müller 2011, the particle *denn* demarcates the vP edge, and *was_i* is extracted from [t_i für Bücher] in the SPEC of v, but crucially not in the SPEC of T):

- (5) *German*
- a. Was_i glaubst du, dass er t_i lesen sollte? (non-V2)
 what believe you that he read should
 ‘What do you think that he should read?’
 - b. *Was_i glaubst du, er sollte t_i lesen? (V2)
 what believe you he should read
 ‘What do you think he should read?’
 - c. *Was_i haben denn [t_i für Bücher] den Fritz beeindruckt?
 what have PRT for books the.ACC Fritz impressed
 ‘What did books for impress Fritz?’

In the face of these facts, it is important to notice that only by Merge (1), the relevant contrasts cannot be explained: because Merge applies freely, all the bad cases, (3b, c), (4c), (5b, c), are as equally generable by Merge as the good cases, (3a), (4a, b), (5a). Given that facts like these concerning extraction are ubiquitous, and nothing should be invoked beyond Merge, the third factor principles of MC and interface properties to explain the facts (Chomsky 2015a: 15), it becomes an important research topic to consider how C_{HL} distinguishes the difference between impeccable and word salad, maintaining the formulation (and the freedom) of Merge. Given this background, this paper aims to “tame” Free Merge in addition to previously made suggestions in the literature so that both the good ones and the bad ones (and other related phenomena, “their kin”) naturally follow from the Free Merge system.

The organization of this paper is as follows. Section 2 introduces a Free Merge system refined in Goto (2016), assuming that a *search* procedure is involved in determining the input of Merge, and the search procedure itself is governed by the third factor principle of *minimal search* (Chomsky 2014: 5). It is shown that the extraction phenomena in English (3), Japanese (4), and its kin naturally follow from the refined Merge system, in

collaboration with independently motivated principles of *Labeling Algorithm* (LA) in English (Chomsky 2013; 2015) and Japanese (Saito 2014; 2016). Section 3 extends the refined system further to the extraction phenomena in German (5). It is shown that not only the long-standing puzzle but also its kin immediately follow from the refined system, significantly in collaboration with an independently motivated principle of LA in V2 languages (Blümel 2017). Section 4 makes a concluding remark.

2 Taming Free Merge

Maintaining the formulation (and the freedom) of Merge (1) (repeated here as (6) with relevant information), Goto (2016) notices how the input of Merge (n) is determined in narrow syntax (NS). To answer this question, Goto proposes that a *search* procedure be involved not only in labeling the output of Merge, as suggested in Chomsky (2013; 2015a) (see below), but also in determining the input of Merge:^{4,5}

$$(6) \quad \text{Merge}(\underbrace{X, Y}_{\text{input}(n)}) \rightarrow \underbrace{\{X, Y\}}_{\text{output}}$$

\uparrow search \uparrow

(A search procedure is involved not only in labeling the output of Merge $\{X, Y\}$, but also in determining the input of Merge (X, Y) .)

Specifically, assuming that the process of $n > 2 \rightarrow n = 2$ is involved in the course of derivation (cf. an access to the lexicon by EM (Chomsky 2013: 41) and an extraction from an SO by IM (Chomsky 2008: 147)), Goto (2016) proposes *Optimization of Merge by Search* (OMS) (7), claiming that Merge reduces its computational load by restricting n to two ($n = 2$) with the help of search (slightly modified from Goto 2016):⁶

- (7) *Optimization of Merge by Search* (OMS)
 Merge requires search to optimize its application in conformity to $n = 2$.
- a. $\text{Search}(\text{SO}_1, \dots, \text{SO}_n) (n > 2) \rightarrow (\text{SO}_1, \text{SO}_n) (n = 2) \rightarrow$
 - b. $\text{Merge}(\text{SO}_1, \text{SO}_n) \rightarrow \{\text{SO}_1, \text{SO}_n\}$

OMS states that Merge typically takes place in two steps. First, given a workspace ($n > 2$), search is invoked to determine two SOs to be merged (7a). Second, given the optimized workspace ($n = 2$), Merge operates over two SOs placed in the workspace (7b). Note that in the process of (7b), nothing new is added (NTC) nor is anything given taken away (IC). Therefore, the formulation (and the freedom) of Merge itself remains intact.

Assuming OMS, Goto (2016) further considers how the search procedure actually takes place in NS, proposing *Minimization of Search under Labelability* (MSL) (8) (slightly modified from Goto 2016):

- (8) *Minimization of Search under Labelability* (MSL)
 Search is inaccessible to the deep interior of an unlabelable $\{XP, YP\}$ structure.

MSL states that the search procedure (7a) to determine the input of Merge as $n = 2$ be governed by *minimality* such as calculated based on the labelability of SOs, which is in turn defined in terms of *Labeling Algorithm* (LA) in Chomsky (2013; 2015). According to Chomsky, “LA is just minimal search” (Chomsky 2013: 43), and $\{H, XP\}$, $\{t_{XP}, YP\}$, and $\{XP_{[F]}, YP_{[F]}\}$ are labeled as HP, YP, and $\langle F, F \rangle$, respectively (where H = a head; XP/YP =

⁴ For similar proposals, see Chomsky (2015b), Larson (2015), Kato et al. (2016), and Epstein, Kitahara, & Seely (EKS) (2018). In particular, EKS cite Noam Chomsky in personal communication, saying: “Chomsky (personal communication) suggests: ‘Labeling is a search procedure, like Agree (and in fact **Merge, which searches for things to merge**). So why isn’t it enough to say that all search procedures are governed by the third factor principle of economy (shortest search).’” [our emphasis – AB & NG] In passing, Larson (2015: 58) might be right in stating that “[i]t is important to note that Merge itself does not *necessarily* entail displacement: **it requires the ability to search inside pre-made structure for displacement to be a possibility**. That displacement does not come for free with Merge as currently conceptualized has long gone underappreciated [...]” [our emphasis – AB & NG]

⁵ Goto (2019) names search to determine the input of (X, Y) “Input-Search” and search to determine the label of $\{X, Y\}$ “Label-Search,” exploring a unified theory of search under the third factor principle of *minimal search* and the hypothesis that “language is optimized relative to the CI interface alone” (Chomsky 2014: 7) (cf. footnote 4). Goto argues that the proposed theory of search leads to a correct prediction concerning the (im)possibility of extraction (as in (3)-(5)), labeling (as in (9)), and pied-piping (Cable 2007; 2010a, b; 2012; 2013; Heck 2008; 2009).

⁶ OMS is fully compatible with the assumption that “Merge is strictly binary” (Chomsky et al. 2019: 9) (cf. footnote 3 (vii)). An important question remains: why Merge must be subject to the binarity restriction? We leave it for future research.

a phrase; t_{XP} = a copy of moved/IMed XP; and F = agreement features such as Q and ϕ), but $\{XP, YP\}$ is not labeled, because “minimal search is ambiguous” (Chomsky 2013: 43):

- (9) *Chomsky’s LA*
- a. $\{H, XP\} = HP$
 - b. $\{t_{XP}, YP\} = YP$
 - c. $\{XP_{[F]}, YP_{[F]}\} = \langle F, F \rangle$
 - d. $\{XP, YP\} = \text{unlabelable}^7$

Note that there are several motives behind MSL. The first has to do with third factor considerations. As one of the third factor principles of MS, Chomsky (2014: 5) suggests: “minimal search is better than deeper search.” This explains why search cannot access a deeper part of the structure: simply because minimal search is favored over deeper search. The second has to do with theory-internal considerations. To reduce derivational cost, Chomsky suggests: “what has once been constructed can be ‘forgotten’ in later computations” (Chomsky 2005: 11),⁸ “only the label [...] is accessible to NS” (Chomsky 2000: 132), and “the label [...] the only element visible for further computations” (Chomsky 2005: 14). Given that $\{XP, YP\}$ is indeed an SO that “has once been constructed” in the course of the derivation (e.g. NP and VP in subject-predicate structures are already (independently) constructed SOs in the course of the derivation; see Chomsky et al. 2019: 9 for relevant discussion) and identified as an unlabelable SO by LA, it would be natural to expect that the unlabelable $\{XP, YP\}$ structure is opaque (“inaccessible” or “invisible”) to search.⁹ And the third has to do with interface considerations (see Goto 2019 for relevant discussion). In designing C_{HL} , Chomsky has put special emphasis on the CI interface: “Language is optimized to the CI interface alone, with externalization a secondary phenomenon” (see Chomsky 2014: 7; also Chomsky et al. 2019: 26). If this view is correct, the essential NS operations, including Merge and search, ought to be designed in parallel to the CI requirement. If the CI interface requires for SOs to be labeled for interpretation, and unlabelable SOs are unable to receive an interpretation at the CI interface (cf. footnote 7), then it is not implausible to conjecture that the unlabelable $\{XP, YP\}$ structure is “inaccessible” or “invisible” at the interface (in that unlabelable SOs are CI “illegible” elements), and accordingly the same holds for the search procedure in NS. Metaphorically speaking, the CI interface-based approach to language design allows us to expect that what the CI can “see” is what NS can see too, but what the CI cannot “see” is what NS cannot see either.¹⁰

At any rate, if “Merge searches for things to merge” (cf. footnote 4), a certain mechanism of search will be required for Merge-application, and how the search procedure actually takes place in NS will be a real problem for any theory that assumes Merge. Thus, in this paper, we assume OMS and MSL, taking them to be one of the possible minimalist approaches to “everyone’s problem.” Before we proceed further, it should be clarified here once again that the refined Merge system (hereafter OMS+MSL) maintains the formulation (and the freedom) of Merge well. In OMS+MSL, the (pre-applied) search procedure (7a) is constrained by the third factor principle of MS and the basic properties of C_{HL} , but Merge-application (7b) itself is not constrained by anything, so the formulation (and the freedom) of Merge itself can be maintained.

Interestingly, OMS+MSL makes an empirical prediction (10):

- (10) Extraction out of the deep interior of an unlabelable $\{XP, YP\}$ is impossible.

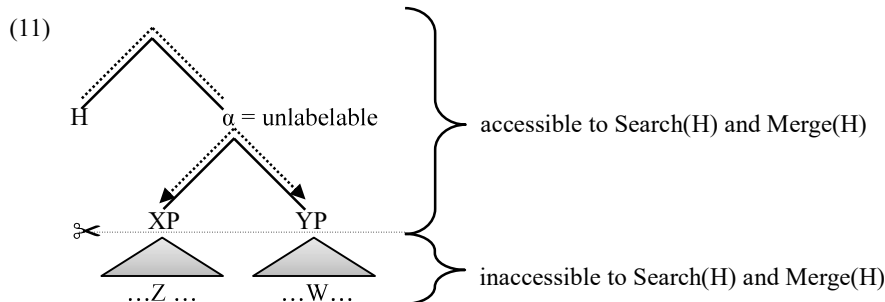
The logic of (10) is as follows: extraction falls into $n > 2$ and when $n > 2$, Merge requires search to optimize its application (OMS); but the deep interior of the unlabelable $\{XP, YP\}$ structure is inaccessible to search (MSL); so therefore extraction from there is impossible. By way of illustration, consider (11) (where α constitutes the unlabelable SO):

⁷ The unlabelable $\{XP, YP\}$ will cause a failure of thematic interpretation at the Conceptual-Intentional (CI) interface (cf. Ott 2015).

⁸ This is a basic intuition behind cyclic operations and the *Phase Impenetrability Condition* (PIC) (Chomsky 2000; 2001).

⁹ See Richards (2017) for relevant discussion.

¹⁰ The logic of this argument is similar to Epstein, Kitahara, & Seely (2014) in that they try to explain why a Case particle is inaccessible/invisible to LA in Japanese (see (17) below) in terms of the CI interface-based approach to language design: “in Japanese, each overt Case particle constitutes an independent head, [...], after valuation, Japanese Case, [...], becomes a purely phonological head which has nothing to do with NS and CI [...] such purely phonological heads, [...], cannot serve as a label-identifier at CI.” (Epstein, Kitahara, & Seely 2014: 13-14).



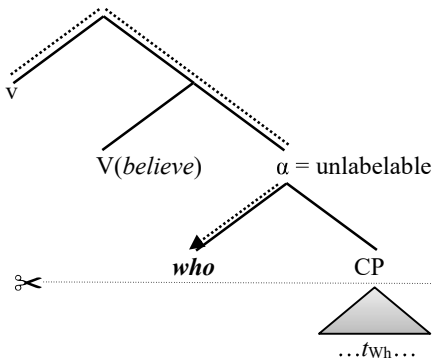
(11) shows that for search from H (Search(H)) that is invoked to determine the input of Merge with H (Merge(H)), XP and YP themselves that constitute the unlabelable α are accessible to Search(H) but the deep interiors of them, i.e., the gray zones containing Z, W, are inaccessible to Search(H). Thus, XP, YP can be the input of Merge(H) but the deep interiors of them, Z, W, cannot. In passing, Chomsky (2013: 43) suggests that LA operates at the phase level (CP, vP). We follow him in assuming that phases are CP and vP. But, in this paper, we follow Bošković (2016), Rizzi (2016), Saito (2016), and Sorida (2016) in assuming that LA applies as soon as it can (in accordance with the *Earliness Principle*). Thus, in (11), the labels of XP, YP have already been determined by LA before Search(H) takes place. Note that raising of an external argument (EA) to SPEC-T from the unlabelable {EA, vP} (Chomsky 2013: 43) (and agreement between them) is possible because T and EA correspond to H and XP in (11), respectively: since EA is *not* in the deep interior of the unlabelable SO, Search(T) (as well as Merge(T)) is accessible to EA.

Now, in terms of (10)-(11), the CED effects in English (3) (repeated here as (12)) immediately follow.

- (12) *English*
- a. Who_i did you believe [that John saw *t_i*]?
 - b. *Who_i did [pictures of *t_i*] please you?
 - c. *Who_i did they leave [before speaking to *t_i*]?

First, consider (12a). The schematic derivation of (12a) is (13):

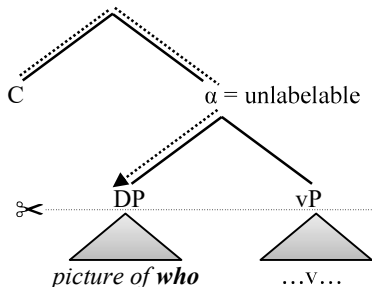
- (13) *Extraction out of objects in English: (12a)*



In (13), *who* has reached the embedded SPEC of C under successive cyclic movement/IM. The resultant SO is {*who*, CP}, constituting an unlabelled SO. But *who* is *not* in the deep interior of the unlabelled SO. Hence *who* is accessible to Search(v) and can be the input of Merge(v). Similarly, an unlabelled SO may be created at the next step of the derivation, as in {*who*, vP}, but for the same reason, Search(C) and Merge(C) are allowed. The possibility of extraction out of objects in English follows from OMS+MSL.

Second, consider (12b). The schematic derivation of (12b) is (14):

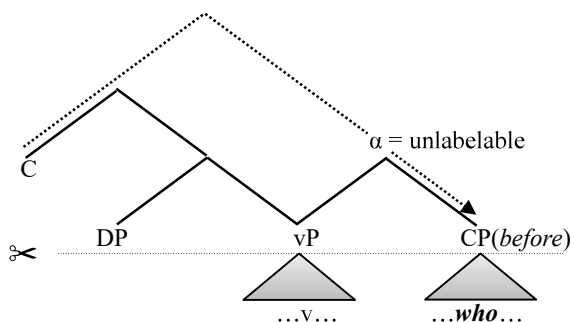
(14) *Extraction from subjects in English: (12b)*



In (14), *who* occupies the SPEC of *v* as EA under the predicate-internal subject hypothesis. The resultant SO is {*who*, *vP*}, constituting an unlabeled SO (Chomsky 2013: 43). Notice that *who* is *in* the deep interior of the unlabeled SO. Hence *who* is *inaccessible* to Search(C) and thus cannot be the input of Merge(C). The German (5c) can be explained in the same way. The impossibility of extraction out of subjects in English follows from OMS+MSL.¹¹

Third, consider (12c). The schematic derivation of (12c) is (15):

(15) *Extraction out of adjuncts in English: (12c)*



In (15), the *before*-clause (CP) is adjoined to *vP* and *who* is in the CP (cf. Boeckx 2014). The resultant SO is {*vP*, *who*}, constituting an unlabeled SO (see Hornstein & Nunes 2008 for the claim that adjuncts may go unlabeled). Notice that *who* is *in* the deep interior of the unlabeled SO. Hence *who* is *inaccessible* to Search(C) and thus cannot be the input of Merge(C). The impossibility of extraction out of adjuncts in English follows from OMS+MSL.

The CED effects in Japanese (4) (repeated here as (16)) also follow from OMS+MSL:

(16) *Japanese*

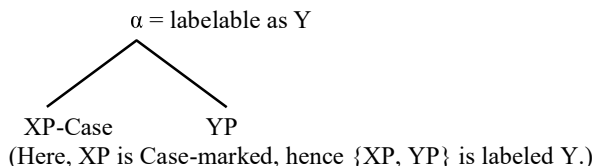
- a. Dare-ni_i John-ga Mary-ga *t_i* atta koto-o mondai-ni siteru no
 who-DATsJ.-NOM M.-NOM met fact-ACC problem-DAT making Q
*Lit. 'Who, John is making an issue out of the fact that Mary met *t_i*.'*
- b. ?Dare-ni_i John-ga Mary-ga *t_i* atta koto-ga mondai-da to omotteru no
 who-DAT J.-NOM M.-NOM met fact-NOM problem-is that think Q
*Lit. 'Who, John thinks that the fact that Mary met *t_i* is a problem.'*
- c. *Sono hon-o_i John-ga minna-ga *t_i* kau node tigau hon-o katta
 that book-ACC J.-NOM all-NOM buy because different book-ACC bought
'Because everyone buys that book, John bought a different one.'

First of all, the possibility of extraction out of objects (16a) and the impossibility of extraction out of adjuncts (16c) can be explained in the same way as in English (see the derivations in (13) and (15) above, respectively). So the question is why extraction out of subjects (16b) is possible in Japanese, unlike in English (cf. (12b)). This can be explained if we adopt an independently motivated LA in Saito (2014; 2016). Considering why apparently unlabeled {XP, YP} structures created by scrambling do not cause any (labeling or interpretive) problems in

¹¹ This “in situ” analysis of the subject island effect is compatible with Chomsky (2008). In the literature, it is often claimed that the subject island effect arises after EA-raising to SPEC-T (see Stepanov 2007 among many others). However, proponents of such an analysis are hard put to explain the German fact (5c) as well as the CED effects in Japanese (4), which immediately follow from OMS+MSL, as we will see.

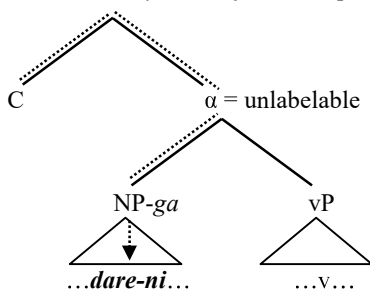
Japanese, and how the LA system can accommodate the property of “free word order,” Saito (2014; 2016) proposes that in a language like Japanese that has a variety of particles, {XP, YP} is labeled *if either XP or YP is marked by an overt Case particle*:^{12,13}

(17) Saito’s LA



Then, assuming Saito’s LA, consider (16b). The schematic derivation of (16b) is (18):

(18) Extraction from subjects in Japanese: (16b)



In (18), the nominative Case(*ga*)-marked noun phrase (NP) meaning ‘the fact that Mary met who’ occupies the SPEC of *v* as EA. The resultant SO is {NP-*ga*, vP}. Apparently, this SO constitutes an unlabelled SO, but under Saito’s LA, the SO is labeled as *v* and identified as a labelable SO. Now *dare-ni* ‘who’ is in the deep interior of the *labelable* SO. Hence *dare-ni* ‘who’ is accessible to Search(C) and can be the input of Merge(C). The possibility of extraction out of Case-marked subjects in Japanese follows from OMS+MSL.

This analysis of subject extraction in Japanese makes a further prediction (19):

(19) If the subject is marked with particles other than the Case particle, then extraction out of subjects in Japanese is impossible.

The prediction is borne out. Consider (20) and (21):

(20) *ga/wa* contrast with extraction out of subjects (based on Bianchi & Chesi 2014, fn.9)

- a. ?Nani-*o*_i John-*ga* Mary-*ga* *t*_i kata koto-*ga* mondai-*da* to omotteru no
 what-ACC J.-NOM M.-NOM bought fact-NOM problem-is C think Q
- b. *Nani-*o*_i John-*ga* Mary-*ga* *t*_i kata koto-*wa* mondai-*da* to omotteru no
 what-ACC J.-NOM M.-NOM bought fact-TOPIC problem-is C think Q
 ‘What_i does John think that the fact that Mary bought *t*_i is a problem?’

(21) *ga/mo* contrast with extraction out of subjects (based on Hasegawa 2005: 69-70)

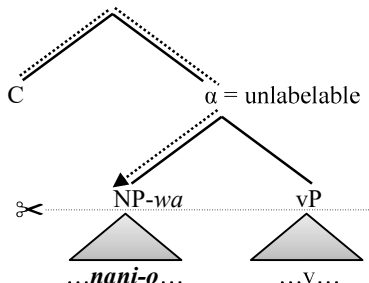
- a. Sono hon-*o*_i Taro-*ga* Hanako-*ga* *t*_i yon-*da* koto-*ga* akiraka-*da* to omotteru
 that book-ACC T.-NOM H.-NOM read fact-NOM obvious C think
- b. *Sono hon-*o*_i Taro-*ga* Hanako-*ga* *t*_i yon-*da* koto-*mo* akiraka-*da* to omotteru
 that book-ACC T.-NOM H.-NOM read fact-‘also’ obvious C think
 ‘Taro thinks that the fact that Hanako read the book is also obvious.’

¹² For example, in (16a, b), an apparently unlabelable {XP, YP} structure is created by scrambling at the edge of the root clause: {*nani-o*, CP}. Under Chomsky’s LA system (see (9) above), it is not clear how the resultant SO is labeled and transferred to the interfaces without causing labeling/interpretive problems at the CI interface. However, given Saito’s LA (17), the SO is labeled as C and identified as a labelable SO since *nani-o* ‘what’ is marked by the accusative Case (*-o*) particle. Saito’s LA presents us with many empirical consequences; see Saito (2014; 2016) for details. Also, for a conceptual/theoretical support for Saito’s LA, see Epstein, Kitahara, & Seely (2014) (cf. footnote 10).

¹³ See also Goto (2013) for relevant discussion on scrambling and labeling in Japanese. The main idea developed there is: “Labels are necessary for {XP, YP} structures at intermediate positions, but unnecessary for ones at the edge of root CP.” (Goto 2013: 15) This may be compatible with Blümel (2017); see the discussion below.

In Japanese, subjects can be marked not only by the nominative Case particle *-ga* but also by other particles such as *-wa* (topic) and *-mo* ‘also.’ Of particular importance here is the grammaticality contrast between (20a) and (20b), and (21a) and (21b). When the subjects are marked by the nominative Case particle *-ga*, extraction is possible, as in the (a) cases, but when they are marked by the topic particle *-wa* and *-mo* ‘also,’ extraction is not possible, as in the (b) cases. To see the point, consider the schematic derivation of (20b), given in (22):

(22) *Extraction from non-Case-marked subjects in Japanese: (20b)*



In (22), the topic(*wa*)-marked noun phrase (NP) meaning ‘the fact that Mary bought what’ occupies the SPEC of *v* as EA. The resultant SO is {NP-*wa*, *vP*}, constituting an unlabelled SO. Even under Saito’s LA, the SO is not labeled and remains unlabelable because *-wa* (topic) is not a Case particle. Now *nani-o* ‘what’ is in the deep interior of the unlabelable SO. Hence *nani-o* ‘what’ is inaccessible to Search(C) and thus cannot be the input of Merge(C). (20b) can be explained in the same way. The impossibility of extraction out of non-Case-marked subjects in Japanese follows from OMS+MSL.¹⁴

In this way, the extraction phenomena in English (12), Japanese (16), and its kin (20)–(21) naturally follow from OMS+MSL, in collaboration with the independently motivated principles of LA.¹⁵ In the next section, we extend OMS+MSL to the extraction phenomena in German. More specifically, it is shown that not only the long-standing puzzle (5a, b), but also its kin immediately follow from OMS+MSL, in conjunction with an independently motivated principle of LA in V2 languages (Blümel 2017).

3 Extensions

This section is devoted to showing that the combination of OMS+MSL with constructions which have independently been suggested to be unlabeled correctly predicts their syntactic opacity. More specifically, embedded V2-clauses in V2-languages are characteristically islands and have been argued to be unlabeled (cf. Blümel 2017). As we will show, their islandhood follows without stipulation given the aforementioned principles OMS+MSL.

3.1 Core properties of V2 and obligatory labeling failures CP-level V2-languages have distinctive core properties, which are listed below:

- (i) Obligatoriness of prefield occupation: In declarative root contexts, at least one XP must occupy the position before the finite verb (the ‘prefield’/*Vorfeld*), traditionally termed SPEC-C.
- (ii) Root: V2 is a root phenomenon.
- (iii) Promiscuity: An XP of any category can occur before the finite verb.
- (iv) Uniqueness: No more than one XP can figure in V2-contexts.
- (v) Obligatoriness of V-in-C: The finite verb is in C.

Space prevents us from giving illustrations of the well-known facts behind these generalizations. Suffice it to say that a novel analysis to capture the relationship between the root-character of V1/V2 and V-in-C (point (ii) and (v)) is currently being explored in ongoing work by Blümel & Goto, which crucially involves the idea that

¹⁴ Clearly, if we are to conciliate the analysis proposed above with OMS+MSL and attain a deeper understanding of the system, we need to find principled explanations for these asymmetries, i.e. for why the non-Case particles such as *-wa* and *-mo do* contribute to labeling, unlike the Case particle. For refinement of the system, see Goto (2019), where he provides a principled explanation of the asymmetry in terms of the CI-interface based approach to language design.

¹⁵ In addition to the phenomena discussed above, Goto (2016) shows OMS+MSL gives us a unified account of (cross-linguistically) various extraction phenomena related to the *Coordinate Structure Constraint* (CSC), the *Specific Condition*, the *Complex NP Constraint* (CNPC), the *Freezing Principle*, and the *Proper Binding Condition* (PBC). For details, see Goto (2016).

root clauses are obligatorily exocentric (cf. Goto 2013; Blümel 2017, Chomsky, Gallego, & Ott 2019). As we will argue below, (iv) and other independent characteristics of V2 are likewise captured, assuming OMS+MSL.

Blümel’s (2017) suggests an analysis to tackle the properties (i), (ii), and (iii) and formulates the central puzzle of prefield occupation, illustrated with German:

- (23) **Prefield-Occupation:**
 In German declarative root(-like) contexts at least and at most one XP must occupy the position before the finite verb (V2 -- the position of the so-called left sentence bracket).

Adopting the LA in Chomsky (2013; 2015), he ventures the following hypothesis:

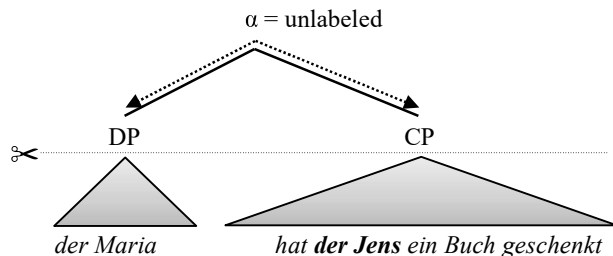
- (24) **Root Exocentricity:**
 Declarative root clauses must not receive a label.

The upshot of his analysis is that V2-clauses are {XP, YP}-structures without the need of being labeled and indeed with **the requirement to remain unlabeled** as (24) states. If this requirement holds, the obligatoriness of prefield occupation and the category-insensitivity of the fronted XP follow without ado: {C+V, TP}=CP_{V2} as such is a labeled category in violation of (24). LA is suppressed and (24) can be met if XP is present in – moved into – (what used to be) SPEC-C, forming {XP, CP_{V2}}. This way, properties (i) and (iii) are derived. Notice that given free Merge, movement of an XP into the prefield may happen or may not happen, i.e. Merge as such is strictly optional. However, by (24) a declarative interpretation only comes about if merger of an XP to the sister position of CP_{V2} happens. We believe that there is a certain naturalness to this type of analysis: As is well-known, V2-sentences are confined to root contexts (cf. e.g. den Besten 1983[1977], Reis 1997 on Dutch and German). In root contexts, no selection by a higher head is involved. Arguably, selectional relations involve sisterhood by a selecting head and a **labeled** category.¹⁷ Thus, we might say that at the point the derivation terminates, the root clauses’ exocentricity is not a defect but is expected, elucidating property (ii). This way, three (out of five) core properties of V2 mentioned above are derived: obligatoriness of filling the “prefield,” the confinement of V2 to root-contexts and the promiscuity of the fronted XP. Given that a Minimalist goal is to specify not just stating what UG comprises but *why* UG is the way it is, Blümel’s (2017) analysis of V2 arguably goes beyond explanatory adequacy (cf. Chomsky 2004).

3.2 Novel analyses, given unlabeled V2 and OMS+MSL Of the two remaining properties above, the problem of uniqueness is still unsolved: Given free Merge, nothing prevents one further phrase (or many) from Merging with unlabeled {XP, CP_{V2}}. We would like to propose that under current assumptions, this problem can be tackled by employing OMS+MSL: The ban on V3 (and Vn) derives because IM of an XP¹⁸ out of an unlabeled V2-clause inevitably violates OMS+MSL. The following examples are all from German, and (25) exemplifies a V3-clause: SU>IO>C/V_{fin} involves the necessity to search into the deep interior of CP_{V2} within α ={DP, CP_{V2}}. This however, is banned by OMS+MSL:

- (25) *_[DP Der Jense]_i [_{α} [_{DP der Maria}] hat _{*t*}_i ein Buch geschenkt].
 the.NOM J. the.DAT M. has a book given

(26) *The ban on V3/Vn (extraction from an unlabeled α /V2-clause)*



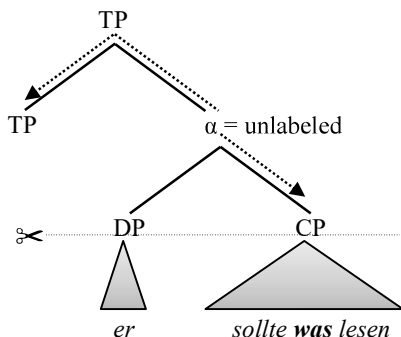
¹⁷ “Each SO generated enters into further computations. Some information about the SO is relevant to these computations. In the best case, a single designated element should contain all the relevant information: **the label [...]. The label selects and is selected in EM.**” (Chomsky 2008: 141, emphasis AB & NG)

¹⁸ Notice that base-generation of prefield-XPs (cf. e.g. Frey 2005) is still an unresolved issue, which does not follow from OMS+MSL: As no search of the derived structure is involved, V3/Vn by base-generation is in principle permitted, given free Merge. We have to leave solving this explanatory lacuna for a future occasion.

A related prediction concerns extraction from embedded V2-clauses, which is impossible, i.e. V2-clauses are extraction islands. The logic of the explanation here is identical to the ban on V3: Since $\alpha = \{XP, CP_{V2}\}$ is unlabeled, search into the interior of CP_{V2} is precluded by OMS+MSL:

- (27) *Was_i glaubst du, [_{α} er sollte t_i lesen]?
 what believe you he should read

- (28) V2-islands

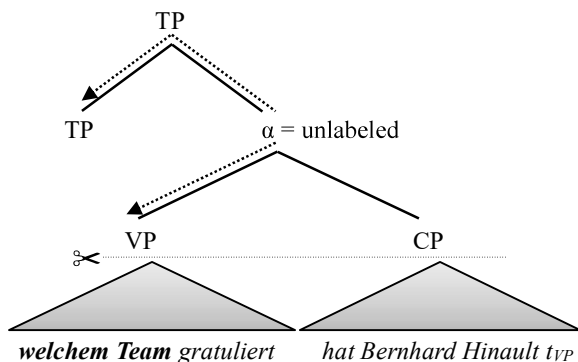


In this way, the ban on V3 (or Vn) is analytically assimilated to V2-islands.

Notice, finally, that our current approach predicts that search into the interior of XP (not just the interior of CP_{V2}) within α is likewise banned. This can be straightforwardly adopted to account for so-called freezing effects with V2, cf. (29a) in contrast to (29b) as recently belabored by Müller (2018). (29a) combines two movement operations: A VP undergoes fronting to SPEC-C. Subsequently, *wh*-movement applies to the grammatical object within this VP.¹⁹ In the current context, these facts fall out from the assumptions made: Fronting VP yields an unlabeled category. Search is required to sub-extract material from the antecedent-VP. Search, however, is “myopic” and confined by OMS+MSL and thus terminates before the *wh*-phrase can be found – the impossibility of sub-extraction an XP from a fronted YP follows from OMS+MSL. In the specific case at hand, VP represents the deep interior of unlabeled α and thus a barrier to movement of material within VP:

- (29) a. *Welchem Team_i denkst du [_{α} [_{VP} t_i gratuliert]_j hat Bernhard Hinault t_j]?
 which.DAT team think you congratulated has B. H.
 b. Welchem Team_i denkst du hat Bernhard Hinault [_{VP} t_i gratuliert]?
 which.DAT team think you has B. H. congratulated
 ‘Which team do you think that Bernhard Hinault congratulated?’

- (30) Freezing in V2-contexts



4 Conclusion

The current approach unifies disparate phenomena from basic and independently motivated ideas:

¹⁹ VP-fronting into SPEC-C in V2-contexts is independently available in German. Similar freezing effects can be constructed with DPs e.g. *was-für*-split, extraction from NPs, etc., each of which is ungrammatical.

Optimization of Merge by Search (OMS) and Minimization of Search under Labelability (MSL) (Goto 2016) captures numerous island phenomena while leaving leeway for extraction cases which are licit (such as Case marked subjects in Japanese). We have proposed that the idea naturally links up with Blümel's (2017) claim that V2-languages involve an exocentric structure {XP, CP_{V2}} and delivers novel accounts for the ban on V3, the islandhood of V2 and freezing effects in complex prefields.

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The Syntax of Sentential Negation in Standard Arabic and Jazani Arabic

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1 Introduction

An essential property of any language is to be able to give the opposite meaning of a statement. Every language, including Arabic, has its own negation system with its own negative markers and strategies. Furthermore, “Negative markers can be sensitive to mood, aspectual, or temporal distinctions, as well as to the type of clause in which they occur (e.g. declarative versus imperative)” (Zanuttini, 1997, p. 512). Payne listed four such strategies to express sentential negation cross-linguistically (as cited in Zanuttini, 1997). According to him, some languages use only one strategy, while others employ more than one. One method “of negating a clause is to add a negative marker that has the characteristics of a verb taking a sentential complement” (p. 513). The following example is from the Polynesian language Tongan.¹

- (1) Na'e 'ikai ke 'alu 'a Siale
ASP NEG ASP go ABL Charlie
'Charlie didn't go.'

Another strategy Payne listed is to use a negative marker that has the properties of a finite auxiliary (carrying person, number, tense, aspect, or mood affixes) followed by the lexical verb in a non-finite participle form (as cited in Zanuttini, 1997). This method is exemplified in (2) with the Siberian language Evenki, of the Tungus family.

- (2) Bi ə-ə-w dukuwun-ma duku-ra
I NEG-PST-1SG letter-OBJ write-PART
'I didn't write a letter.'

A common strategy is to add a negative marker that appears in the form of a particle (e.g., Russian *ne*) or that can exhibit sensitivity to mood (e.g., Hungarian *ne/nem*), tense, or aspect (e.g., Arabic *lam/la*). An example from Welsh is given in (3).

- (3) Nid yw'r bachgen ddim yn hoffi coffi
NEG is.the boy NEG in like coffee
'The boy does not like coffee.'

The last strategy Payne mentions is that negative markers can be part of the derivational morphology of the verb, as a prefix, suffix, or infix. For example, Turkish *-me-* precedes the affixes expressing tense, mood, person, and number and follows those indicating reciprocals, reflexives, causatives, and passives, as shown in (4) from Ouhalla and Shlonsky (2002).

- (4) ma mf-af Omar
NEG1 go.3SG.M-NEG2 Omar
'Omar did not go.'

¹ Unless otherwise indicated, examples are from the author's intuitions as a native Arabic speaker.

Negation in Standard Arabic and modern colloquial dialects of Arabic is expressed in diverse ways that have led to its being studied extensively by many linguists, including Benmamoun (2000), Al-tamari (2001), Eid (1991), Alsalem (2012), Harrama (1983), and Al-Horais (2017). In addition, Al-Shurafa (2006) examined Kuwaiti Arabic, Al-Momani (2011) Jordanian Arabic, and Qafisheh (1996) Yemeni Arabic. Benmamoun (2000) and Ouhalla and Shlonsky (2002) identified five negative elements in Standard Arabic: *maa*, *la*, *lan*, *lam*, and *laysa*. Each element has specific features: *lam* carries past tense, *lan* carries future tense, and *laysa* inflects for agreement, whereas *laa* and *maa* carry neither tense nor agreement.

The aim of this paper is to describe the syntax of negation particles in Standard Arabic and other Arabic dialects. Furthermore, it explores the extent to which a unified analysis of negation in Arabic is possible and details those phenomena that resist a unified account by presenting examples from corpora and previous studies of negative expressions in Standard Arabic and other Arabic dialects. The following section illustrates the syntactic structure of Arabic sentences, such as word order, nominal and verbal clauses, and verb tense. The next section discusses sentential negation in Standard Arabic in general. The last section discusses the syntactic structure of the negative marker *ma* in Jazani Arabic.

2 Sentence structure in Standard Arabic

This section examines word order, nominal and verbal clauses, and verb tense in Arabic syntax.

2.1 Word order in Standard Arabic Word order has been the focus of many Arabic syntactic scholars. To start analyzing sentential negation, we first need to know whether a given sentence is nominal or verbal. Word order plays a significant role in Arabic sentence structure. Some Arabic linguists have stated that a nominal sentence is a clause that does not contain a verb, while others have defined a nominal sentence as any clause that starts with a noun whether it contains a verb or not (Alamah, 1993). If a verbal sentence consists of a transitive verb, there are six possible word orders: SVO, VSO, OVS, OSV, VOS, and SOV (Alsalem, 2012), as illustrated in (5).

- (5)
- a. SVO
 Ahmed-u ?kala t-tuffaha-ta
 Ahmed-NOM eat.3SG.M.PST the-apple-ACC
 ‘Ahmed ate the apple.’
 - b. VSO
 ?kala Ahmed-u t-tuffaha-ta
 eat.3SG.M.PST Ahmed-NOM the-apple-ACC
 ‘Ahmed ate the apple.’
 - c. OVS
 t-tuffaha-ta ?kala Ahmed-u
 the-apple-ACC eat.3SG.M.PST Ahmed-NOM
 ‘Ahmed ate the apple.’
 - d. OSV
 t-tuffaha-ta Ahmed-u ?kala
 the-apple-ACC Ahmed-NOM eat.3SG.M.PST
 ‘Ahmed ate the apple.’
 - e. VOS
 ?kala t-tuffaha-ta Ahmed-u
 eat.3SG.M.PST the-apple-ACC Ahmed-NOM
 ‘Ahmed ate the apple.’
 - f. SOV
 Ahmed-u t-tuffaha-ta ?kala
 Ahmed-NOM the-apple-ACC eat.3SG.M.PST
 ‘Ahmed ate the apple.’

The tree diagram of word order VSO from (5b) is given in Figure 1.

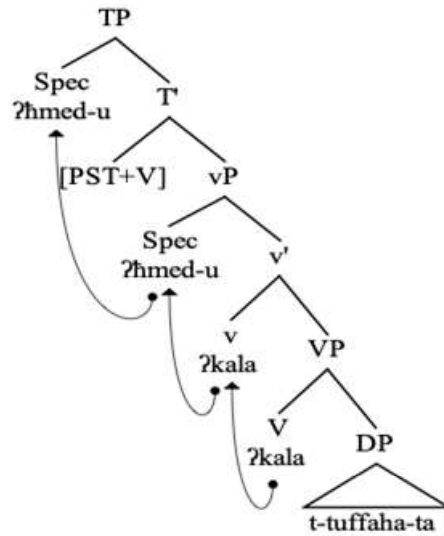


Figure 1. Tree diagram of (5b).

The instances above do not have the same pragmatic context; each word order indicates a specific context. For instance, VSO focuses on the verb *ʔkala-a*, while in SVO, the focus is on the subject, and in OVS, the focus is the object *t-tuffaha-ta*.

2.2.1 Nominal clause Arabic is a zero-copula language since it does not need a verb in a nominal sentence; the clause is initiated with a construction called the *mubtadaʔ*, which is *ʔhmed-u* in (6a), and the second part of the clause is called the *xabar*, as in *mudir-un* in (6a). Since there is no copula in the nominal sentence, tense is an important aspect in forming nominal tense, especially present tense, where the copula is not present (Fassi, 1993; Neʕmat, 1973). For instance, in (6a), the nominal sentence *Ahmed-u mudeer-un* is in the present, where *Ahmed-u* is the subject of the sentence, which could be a pronoun *huwa* as in (6b). The verbal copula is absent in these cases. In perfective and future forms, the nominal sentence is unacceptable in Standard Arabic, as there must be a verb in the sentence (Bakir, 1980; Benmamoun, 2000; Fassi, 1993). In (5a), the sentence is called a nominal clause because it starts with a noun phrase *Ahmed-u*, while in (5b), the clause is called a verbal clause because it starts with a verb. Example (6) illustrates a nominal clause without a verb. It contains two parts: a subject *Ahmed*—which could be a proper noun as in (6a) or a pronoun as in (6b)—and a second noun or noun phrase.

- (6)
- | | | | | |
|----|--------------------------|--------------|--------|--------------|
| a. | ʔhmed-u | mudeer-un | | |
| | Ahmed-NOM | director-NOM | | |
| | 'Ahmed is a director.' | | | |
| b. | huwa | sawfa | yakunu | mudeer-an |
| | he.NOM | FUT.be.3SM | be | director-ACC |
| | 'He will be a director.' | | | |

2.2.2 Verbal clause According to Benmamoun (2000), there are two forms of Arabic verbs, which differ in their agreement and mood morphology. The perfective is the past tense and appears as a suffix. The imperfective is the present tense and appears as a prefix that shows gender and first-person plural and as a suffix showing singular or plural. Tables 1 and 2 summarize imperfective and perfective forms in Standard Arabic and modern Saudi Arabic dialects, taken from Benmamoun (2000).

A significant feature of the perfective is that it requires a verbal predicate, while in the imperfective, a verbal predicate is not necessary in all sentences. For example, in a nominal sentence, there is no verbal predicate in the clause.

Person	Number	Gender	Affix	Verb+Affix
1	Singular	M/F	-tu	daras-tu
	Plural	M/F	-naa	daras-naa
2	Singular	M	-ta	daras-ta
		F	-ti	daras-ti
	Dual	M/F	-tumaa	daras-tumaa
		Plural	M	-tum
	F		-tunna	daras-tunna
3	Singular	M	-a	daras-a
		F	-at	daras-at
	Dual	M	-aa	daras-aa
		F	-ataa	daras-ataa
	Plural	M	-uu	daras-uu
		F	-na	daras-na

Table 1. Perfective forms.

Person	Number	Gender	Affix	Verb+Affix
1	Singular	M/F	ʔa-	ʔa-drusu
	Plural	M/F	na-	na-drusu
2	Singular	M	ta-	ta-drusu
		F	ta-iin	ta-drus-iina
	Dual	M	ta-aani	ta-drus-aani
		F	ta-aani	ta-drus-aani
Plural	M	ta-uuna	ta-drus-uuna	
	F	ta-na	ta-drus-na	
3	Singular	M	ya-	ya-drusu
		F	ta-	ta-drusu
	Dual	M	ya-aani	ya-drus-aani
		Plural	M	-uu
	F		-na	daras-na

Table 2. Imperfective forms.

Future tense in Standard Arabic is formed by adding the *sa* or *sawfa* particle before an imperfect verb. In (7a), *a-ktub-u* is in the first-person singular present tense. The future particles *sa* and *sawfa* in (7b)-(7c) precede the verb *a-ktub-u*, while (7d) is ungrammatical because a future particle in Standard Arabic must precede the verb; if the particle comes after the verb, the sentence becomes unacceptable. In (7e), the sentence is ungrammatical because the future particle precedes the past-tense verb *kataba*.

- (7)
- a. a-ktub-u
write.1SG.PRS-IND
'I write.'
 - b. sa-aktub-u
FUT-I-write1SG.PRS-IND
'I will write.'
 - c. sawfa-aktub-u
FUT-I-write1SG.PRS-IND
'I will write.'
 - d. *aktub-u-sawfa/s
FUT-I-write1SG.PRS-IND
'I will write.'
 - e. *sawfa/s-ktub-tu
FUT-I-write1SG.PST-IND
'I will write.'

2.3 Sentential negation in Standard Arabic This section gives a brief description of negative markers in Standard Arabic. As stated previously, the main negative elements in Standard Arabic are *laa*, *lam*, *lan*, *maa*, and *laysa* (Benmamoun, 2000; Ouhalla & Shlonsky, 2002), which can be divided into three groups: negation with *lan*, *lam*, and *laa*; negation with *laysa*; and negation with *maa*. Each group is discussed below. Benmamoun adapted the NegP Hypothesis, which states that negative particles head their own functional projections (as cited in Al-Momani, 2011), as shown in Figure 2.

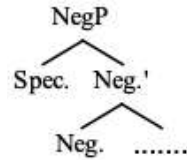


Figure 2. NegP Hypothesis (Benmamoun, 2000).

2.3.1 First group of negative markers in Standard Arabic The first group of negative markers includes *laa*, *lam*, and *lan*. The marker *laa* is always in the present tense, *lam* carries past tense, and *lan* carries future tense, as shown in (8a)-(8c). All these elements appear with only the imperfective form. If any members of this group occur with past tense, the result will be ungrammatical, as in (9a)-(9c).

- (8)
- a. **laa** y-katab-u l-dars-a
NEG 3SG.M-write-PRS the-lesson-ACC
'He doesn't write his lesson.'
 - b. ?al-fatat-u **lam** tu-safer
the-lady-NOM NEG.PST 3SG.F-travel.PRS
'The lady did not travel.'
 - c. Khalid-u **lan** y-safer
Khalid-NOM NEG.FUT 3SG.M-travel
'Khalid will not travel.'
- (9)
- a. ***laa** katab-a l-dars-a
NEG write.3SG.M-PST the-lesson
'He did not write the lesson.'
 - b. *?al-fatat-u **lam** safara-t
the-lady-NOM NEG.PST travel.3SG.F
'The lady did not travel.'
 - c. *Khalid-u **lan** safar-a
Khalid-NOM NEG.FUT travel.PST.3S.M
'Khalid will not travel.'

Benmamoun (2000) provided a syntactic representation for this first group of negative elements. He stated that negative markers in Arabic head their own functional projections and that the NegP projection occurs between the tense phrase (TP) and verb phrase (VP). Thus, negative elements in Standard Arabic occupy the head of Neg (as cited in Alsalem, 2012), as shown in Figure 3.

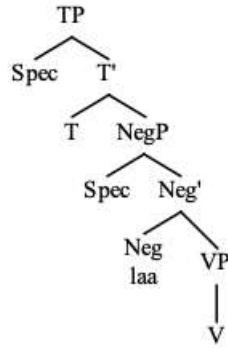


Figure 3. Syntactic representation of first group of negative elements.

The verb cannot move to tense across the negative head to yield an ungrammatical form. These sentences are ungrammatical because they violate minimality, as illustrated in (10), taken from Aoun, Benmammoun, and Choueiri (2010).

- (10) a. *t-tullaab-u daras-uu laa
 the-students-NOM study-PST.3MP NEG
 'The students studied.'
- b. *t-tullaab-u sa-ya-drus-uu-n laa
 the-students-NOM FUT-3-study-MP-IND NEG
 'The students studied.'

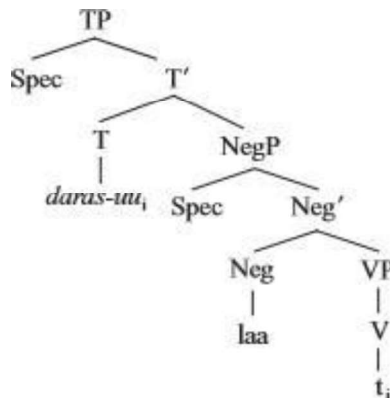


Figure 4. Tree diagram of (10a).

2.3.2 Second group of negative markers in Standard Arabic The second group comprises *laysa*, which only occurs with present tense. It agrees with the subject in gender and number, as in (11), where *laysa* becomes *laysa-t* to indicate that the following subject is singular and feminine.

- (11) a. **laysat** t-talibat-u ya-drusunna
 NEG.3SG.F the-student-NOM 3PL.F-study
 'The students don't study.'
- b. al-θoub-u **laysa** jaded-un
 the-dress-NOM NEG.2SG.M new-ACC
 'The book is not new.'

2.3.3 Third group of negative markers in Standard Arabic The third group of negative particles comprises *maa*. Regarding *maa* in Standard Arabic, Moutaouakil (1993) illustrated a variety of contexts presented in (12) (as cited in Aoun et al., 2010). In (12a), *maa* precedes the perfective form *saafarat*. In (12b), it negates a habitual present-tense sentence. In (12c), it negates a non-verbal sentence with a nominal

predicate. In (12d) and (12e), *maa* negates adjectival and PP predicates, respectively.

- (12) a. **maa** saafar-at Hind-un
 NEG travel.PST.3SG.F Hind-NOM
 ‘Hind did not go on a trip.’
- b. **maa** yu-saafiru ʕamr-un ʔilla fii s-sayfi
 NEG 3SG.M-travel.PRE Amr-NOM except in the-summer
 ‘Amr travels only during the summer.’
- c. **maa** muhammadun kaatib-un
 NEG Mohammad writer.3SG.M-NOM
 ‘Mohammad is not a writer.’
- d. **maa** hindun haziinatun
 NEG Hind sad.ADJ
 ‘Hind is not sad.’
- e. **maa** xaalid-un fii l-bayt-i
 NEG Khalid-NOM.3SG.M in the-house-ACC
 ‘Khalid is not in the house.’

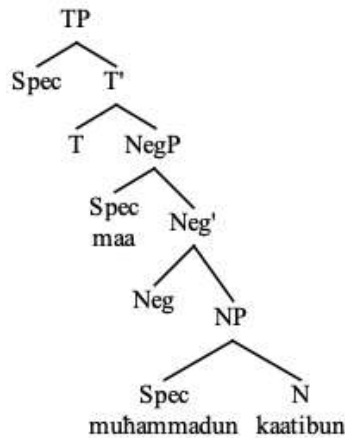


Figure 5. Tree diagram of (12c).

3 Sentential negation in Jazani Arabic

Different instances of sentential negation in Standard Arabic showed that *maa* is different from all other negative markers because it does not carry tense. In addition, *maa* occupies positions in both nominal and verbal constructions. This section explores a variation of *maa* in Jazani Arabic. Jazan is a city in the southwest corner of Saudi Arabia, bordering Yemen to the south.

In Jazani Arabic, sentential negation is expressed by three elements in verbal sentences: the proclitic *ma*, the single negator *mif*, and the bipartite negative marker *ma...f*. The particle *ma* negates verbal sentences, while the bipartite negative marker *ma...f* only appears in verbal sentences and nominal clauses that start with pronouns, as explained in the following examples. The particle *mif* only negates nominal clauses. The two negation patterns of the bipartite negative marker *ma...f* and single negator *mif* do not exist in Standard Arabic.

3.1 Bipartite negative marker *ma...f* The particle *ma...f* negates verbs in present and past, but not future tense. In (13a), the clause is in VSO word order; the pre-verbal *ma* appears before *ʔkal*, and the verb is in the past tense with the enclitic *-f* attached to it. In (13b), the sentence has VSO word order. This word order is grammatical as the verb agrees with the subject in gender and number, but the enclitic *-f* is attached to the verb without the negative marker *ma*. The absence of *ma* results in an ungrammatical sentence in Jazani Arabic as both *ma* and *-f* must be present in the same sentence. In (13c), the word order is SVO, and

the sentence is grammatical. The bipartite negative particle *ma...f* is attached to the verb in the past tense. In (13d), *ma...f* is attached to the verb in the present tense *yʔkal*. In (13e), the verb is in future tense; negating a future-tense clause via *ma...f* results in an ungrammatical sentence in Jazani Arabic.

- (13) a. **ma-ʔkal-f** l-walad futur-uh
NEG1-2SG.M-eat.PST-NEG2 the-boy breakfast-his
'The boy didn't eat his breakfast.'
- b. *ʔkal-f l-walad futur-uh
eat.PST.3SG.M-NEG2 the-boy breakfast-his
'The boy didn't eat his breakfast.'
- c. l-walad **ma-ʔkal-f** futur-uh
the-boy NEG1-3SG.M.eat.PST-NEG2 breakfast-his
'The boy didn't eat his breakfast.'
- d. **ma-yʔkal-f** l-walad futur-uh
NEG-eat.PST.3SG.M-NEG the-boy breakfast-his
'The boy didn't eat his breakfast.'
- e. ***ma** sa-ʔkal-f l-walad futur-uh
NEG FUT-eat.3SG.M-NEG the-boy breakfast-his
'The boy will not eat his breakfast.'

As shown in these examples, *ma...f* works to negate past- and present-tense verbs in different word orders; *ma...f* must co-occur in the same sentence for sentential negation to be grammatical, as the absence of either *ma* or *-f* in negation would be ungrammatical. Table 3 presents this marker with various pronouns.

Gloss	Jazani Pronoun	Bipartite negative marker <i>ma...f</i>
NEG+I.M/FS + NEG	ana	maa-ni-f
NEG+you.MS + NEG	anta	maa-nta-f
NEG+you.FS + NEG	anti	maa-ntin-f
NEG+he + NEG	huwa	maa-hu-f
NEG+she + NEG	heya	mahi-f
NEG+we.P.M/F + NEG	nahnu	ma-hnaa-f
NEG+you.P.M + NEG	antum	ma-ntum-f
NEG+you.P.F+ NEG	antun	ma-ntun-f
NEG+they.P.M+NEG	hum	ma-hum-f
NEG+they.P.F+NEG	hun	ma-hun-f

Table 3. Examples of pronouns with *ma...f*.

The examples in (14) investigate previous examples of *ma...f* with pronouns in Table 3. In (14a), the negative particle *ma* precedes the pronoun *huwa*, while the enclitic *-f* is attached to the pronoun. The same system occurs in (14b). Regardless of the person and number, pronouns in Jazani Arabic construct the negative using this same method.

- (14) a. **ma-huwa-f** jameel
NEG1-he-NEG2 beautiful
'He is not beautiful.'
- b. **ma-hum-f** t-tullab
NEG1-they-NEG2 students
'They are not students.'

3.2 Single negative marker *mif* The negator *mif* is used to negate nominal sentences that start with a proper noun or pronoun. Example (15a) is a nominal sentence that starts with the pronoun *huwa*. The independent negative marker *mif* precedes the adjective predicate *Jameel*. The same situation can be seen in (15b)-(15d). In (15e), the sentence is ungrammatical because it negates the past tense verb *katab*, and *mif* is

only allowed to negate nominal clauses in Jazani Arabic. Figures 7 and 8 illustrate (15c)-(15d).

- (15) a. Huwa **mif** jameel
 he NEG beautiful
 'He is not beautiful.'
- b. Hiya **mif** Jameel-a
 she NEG beautiful-F
 'She is not beautiful.'
- c. Hum **mif** t-tullab
 they NEG students
 'They are not students.'
- d. Ahmed **mif** jameel
 Ahmed NEG handsome.M
 'Ahmed is not handsome.'
- e. Al-bayt-u **mif** kabir
 the-house-NOM NEG big
 'The house is not big.'
- f. *Al-walad-u **mif** katab dars-uh
 the-boy-NOM NEG write.3SG.M.PST lesson-his
 'The boy did not write his lesson.'

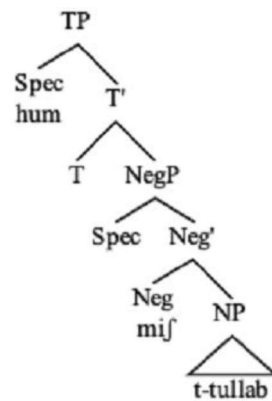


Figure 7. Tree diagram of (15c).

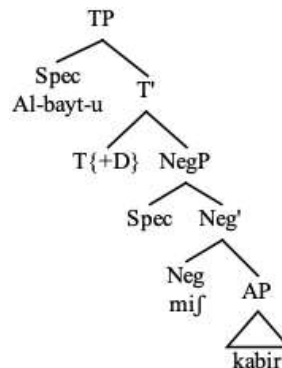


Figure 8. Tree diagram of (15d).

3.3 Negative marker *ma* In Jazani Arabic, the particle *ma* is used to negate perfective and imperfective, as illustrated below. In (16a), the negative marker *ma* appears before the present verb *aktub* and past tense *katabu*. In (16c), the negation failed because the negative marker *ma* must appear before the verb.

- (16) a. ana **ma** ?ktub
I NEG write1SG.PRS
'I will write.'
- b. Ahmed wa Khalid **ma** katabu
Ahmed and Khalid NEG write3SG.PST
'Ahmed and Khalid did not write.'
- c. *Maha katabat **ma** darsaha
Maha write3SG.PST NEG lesson-her
'Maha did not write her lesson.'

3.4 Sentential negation in future tense in Jazani Arabic In Jazani Arabic, *rah* must precede the verb in the present tense to form sentential negation in the future, as shown in (17a)-(17b) with and without negation.

- (17) a. ana *rah* aktub
I FUT 1SG.M.write.PRS
'I will write.'
- b. ana **ma** *rah* aktub
I NEG FUT write1SG.PRS
'I will not write.'
- c. Ahmed **ma** *rah* jaʃ-rab
Ahmed NEG FUT 3SG.M-drink.PRS
'He is not going to drink.'

4 Conclusion

This paper highlighted the varied syntax of sentential negation in Standard Arabic and Jazani Arabic. After discussing Arabic word order, clause, and tense patterns, it discussed sentential negation in Standard Arabic, which contains five negative markers: *la*, *lam*, *lan*, *ma*, and *laysa*. The marker *lan* negates future tense, *lam* negates past tense, and *laysa* inflects for agreement. The markers *laa* and *maa* do not carry tense or agreement. Next, *ma* and associated negative markers in Jazani Arabic were discussed. The discontinuous negative marker *ma...ʃ* appears with verbal sentences, the independent negative marker *mif* appears with nominal sentences, and the negator *ma* appears with sentences in the future tense. Based on his evidence, it appears the negator *ma* is from Standard Arabic, while *ʃ* developed from the word *ʃayʔ* 'thing' (Ouhalla & Schlonsky, 2002). Benmamoun (2000) stated that *ʃ* seems to have evolved relatively recently to reinforce *ma*. Finally, from the data provided in the Jazani Arabic section, the negative particles *ma* and *-ʃ* are not found in Standard Arabic. In addition, the use of the negative particle *ma* in Jazani Arabic is similar to *ma* in Standard Arabic.

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Serial Tonal Derivations in Southern Taiwanese Diminutive Structure

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1 Introduction

This paper discusses the serial tone changes in diminutive structure of Southern Taiwanese. Southern Taiwanese refers to the accent spoken in the southern part of Taiwan, particularly, in Kaohsiung City and Tainan City. In Taiwanese, there is a diminutive suffix: -a, whose base tone is a high-falling tone, HM. The syllable in the pre-a position shows a two-step tone change, as in (1).

(1) Smooth tones: pre-a (Hr/Lr: high/low register. h/l: high/low pitch melody.)

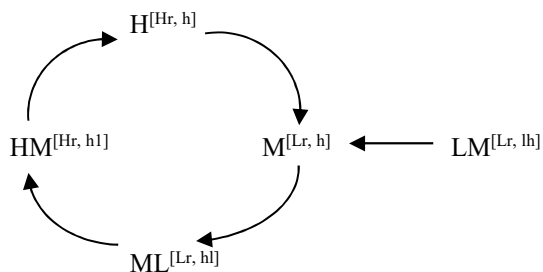
Base tones	H ^[Hr, h]	LM ^[Lr, lh]	M ^[Lr, h]	HM ^[Hr, hl]	ML ^[Lr, hl]
Regular tone change	M ^[Lr, h]	M ^[Lr, h]	ML ^[Lr, hl]	H ^[Hr, h]	HM ^[Hr, hl]
Extra tone change	MH ^[Lr, lh]			H ^[Hr, h]	

The table in (1) shows that for the pre-a tone, regular tone sandhi applies first and then an extra tone change follows. Classic OT (Prince and Smolensky 1993/2004) is a parallel version of grammar, which allows no serial derivation. I will argue in this paper that Harmonic Serialism (McCarthy 2008, 2010, 2016), which is a serial version of OT, better accounts for the pre-a two-step tone change in Southern Taiwanese.

2 Regular tone sandhi

Tone sandhi is a common phenomenon among Chinese dialects. An isolated syllable usually carries a base tone in the output, but undergoes tone change in connected speech. In Taiwanese, each base tone has a corresponding sandhi form. The regular tone sandhi in this language shows a series of chain shifts, as illustrated in (2). Namely, LM maps to M, M maps to ML, ML maps to HM, HM maps to H, and then H maps to M. Examples are given in (3).

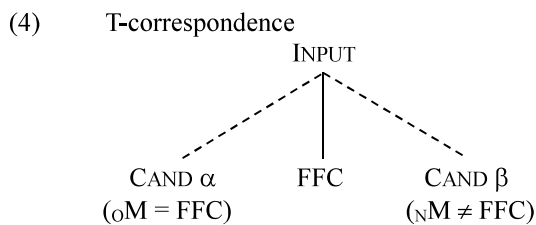
(2) Tonal chain shifts (cf. also Chen 1987, 2000; Hsiao 1991, 1995).



* I would like to thank the Ministry of Science and Technology in Taiwan for sponsoring this research, under the grant MOST#107-2410-H-004-115-MY2.

- (3)
- | | | |
|--|---|---|
| a. <i>hiLM tiLM</i> ‘fish pond’ | → | <i>hiM tiLM</i> |
| b. <i>kimH tsengH</i> ‘gold brick’ | → | <i>kimM tsengH</i> |
| c. <i>tauM p^hueLM</i> ‘bean skin’ | → | <i>tauML p^hueLM</i> |
| d. <i>ts^hinML t^hauLM</i> ‘weigh’ | → | <i>ts^hinHM t^hauLM</i> |
| e. <i>kauHM t^hauLM</i> ‘dog’s head’ | → | <i>kauH t^hauLM</i> |

Hsiao (2015) employs the theory of Comparative Markedness (McCarthy 2003) to explain the regular tone sandhi. This theory distinguishes two kinds of markedness violations: old markedness violations and new markedness violations. Old markedness violations are shared with the fully faithful candidate, FFC. New markedness violations are not shared with the fully faithful candidate, FFC. Comparative markedness is rooted in two notions, t-correspondence and violation locus. The t-correspondence relates two output candidates through a transitivized correspondence by way of a shared input, as illustrated by the schema in (4).



The violation locus refers to the spot in an output candidate where a markedness constraint is violated. Hsiao (2015) posits two versions of the markedness constraint *T, namely, *_OT and *_NT, whose locus functions are given in (5a) and (5b).

- (5) Tonal violation loci (Hsiao 2015: 146)
- a. *_OT_i (CAND, FFC, $\mathfrak{R}t$): Let $LOC_i(CAND) = \{c_1, c_2, c_3, \dots\}$ and let $LOC_i(FFC) = \{f_1, f_2, f_3, \dots\}$. For each c_m that has a t-correspondent among f_n , assign one violation mark.
- b. *_NT_i (CAND, FFC, $\mathfrak{R}t$): Let $LOC_i(CAND) = \{c_1, c_2, c_3, \dots\}$ and let $LOC_i(FFC) = \{f_1, f_2, f_3, \dots\}$. For each c_m that lacks a t-correspondent among f_n , assign one violation mark.

In terms of comparative markedness, a language may tolerate marked structures that are inherited from the input, but ban the same structures that are invented in the output. This is referred to as grandfathering effect. The grandfathering effect is governed by the ranking where *_NT dominates faith and faith dominates *_OT. On the other hand, a reversal of grandfathering effects is also possible. A language may prohibit marked structures that are inherited from the input but allow the same structures that are newly created. This is referred to as anti-grandfathering effect. Hsiao (2015) observes that in Taiwanese anti-grandfathering effects block the emergence of non-derived tones; particularly, the sandhi position, or the non-final position, forbids a base tone but allows a sandhi tone of the same value. The anti-grandfathering effect is governed by the ranking where *_OT dominates faith and faith dominates *_NT.

Another concept used to account for the tonal chain shifts is local conjunction (Smolensky 1993, 1995). The purpose of local conjunction is to prohibit the “worst of the worst”, known as WOW effects. A conjoined constraint is violated only when both of its members are violated. The combined effects add up to a single constraint that dominates the unconjoined members individually. Conjunction of markedness and faithfulness constraints indicates that an inactive or suspended markedness member is activated when the faithfulness member is violated. The combination of anti-grandfathering effects and WOW effects makes possible the constraint rankings in (6) to govern the tonal chain shifts.

- (6) Constraint rankings for the chain shifts (Hsiao 2015: 150-153)
- a. *_OT, IDENT-REG&IDENT-CONTR, LINEARITY >> *_NT (LM → M)
- b. *_OT, IDENT-REG&IDENT-CONTR, LINEARITY >> *_NH&IDENT-REG >> *_NT (H → M)
- c. *_OT, IDENT-REG&IDENT-CONTR, LINEARITY >> *_NML&IDENT-REG >> *_NT (ML → HM)

- d. $*_{\text{O}}\text{T}$, IDENT-REG&IDENT-CONTR, LINEARITY \gg $*_{\text{N}}\text{M}&\text{IDENT-CONTR}$ \gg $*_{\text{N}}\text{T}$ (M \rightarrow ML)
 e. $*_{\text{O}}\text{T}$, IDENT-REG&IDENT-CONTR, LINEARITY \gg $*_{\text{N}}\text{HM}&\text{IDENT-CONTR}$ \gg $*_{\text{N}}\text{T}$ (HM \rightarrow H)

I do not plan to go into the details of the grammar, but the crucial point is that each tone shift changes either the register feature or the contour feature, but not both, (cf. Hsiao 2015, for further discussion). For the convenience of discussion, I will use the term TCS in the following section as a cover constraint which represents the set of constraints governing the tonal chain shifts.

The tonal chain shifts operate in sandhi position, i.e., the non-final position. Given a pair of base tones, the left tone surfaces with its sandhi form, but the right tone retains its base form. The retention of the rightmost tone is governed by the constraint in (8), and the partial constraint ranking can be posited as (9).

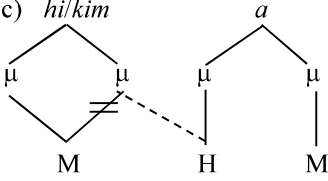
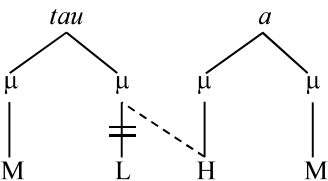
- (7) B \rightarrow S / ___ B (B: base tone. S: sandhi tone)
 (8) IDENT-R (Hsiao 2000)
 Assign a violation mark for every rightmost tone which does not retain its base form in the output.
 (9) Right retention
 IDENT-R \gg $*_{\text{O}}\text{T}$

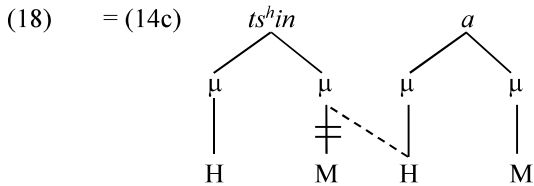
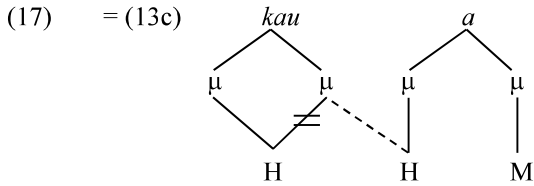
3 Diminutive tone changes

With the idea of the tonal chain shifts in mind, we can now look at the tone changes in pre-*a* position. There is a two-step tonal derivation in the pre-*a* position. That is, tone shift and high spreading. Consider the data in (10-14). The (a)-set contains the isolated base tones. In the (b)-set, the left syllables undergo tone shifts. And in the (c)-set, extra high spreading is triggered.

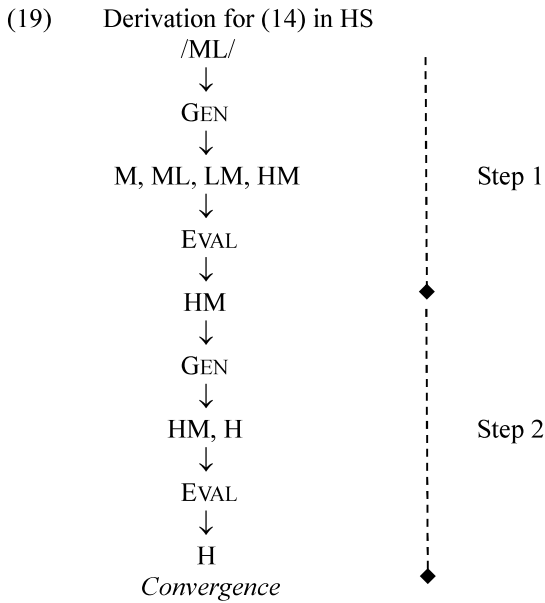
- (10) a. *hiLM* ‘fish’ b. *hiM tiLM* ‘fish pond’ c. *hiMH-aHM* ‘small fish’
 (11) a. *kimH* ‘gold’ b. *kimM tsengH* ‘gold brick’ c. *kimMH-aHM* ‘small gold’
 (12) a. *tauM* ‘bean’ b. *tauML p^hueLM* ‘bean skin’ c. *tauMH-aHM* ‘small beans’
 (13) a. *kauHM* ‘dog’ b. *kauH t^hauLM* ‘dog’s head’ c. *kauH-aHM* ‘small dogs’
 (14) a. *ts^hinML* ‘scale’ b. *ts^hinHM t^hauLM* ‘weigh’ c. *ts^hinH-aHM* ‘small scales’

The high spreading is illustrated in (15-18).

- (15) = (10c/11c) *hi/kim* *a*

 (16) = (12c) *tau* *a*


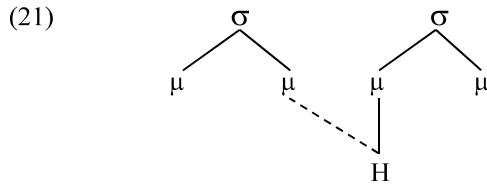


The classic OT maps between underlying and surface forms without intermediate derivations, and thus disallows serial tonal changes. In this section, I argue that Harmonic Serialism (McCarthy 2008, 2010, 2016) better accounts for the two-step tonal derivation in the pre-*a* position. Harmonic Serialism is a serial version of OT. This theory allows the output chosen by EVAL to be a new input for GEN, until the chosen output is identical with the latest input to GEN. Namely, the GEN-to-EVAL-to-GEN loop continues until convergence. Derivations in Harmonic Serialism (hereafter, HS) have to show steady harmonic improvement until convergence. And specifically, GEN is limited to making just one change at a time. The schema in (19) demonstrates an example of derivation for (14).



In (19), the input tone is ML; step 1 operates tone shift and selects HM as an intermediate output. HM then enters as the input for step 2. In step 2, high spreading applies and selects H as the optimal output, which converges in the next step. It should be noted that H is not qualified as a candidate in step 1, since it changes both register and contour features. According to Harmonic Serialism, the candidates generated by GEN in each step are limited to making just one change. I propose the alignment constraint in (20) to govern the high spreading. This constraint requires that a H melody be left-aligned to an adjacent nonhead mora. The schema in (21) illustrates this point.

- (20) ALIGN-L(H, $\mu^{-\text{HD}}$)
 Assign a violation mark for every H tone melody whose left edge does not coincide with the left edge of a preceding adjacent non-head mora ($\mu^{-\text{HD}}$).



The constraint ranking is given in (22).

- (22) Constraint Ranking
 IDENT-R >> TCS >> ALIGN-L(H, $\mu^{-\text{HD}}$)

The tableaux in (23-27) show how the serial derivations work.

- (23) a. HS analysis of /*ts^hinML-aHM*/ → *ts^hinHM-aHM* — Step 1

	IDENT-R	TCS	ALIGN-L(H, $\mu^{-\text{HD}}$)
a. <i>ts^hinLM-aHM</i>		*!	*
b. <i>ts^hinM-aHM</i>		*!	*
c. <i>ts^hinML-aHM</i>		*!	*
☞ d. <i>ts^hinHM-aHM</i>			*
e. <i>ts^hinML-aH</i>	*!	*	*

- b. HS analysis of /*ts^hinHM-aHM*/ → *ts^hinH-aHM* — Step 2

	IDENT-R	TCS	ALIGN-L(H, $\mu^{-\text{HD}}$)
☞ a. <i>ts^hinH-aHM</i>			
b. <i>ts^hinHM-aHM</i>			*!

c. Step 3: Convergence

- (24) a. HS analysis of /*tauM-aHM*/ → *tauML-aHM* — Step 1

	IDENT-R	TCS	ALIGN-L(H, $\mu^{-\text{HD}}$)
a. <i>tauLM-aHM</i>		*!	*
b. <i>tauM-aHM</i>		*!	*
☞ c. <i>tauML-aHM</i>			*
d. <i>tauH-aHM</i>		*!	
e. <i>tauML-aH</i>	*!	*	*

- b. HS analysis of /*tauML-aHM*/ → *tauMH-aHM* — Step 2

	IDENT-R	TCS	ALIGN-L(H, $\mu^{-\text{HD}}$)
a. <i>tauM-aHM</i>			*!
b. <i>tauML-aHM</i>			*!
☞ c. <i>tauMH-aHM</i>			

c. Step 3: Convergence

- (25) a. HS analysis of /kimH-aHM/ → kimM-aHM — Step 1

	IDENT-R	TCS	ALIGN-L(H, μ^{-HD})
☞ a. kimM-aHM			*
b. kimH-aHM		*!	
c. kimHM-aHM		*!	*
d. kimH-aH	*!	*	

- b. HS analysis of /kimM-aHM/ → kimMH-aHM — Step 2

	IDENT-R	TCS	ALIGN-L(H, μ^{-HD})
a. kimM-aHM			*!
b. kimML-aHM			*!
☞ c. kimMH-aHM			

c. Step 3: Convergence

- (26) a. HS analysis of /hiLM-aHM/ → hiM-aHM — Step 1

	IDENT-R	TCS	ALIGN-L(H, μ^{-HD})
☞ a. hiM-aHM			*
b. hiLM-aHM		*!	*
c. hiML-aHM		*!	*
d. hiLM-aH	*!	*	*

- b. HS analysis of /hiM-aHM/ → hiMH-aHM — Step 2

	IDENT-R	TCS	ALIGN-L(H, μ^{-HD})
a. hiM-aHM			*!
b. hiML-aHM			*!
☞ c. hiMH-aHM			

c. Step 3: Convergence

- (27) a. HS analysis of /kauHM-aHM/ → kauH-aHM — Step 1

	IDENT-R	TCS	ALIGN-L(H, μ^{-HD})
☞ a. kauH-aHM			*
b. kauHM-aHM		*!	*
c. kauML-aHM		*!	*
d. kauHM-aH	*!	*	*

- b. HS analysis of /kauH-aHM/ → kauH-aHM — Step 2 (Convergence)

	IDENT-R	TCS	ALIGN-L(H, μ^{-HD})
☞ a. kauH-aHM			
b. kauHM-aHM			*!

In tableau (23), step 1 maps ML to HM by TCS. But in step 2, the derived HM is irrelevant to TCS, and thus the constraint ALIGN-L(H, μ^{-HD}) favors H over HM. Convergence is achieved in step 3. In tableau (24), step 1 maps M to ML by TCS. But in step 2, the derived ML is irrelevant to TCS, and thus ALIGN-L(H, μ^{-HD}) favors MH over the others. Again, convergence is achieved in step 3. In tableau (25), step 1 maps H to M by TCS. But in step 2, the derived M is irrelevant to TCS, and thus ALIGN-L(H, μ^{-HD}) favors MH over the others. In tableau (26), step 1 maps LM to M by TCS. But in step 2, the derived M is also irrelevant to TCS, and thus ALIGN-L(H, μ^{-HD}) favors MH over the others. In tableau (27), step 1 maps HM to H by TCS. The derived H then converges in step 2. At this point, Harmonic Serialism successfully predicts the serial tonal derivations.

4 On an alternative analysis

A possible analysis may be as follows. Tonal chain shifts are skipped in diminutive structure, where the base tone is directly subject to High-spreading. In this case, Harmonic Serialism is not needed, but parallel OT can do the job, as shown in tableaux (28-30).

- (28) POT analysis of /*tauM-aHM*/ → *tauMH-aHM*

	IDENT-R	ALIGN-L(H, μ^{HD})
a. <i>tauM-aHM</i>		*!
($\text{\textcircled{a}}$) b. <i>tauMH-aHM</i>		

- (29) POT analysis of /*hiLM-aHM*/ → *hiLH-aHM*

	IDENT-R	ALIGN-L(H, μ^{HD})
a. <i>hiLM-aHM</i>		*!
($\text{\textcircled{a}}$) b. <i>hiLH-aHM</i>		

- (30) POT analysis of /*kauHM-aHM*/ → *kauH-aHM*

	IDENT-R	ALIGN-L(H, μ^{HD})
a. <i>kauHM-aHM</i>		*!
($\text{\textcircled{a}}$) b. <i>kauH-aHM</i>		

However, tableaux (31) and (32) show that such alternative analysis may result in incorrect predictions.

- (31) Incorrect POT prediction of /*kimH-aHM*/ → *kimH-aHM*

	IDENT-R	ALIGN-L(H, μ^{HD})	DEP
✘ a. <i>kimH-aHM</i>			
($\text{\textcircled{a}}$) b. <i>kimMH-aHM</i>			*!

- (32) Incorrect POT prediction of /*ts^hinML-aHM*/ → *ts^hinMH-aHM*

	IDENT-R	ALIGN-L(H, μ^{HD})	DEP
a. <i>ts^hinML-aHM</i>		*!	
✘ b. <i>ts^hinMH-aHM</i>			
($\text{\textcircled{a}}$) b. <i>ts^hinH-aHM</i>		*!	

The internal grammar also shows that tonal chain shifts are not absent in diminutive structures. Some examples are shown in (33-35). In (33), the leftmost *hiLM* in the diminutive compound undergoes tone shift. In (34), the leftmost *neH* in the diminutive reduplication also undergoes tone shift. In (35), the diminutive infix *-a* undergoes tone shift itself.

- (33) Diminutive compound
hiLM-wanLM-aHM ‘small fish ball’ → *hiM-wanMH-aHM*

- (34) Diminutive reduplication (baby talk)
neH-neH-aHM ‘small breast’ → *neM-neMH-aHM*

- (35) Diminutive infixation
niaoH-aHM-kĩāHM ‘small kitty’ → *niaoMH-aH-kĩāHM*

5 Summary

In summary, this paper has presented evidence for serial tonal derivations in diminutive structures. There is a two-step tonal derivation in the pre-*a* position, i.e., a tone shift and then high spreading. I propose the constraint ALIGN-L(H, μ^{HD}) to govern the high tone spreading. This constraint requires the H melody of *-a* to spread to its neighboring nonhead mora on the left. I also comment on a possible alternative analysis, which skips tonal chain shifts in diminutive structures and allows direct application of high spreading. Such alternative analysis appeals to parallel OT, which however may render incorrect predictions. I have also shown that tonal chain shifts are not absent in diminutive structures. In fact, they are found in diminutive compound, reduplication and infixation. I argue that Harmonic Serialism successfully predicts the serial tonal derivations, and is able to draw generalizations on the intermediate tone representations.

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Psych Adjectives and Their Cross-categorial Behaviors

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1 Introduction

Cheng (2015) notes that the label “psych-predicates” is for semantic reasons and suggested an applicative-like layer between a lexical projection and vP. In the words of Landau (2010), “A psychological entailment involves an individual being in a certain mental state.” In terms of syntactic aspects, Cheung & Larson (2015) stated that psych verbs appear to project the same θ -relations into inverse configurations. They also point out that Experiencer Object psych verb constructions admit backward binding in apparent violation of familiar c-command conditions (Pictures of himself anger John) and suggests an updated version of Belletti and Rizzi’s (1988) analysis that the putative Theme is a Source underlyingly c-commanded by the Experiencer. The previous studies mentioned above are concerned with psych verbs. The psych words carry unique semantic and syntactic features.

Against the background, the present paper focused on the categorial nature of canonical psych adjectives in Mandarin, which refer to words with their roots as adjectives carrying psychological entailments with respect to the argument(s) in a clause. The word “canonical” is required in the light of the categorization uniqueness in Mandarin. The following sentences (1)-(3) are typical examples in Mandarin.

- (1) Ta chuanzhe xin qunzi, meimei de chumen.
She wear new dress, beautiful de-adv. outdoor.
Wearing the new dress, she goes out beautiful-ly.
- (2) Tamen shoudao biaoyang, xinli mei le yitian.
They received compliment, heart inside beautify one day.
They received others’ compliments, which beautifies his mood all day.
- (3) Renmen kandao le Xiaowang xinling de mei.
People saw ASP Wang heart de beauty.
People have seen her inner beauty.

Scholars hold different opinions regarding the independence of the categories in Chinese (see Chao 1968, Li and Thompson 1981, Zhu 1982, Xing & Ma 1992). Shen (2009) pointed out two dilemmas in Chinese parts of speech; one is “words with no fixed category” and the other is “word category with no fixed values.”

[English]

- (4) The new dress **beautifies** her mood.
- (5) Delicious breakfast gives him a **beautiful** mood.
- (6) People see her inner **beauty**.

[Japanese]

- (7) Atarashī doresu wa tsuitachi kanojo no kibun o bika shimashita.
New dress one day her of mood beautify.
The new dress beautifies her mood.
- (8) Oishī chōshoku wa kare ni utsukushī kibun o ataemasu.
Delicious breakfast him to beautiful mood give.
Delicious breakfast gives him a beautiful mood.

- (9) Hitobito wa kanojo no naimen no utsukushi-sa o goran kudasai.
 People her inner side beauty see.
 People see her inner beauty.

To sum up, Chinese word form “mei” usually takes on multiple categories without affixes within the word itself. In this way, Chinese word categories are characterized with two dilemmas: one is “words with no fixed category” and the other is “word category with no fixed syntactic positions.” In comparison, in English and Japanese, the formal marking system usually labels each word with fixed category.

2 The empirical evidence: hints from antecedents in relatives

Del Gobbo (2015) states that the antecedents of Chinese attributive clauses are often limited to a noun phrase (NP). By contrast, in languages like English and Italian, the categories of an antecedent are diverse, including VP, AP, CP, AdvP and the like. He suggests that the reason lies in the lack of an “E-type” relative pronoun.

Based on Heim and Kratzer (1998), the modification relation is a predication relation. In Mandarin, the constituents in front of “的 de” make up the relative clause which usually takes the form of VP/CP structure. Whereas the words after “的 de” are the modified antecedent. Del Gobbo (2015) maintains that in Chinese the two conjuncts, modifier and modifiee, are of identical type for lambda abstraction and “...de is a head that subcategorizes for two phrases, but it doesn’t contribute a categorial feature to the dominating category. In this sense, de is similar to ‘and’ in English.”

According to Li (2008), Rebushi (2005) and Del Gobbo (2015), the modifying particle *de* is a special kind of conjunction (with no categorial features). Based on Huang (2006) and Del Gobbo (2015)’s theory that the conjunction *de* type-shifts the relative from $\langle e, t \rangle$ to e . Different from Li (2008) and Del Gobbo (2015)’s opinion that “de” doesn’t contribute to the categorial feature of the modifier, this paper maintains that since Chinese “de” structures take on the formula: ModP (AP/CP/NP) + 的 de + NP, “de” brings a nominal feature to the word after it and assigns a modifier function to the constituents before it. Larson (2009) argues that nominal DE(的) is a concordializing element.

When Chinese canonical psych adjectives appear after “de”, they automatically carry a nominal feature syntactically. In this way, antecedents in Chinese relatives undergo the processes of category conversion only in LF (logical form) level, but not in PF (phonological form) level.

- (10) Ta ganjue xiang hele mi yiyang de tian.
 She feel like drink-ASP honey same de sweet.
 She feel sweet, which is like the feelings of drinking honey.
- (11) Laoshi de weixiao you zhong rang ren fangsong de nuan.
 Teacher GEN smile have CL make people relax de warm.
 The teacher’s smile has a kind of warmth which make us relaxed.
- (12) Ta xinli you shuo bu chu de ku.
 He mind-inside have speak not out de bitter.
 He feels bitterness in his mind, which he cannot speak out.

Sentence (10)-(12) take three canonical psych adjective “tian”, “nuan” and “ku” in Chinese as examples. When they function as an antecedent, in spite of the facts that their word roots are adjectives and carry no nominal labels morphologically, they are somehow assigned with a [+N] categorial feature.

3 Approaches

In order to analyze the unique categorization of Chinese psych “adjectives” further, this section resorts to the “Checking Theory” of Chomsky (1995), which states that through the raising process of a lexical item with inflectional features, it could be checked against the corresponding features of the other inflectional heads. Based on the Semantic selection and Categorical selection (Chomsk:1965, et al), the assignment of categorial features on canonical psych adjectives in Mandarin is carried out in three approaches: (1) sporadic phonological markings; (2) semantic theta-role assignment from verbs; (3) syntactic feature projections.

3.1 Sporadic phonological markings Categorical feature assignment from the phonological spell-out is systematic in languages which are rich in formal markings. Whereas in Chinese, formal marking is sporadic without a well-defined system. The list (13)-(17) below illustrate five examples for the categorial marking on psych “adjectives” from the phonological spell-outs in Chinese. In terms of the adjective “prefix” in (14), Huang (2006) treats “hen” as a type-raiser: it raises in principle non-predicative elements to the status of predicate. The psych adjective “tian” occurs after “hen” with categorial feature [+N, +V]. Grano (2012) proposes that “hen” has both a semantic and a syntactic role. Following Larson (2015) and Li (1985, 1990), the marked manner adverbs with “de” must raise to agreement position because they are unvalued for case. Since “de” is both an adjective “suffix” and a verbal “prefix”, its case agreement need to be met from both the adjective before it and the verb after it.

Adjective “suffix” (occur after adjectives)

- (13) Ta tiantian de xiao le
She sweet de smile.
She smiled sweetly.

Adjective “prefix” (occur before adjectives)

- (14) Ta xiao de hen tian.
She smile de very sweet.
She smiled very sweetly.

Verbal “prefix” (occur before verbs)

- (15) Ta guyi de suan ni.
He on purpose de sour you.
He satires you on purpose.

Nominal “preffix” (occur before nouns)

- (16) Ta xinli gandao jiuwei de nuan.
He heart-inside feel friendship de warm.
He feels the warmth from friends.

Adjective “prefix” / “suffix” (occur before/after adjectives)

- (17) Ta de xinqing ji mei.
She mood ji(very) beautiful.
She is very happy.

3.2 Semantic theta-role assignments from verbs The Uniformity of Theta Assignment Hypothesis (or UTAH) (Baker 1988) explains how identical thematic relationships between items are shown by identical structural relationships. According to the approach from Hale & Keyser (1993, 2001), the interpretive component of the grammar identifies the semantic role of an argument based on its position in the tree. With respect to the hierarchical projection via θ -roles, Li (2014) noted potentially all Lv’s, and hence all roles, must be projected with every V. Yet, Larson (2015) argues that in vP/VP structures, a set of semantic features (theta roles) are associated with the central verb (V), which are arranged as: [AG]> [TH]> [GL]> [LOC]> ... + (15). In light of the semantic features on the psych “adjective”, “suan”, which are “[EXPval]; [SRCval]” and un-interpretable themselves, it carries a certain degree of verbal color with [-N, +V].

- (18) Ta guyi suan_{[EXPval], [SRCval]} ni.
He on purpose sour you.
He satirizes you on purpose.

3.3 Syntactic feature projections on hierarchical nodes With respect to the case features on the psych “adjective”, “suan”, which are “[ACCval]; [NOMval]” and un-interpretable themselves, it carries a certain degree of verbal color with [-N, +V]. Due to the lack of phonological realization, Chinese canonical psych adjectives could not resort to formal labels for categorization (except a few sporadic “affixes”), instead, they turn to categorial feature assignments from semantic and syntactic projections and thus adopt a rather comprehensive strategy.

4 Conclusions

In order to further analyze the categorization dilemmas of Chinese canonical psych adjectives like “tian (sweet)”, “suan (sour)”, “nuan (warm)”, “leng (cold)”, “ku(bitter)”, “mei (beautiful)” and “la (spicy)”, the empirical data on canonical psych adjectives in multiple languages is analyzed and accounted. The assignment of categorial features on canonical psych adjectives in Mandarin is carried out in three approaches: (1) sporadic phonological markings; (2) semantic theta-role assignment from verbs; (3) syntactic feature projections. Finally, a more detailed study of the values and features would shed light on the universality and diversity of cognitive categorization cross-linguistically.

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Some Linguistic Features in Green Hmong, White Hmong, and Hmong Leng

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1 Introduction

The Hmong people originates from China, but the ones who have migrated to Western countries (USA, France, Germany, Australia, etc.) are mostly from Laos. It is said that they have migrated from China to Vietnam, Laos, Thailand and Burma in the 19th century (as early as 1810-1820 for Yang (1975), later for other authors (mid-19th for Cooper (1991) for example)). But because Laos became communist in 1975, many Hmong fled the country to the Thai refugee camps, and from there, migrated to other countries. Since most of the Hmong who live in Western countries (mostly in the United States of America) nowadays are from Laos, this paper will focus on the Hmong dialects spoken in this latter country only. Linguistically, Western literature has always said that there are two dialects in Laos, and by extension, in America and in the other countries where Hmong had migrated. These two dialects are White Hmong and Green Hmong, also called Hmong Leng. For White Hmong, it is also called Hmong Daw, which is an approximate adaptation of White Hmong term “white” spelled in Hmong *dawb*. For Green Hmong/Hmong Leng, it is also called Hmong Njua (Lemoine 1972, Lyman 1975, Thao (1999), Golston & Yang (2001), Niederer (2001-2002), Mortensen (2004), Thao & Yang (2004), See (2005), Bruhn (2006), etc.). Like for Hmong daw, Hmong Njua is just an adaptation of the Hmong term “green”: *ntsuab*. The statement that there are two dialects is wrong. The author asserts that White Hmong dialect (now WH), Green Hmong dialect (now GH) and Hmong Leng dialect (now HL) are three different dialects.

In the first place, we will describe what could have lead Hmong and non-Hmong researchers to this misconception. The reasons may come from an original, but wrong, statement of early researchers such as anthropologists (Lemoine, Tapp) or missionaries (Bertrais, Mottin) -the first westerners who studied the Hmong people and language in general- that GH and HL are one same dialect. Other reasons may claim that the distinction between GH and HL are badly known by the Hmong themselves, may they be average people, students, Hmong teachers, or scholars (Thao, See) since some Green Hmong call themselves Hmong Leng too. The denomination used to call them might then not be their own, but one chosen by outsiders first and foremost.

Then the author will give the main linguistic differences between GH and HL. A few features show the slight differences between GH and HL, but as regularly reminded in this paper, we invite the reader to never draw hasty conclusions out of these features. Counterexamples will frequently be given to show that a few features do not make an infallible rule. Next, we will describe the main differences between GH/HL and WH. Even though these differences are more important than the differences between GH and HL, once again, we will pay a particular attention to never make the reader to jump to conclusions. Various and numerous counterexamples will be used to prevent one to make these correspondences a rule. As a conclusion, the author hopes that such a study will finally and definitively set clear differences between the three dialects to current and future researchers, and to the different Hmong communities in the world.

1.1 Origins of the misconceptions Many reasons could be pointed out to explain why Hmong and non-Hmong researchers, and Hmong people themselves, have believed for the longest that there are only two Hmong dialects spoken in Laos. First of all, Lemoine (2013) said the Green Hmong denomination is a term used by the Chinese linguists, who oppose Green Hmong and Hmong Leng. And it is believed that himself used their naming differentiation without knowing precisely why the Green/Leng Hmong were divided in two groups since he wrote: “Au Laos et en Thaïlande, les Hmong se distinguent eux-mêmes en trois sous-groupes : les Blancs : HMONG ‘DAEU (*Hmoob dawb*), les Verts : HMONG NDJOUA (*Hmoob*

Ntsuab), et les Manches Galonnées : HMONG KH'OUA MBA (*Hmoob Quas Npab*). Sur le plan linguistique par contre on ne trouve que deux dialectes : Vert et Blanc, les Hmong à Manches Galonnées parlant le dialecte Hmong Blanc¹.” Lemoine (1972). Other early researchers have used the Green term as well (Lyman, 1974, Tapp, 1989), but without highlighting the differences between GH and HL dialects. Lemoine and Tapp being major references when it comes to Hmong studies, this might have conducted other later researchers to mistakenly believe that GH and HL are one same dialect.

Another factor that contributed to this imbroglio is that the way outsiders call a people does not always reflect the way the people call themselves. More precisely, even if the hereinabove mentioned authors call them Green Hmong, some Green Hmong sometimes call themselves Hmong Leng as well. During our conversations with GH speakers, our interlocutors all said that they have always called themselves Hmong Leng². This increases the difficulty to distinguish HL speakers from GH speakers. Like Purnell said in his preface (Purnell, 1972): “Both the Miao and the Yao are known by bewildering variety of ethnonyms, changing from locality to locality and according to the nationality of the denominating group (Chinese, Vietnamese, Lao, French, German, British, etc.). Frequently, the primary feature used in such informal classification was a cultural trait which captured the attention of the designators, often some detail of the women’s dress”. In other words, the different Hmong groups have been given names according to features like women’s clothing. The linguistic features seem to not have been a criterion of differentiation, neither a criterion of denomination to most of the researchers. This may have resulted in a misreading of GH and HL as well.

In addition to this, another factor that could explain the GH/HL misunderstanding is a popular belief saying the Green Hmong have the reputation to have had cannibalistic rituals in the past. This has been signaled by Thao (1999), who is a Hmong Leng. Furthermore, he stated that there are no more Green Hmong (based on the fact that there are no more cannibal Hmong?), which shows a great ignorance of the Green Hmong as defined by other researchers (Lemoine, Tapp), who even say Green Hmong are the most numerous of the three groups nowadays³. Thao may have not made any field research at the time he wrote his book or may not know much about Green Hmong (group and dialect). Whether or not this cannibalistic belief is true is not the point here. But this bad reputation might have led Green Hmong to hide their “Green identity” by saying they are Hmong Leng. This certainly complicates even more the distinction between the two groups.

Finally, the author believes that it was especially ignorance of the fact that there are linguistic differences between GH and HL that the early and recent researchers on Hmong language have all described these two dialects as being the same one.

In order to distinguish the three dialects, the author has compared the lexis of different dictionaries and has contrasted them with his own knowledge of GH (as a Green speaker himself). For GH, Lyman’s Dictionary of Mong Njua⁴ was very useful, even though the author disagrees with his description of some vowels in GH. Further explanations will be brought in part II.1. (the vowels) on this. Lyman’s dictionary is the only dictionary in GH but it did not have any impact on Western researchers who mainly focused on describing WH. Like Lemoine (2013) said, Lyman’s dictionary had the double disadvantage to use his own writing system and to be published just when Hmong RPA, the most used writing system nowadays, and the one used in this paper, had been created. The creation of RPA completely outshone Lyman’s work. For

¹ Our translation: “In Laos and Thailand, the Hmong distinguish three sub-groups: the White Hmong: Hmong ‘Daeu (Hmoob dawb), the Green: Hmong Ndjoua (*Hmoob Ntsuab*), and the Striped Hmong: Hmong Kh’oua Mba (*Hmoob Quas Npab*). Linguistically however, there are only two dialects: Green and White, the Striped Hmong speaking in White.”

² Even though Lyman wrote in his Foreword that the Hmong he was in contact with in Thailand called themselves Green: “the tribesmen used the designator *ñjua* ‘to be green, be azure’”. But like said earlier, we focus on the Hmong originating from Laos.

³ Lemoine and Tapp have told so to the author in private conversations but have never clearly written it anywhere. Like Lemoine said (2013), there have never been any official number of Green Hmong, Hmong Leng or White Hmong provided by China, Thailand, Laos or Vietnam, so without being able to use official numbers, they did not write it. However, he prudently wrote that out of the ten or so Hmong dialects inventoried in South-East Asia, only four of them might be related to WH.

⁴ Lyman’s writing system being quite different from Hmong RPA, examples taken from his dictionary have been transcribed in RPA in this paper.

HL, Lang Xiong, Joua Xiong and Nao Leng Xiong's dictionary (1983, now Xiong et al.) was used as reference. For WH, two dictionaries were consulted: Yuepheng L. Xiong's English-Hmong/Hmong-English Dictionary (2011) and Yves Bertrais' Dictionnaire Hmong-Français (1978). In order to not just propose a long list of words changing from one dialect to another, the author will focus on the characteristics with the most occurrences of each dialect for the reader to better understand the correspondences between the three dialects.

2 Phonetic differences between Hmong Leng and Green Hmong

Grammatically and syntactically, GH and HL do not seem to differ one from another. Maybe further researches could find syntactical differences, but as far as we know, they are similar. The differences are more on a phonetic level. Even though this part focuses on the differences between GH and HL only, sometimes some WH words will be added here for better comparison. Here are the differences.

2.1 Vowels

2.1.1 *i* vs. *ɨ* vs. *w* The main phonetic difference between GH and HL is the use of a vowel typical to GH that does not exist in HL and WH. Lyman spelled it *ɨ* in his dictionary (this letter spelling will be used here from now on). But this does not mean that the /i/ sound does not exist in GH. It does, but it is not used as often as in HL and WH. The distribution of *i* and *ɨ* is very precise in GH. The latter sound is used with the following consonants: *ntsh*, *ntx*, *ntxh*, *s*, *ts*, *tsh*, *tx*, *txh*, *x*, and *z*⁵. In other words, *ɨ* is realized mainly with the affricate and some fricative consonants (but not all). The author believes that the realization of the *ɨ* sound itself (in GH) can explain this distribution. Indeed, *ɨ* is realized with the help of the friction of the consonant. This sound corresponds to the International Phonetic Alphabet's (IPA) /ɨ/ sound, but completely different from Hmong vowel *w*, which corresponds to IPA's /y/ sound. Without friction, for example with /m/, it is very hard to make that *ɨ* sound because it is made at the end of the friction, with the help of the friction. As if sounding the friction rather than adding a vowel sound after the consonant. The /i/ sound, in the meantime, is used with all the other consonants. No consonant that would use *i* for some words and *ɨ* for some other words has been found in GH. It is always either one or the other. The different vowels charts found in literature indicate either *i* and *ɨ*, or *i* and *w*, but never the three of them together (Thao 1999, Golston & Yang 2001, Niederer 2001-2002, Mortensen 2004, Bruhn 2006, Lemoine 2013, Wikipedia). Niederer focuses on WH only, so her vowel chart (showing *i* and *w* only) is correct, but Golston & Yang, who also focus on WH, have /i/ for *i* and /ɨ/ for *w*, which is wrong. On the other hand, Bruhn and Mortensen, who focus on HL, give *i* and *ɨ* without signaling *w*, but like said earlier, *ɨ* does not exist in HL. Finally, Lemoine (2013), even if he made an effort to try to describe the differences between GH and HL, just used the chart given in Wikipedia, where /i/ (for *i*) and /ɨ/ (for *w*) are mentioned but not /y/, which, once again, corresponds more to *w*, while *i* should have its own pronunciation, as explained earlier. For example, Lemoine used *txwv* for father in GH, and *txiv* for HL and WH. Only GH has the three vowels /i/, /ɨ/, and /y/, as in *miv* (cat), *txiv* (father) and *txwv* (to prohibit). HL and WH have just /i/ and /y/ as in *txiv* (father) and *txwv* (to prohibit). Consequently, it is believed that despite what Bertrais (1991) stated: "The transcription system is valid for both White Hmong and Green Hmong currently used in Laos", misreading or ignorance of GH resulted in Hmong RPA not having a transcription for the /ɨ/ sound. Nowadays in America and in France, *ɨ* has become quite rare because the new generations have shifted its pronunciation to an easier and more common sound: /y/. Even if their parents (generally the first generation of Hmong migrants) continue to use *ɨ*, the mishearing and their mispronouncing of this vowel, combined with the non-correction by the parents, have led to this shift. Hence words like *txwv* (father⁶), *tswb* (five), *xeeb ntxwv* (grandchild) or *xws* (right) have emerged while they should be respectively pronounced *txiv*, *tsɨb*, *xeeb ntxiv*, *xɨs*. The GH consonants that use /i/ share the same "i words" as in HL and in WH, as in *ci* (to grill), *miv* (cat), or *Lis* (Lee clan); or the same /y/ words: *pw* (to sleep), *fwj* (bottle) or *vwm* (crazy).

2.1.2 *ia* vs. *a* vs. *aa* One mistake of Lyman on the consonantal level in his dictionary is the use of A

⁵ The letters, words, sentences in italic in the text are in Hmong.

⁶ Most of the Hmong words are polysemous. We chose to give only one translation here.

and IA in GH. He states that *ia* does not exist in GH (1975: 16). Even if no entry was found with *ia* in his dictionary, *ia* is a main difference between GH and HL. It is such an important trait that GH and HL regularly joke about this by saying: “*Puab yog cov moob nyiaj, tsi yog cov moob nyaj*” (They are the Hmong who say *nyiaj*, not the Hmong who say *nyaj*). Besides *nyiaj* (money or silver), other GH words use *ia* like *cia* (to let), *kiag* (promptly) or *Kiab* (girl name). The author uses the latter example to help students determine whether they are Green Hmong or Hmong Leng: he asks them if the girls in their family are named *Kab* (HL) or *Kiab* (GH), since *Kiab* is used in GH only (and in WH, but this does not apply here). But the *ia/a* distinction is not a rule that one should use to differentiate GH and HL. A lot of *a* words are common in both dialects while they are pronounced *ia* in WH. The vowel *ia* is much more used in WH than in GH:

(1)	WH	GH	HL	English
	<i>Tiab</i>	<i>tab</i>	<i>tab</i>	skirt
	<i>Liab</i>	<i>lab</i>	<i>lab</i>	red
	<i>Xiav</i>	<i>xav</i>	<i>xav</i>	blue

Nowadays, some words may even be pronounced *ia* in WH, *a* in GH and *aa* in HL. For example, there are two ways to say “but” in WH: *tab sis*, or *tiam sis*. In GH, it is *tab sis* while in HL, it is *taab sis*. The Xiong et al. dictionary indicates *tab sis* as well, but there seems to be a will, by the Hmong Leng, to distinguish themselves more from the White Hmong group. This distinction has them shift the pronunciation of some *a* words into *aa* words. Another example is GH: *kav lam*, HL: *kaav lam* (never mind). A more in-depth study is needed to tell us more about this “change in progress” (Labov, 1966) that we have only perceived at this stage. Once again, this should not be made a rule that would distinguish GH and HL. For instance, a lot of words share the same *aa* vowel while WH uses *a* (since *aa* does not exist in WH):

(2)	WH	GH	HL	English
	<i>lab</i>	<i>laab</i>	<i>laab</i>	store
	<i>Pab</i>	<i>paab</i>	<i>paab</i>	to help
	<i>Kam</i>	<i>kaam</i>	<i>kaam</i>	to allow

The only permanent difference between GH/HL and WH is that *aa* always corresponds to *a* in WH. But *a* in WH does not always correspond to *aa* in GH/HL. For example:

(3)	WH	GH	HL	English
	<i>Mas</i>	<i>mas</i>	<i>mas</i>	(no meaning, oral pause)
	<i>Kav theej</i>	<i>kav theejkav</i>	<i>theej</i>	rattan
	BUT			
	<i>caj dab</i>	<i>cij dlaab,</i>	<i>cej dlaab</i>	neck

This last example takes us to our third disagreement with Lyman.

2.1.2 *i* vs. *e* Another mistake Lyman made is that he did not distinguish the use of *i* in a lot of GH words while they are said with *e* in HL. For example, he translated “hard to do, difficult to do” as *ceb laaj* while it should be *cib laaj*. *Ceb laaj* is used in HL and in WH. For this trait, HL is more similar to WH. For example:

(4)	WH	GH	HL	English
	<i>Cheb</i>	<i>chib</i>	<i>cheb</i>	to sweep
	<i>Kev</i>	<i>kiv</i>	<i>kev</i>	road
	<i>Nyem</i>	<i>nyim</i>	<i>nyem</i>	to grasp firmly

Nonetheless, for “road”, Lyman did signal *kiv* as an alternative word of *kev*. One more time, one should not make it a rule either. A lot of words are pronounced the same, using *e* or *i*:

(5)	GH	HL	English
	<i>Chim</i>	<i>chim</i>	to be upset
	<i>Tim</i>	<i>tim</i>	over there
	<i>Kib</i>	<i>kib</i>	to fry
	<i>Peb</i>	<i>peb</i>	three
	<i>Tsev</i>	<i>tsev</i>	house
	<i>Nqe</i>	<i>nqe</i>	price

Besides these three main differences (*i/i/w*, *ia/a/aa*, and *i/e*), some minor differences may be found, like some words may also change their vowels, but not on a recurrent enough basis to be signaled. There may be some totally different vowels like GH: *qos puj/qos yawg* (wife/husband) compared to HL: *quas puj/quas yawg*, or some (quite rare) words that may even change completely like GH: *ntshab si* compared to HL: *ntshab laaj* or *ntshab laag* (crystal clear). Concretely, there is no easy way to learn the differences between GH and HL: one must learn the differences one by one.

2.2 Consonants and tones

2.2.1 Consonants On the consonantal level, the only noticeable difference between GH and HL resides in the use of the *r* sound. Here, the author disagrees with Lyman who considers *r* as being used in GH. The author believes that the *r* sound and its derivatives *nr*, *rh*, *nrh* are used in HL and WH only. Lemoine (2013:102) thinks the same: “le parler mong djoua la r cuse et prononce **ts** pour **r**, **tsh** pour **rh**, **nts** pour **nr**, **ntsh** pour **nrh**.”⁷. This is not an evolution of the *r* sound being mispronounced by the younger generations⁸. These sounds simply do not exist in GH. Even the old GH speakers do not say the *r* and its derived sounds. Here are some examples:

(6)	GH	HL	English
	Tsaum	raum	kidney
	Tsag	rag	knife
	Tsooj	rooj	table

Nevertheless, it has been noticed that more and more young Hmong Leng cannot pronounce the *r* sound and its derivatives properly and have switched them for *ts* and its derivatives. A more advanced research on this is needed to confirm this change in progress.

2.2.2 Tones On the tonal level, there are just a few differences, but there is no automatic tone change that would allow one to deduce a rule explaining it. Here are some examples:

(7)	GH	HL	English
	Qom	qos	potato
	Puj	pug	grandmother (even if <i>puj</i> is also used in HL like shown in Xiong et al.’s dictionary)

Even though all these differences might seem minor, because not different enough for both dialects to not be intercomprehensible, which is the definition of a dialect after all, they are important enough for HL speakers to say about GH speakers that “they speak in a strange way”: “*puab has lug txawv txawv*”. Now let us compare these two dialects with WH, an even more different dialect.

⁷ Our translation: “GH rejects it and pronounces *ts* instead of *r*, *tsh* instead of *rh*, *nts* for *nr*, *ntsh* for *nrh*.”

⁸ The difficulty of pronunciation of this consonant for the young generations (may they be HL or WH) might have them shift them for easier and similar sounds like in GH. As a teacher, the author sees every semester many students who do not really know the correct pronunciation of *r* and its derivatives.

3 Phonetic differences between Hmong Leng/Green Hmong and White Hmong

3.1 Phonetic differences If we sum up the examples given so far and compare them with WH, WH may not seem that different from GH and HL. Most of the time, it is either similar to GH, or similar to HL when not both:

Table 1: previous examples compared to WH

GH	HL	WH	English
<i>Txiv</i>	<i>Txiv</i>	<i>Txiv</i>	Father
<i>Tsib</i>	<i>Tsib</i>	<i>Tsib</i>	Five
<i>Xeeb ntxiv</i>	<i>Xeeb ntxwv</i>	<i>Xeeb ntxwv</i>	Grandchild
<i>Chib</i>	<i>Cheb</i>	<i>Cheb</i>	To sweep
<i>Kiv</i>	<i>Kev</i>	<i>Kev</i>	Road
<i>Nyim</i>	<i>Nyem</i>	<i>Nyem</i>	To grasp firmly
<i>Tsaum</i>	<i>Raum</i>	<i>Raum</i>	Kidney
<i>Tsag</i>	<i>Rag</i>	<i>Riam</i>	Knife
<i>Tsooj</i>	<i>Rooj</i>	<i>Rooj</i>	Table
<i>Kiab</i>	<i>Kab</i>	<i>Kiab</i>	Quiet
<i>Lab</i>	<i>Lab</i>	<i>Liab</i>	Red
<i>Tab sis</i>	<i>Taab sis</i>	<i>Tab sis</i>	But
<i>Kav lam</i>	<i>Kaav lam</i>	<i>Kav liam</i>	Never mind
<i>Pw</i>	<i>Pw</i>	<i>Pw</i>	To sleep
<i>Fwj</i>	<i>Fwj</i>	<i>Fwj</i>	Bottle
<i>Kib</i>	<i>Kib</i>	<i>Kib</i>	To fry
<i>Miv</i>	<i>Miv</i>	<i>Miv</i>	Cat

Evidently, there are more differences than this, as follows.

3.2 Consonants

3.2.1 *dl, ndl, dlh, ndlh* The main phonetic difference that can be made into a rule concerns the rather famous GH/HL consonants *dl* and its derivatives *ndl*, *dlh* and *ndlh*.⁹ To make it simple, *dl* words in GH/HL always correspond to *d* words in WH, *ndl* to *nt*, and *dlh* to *dh*. *Ndlh* has no equivalent in WH. For example:

(8)	GH/HL	WH	English
	<i>Dlej</i>	<i>dej</i>	water
	<i>Dlawb</i>	<i>dawb</i>	white
	<i>Ndlog</i>	<i>ntog</i>	to fall
	<i>Dlhos</i>	<i>dhos</i>	to assemble
	<i>Ndlhij ndlhuaj</i> ¹⁰	Ø	No meaning, onomatopoeia imitating the sound of steps in the water

But the contrary does not always apply. For example, *nt* WH words do not always correspond to GH/HL *ndl* words:

(9)	WH	GH/HL	English
	<i>Ntev</i>	<i>ntev</i>	long

⁹ It is surprising how these consonants were completely omitted by the creators of the alphabet while one of them, Barney, was working on GH/HL (Bertrais 1991). They were added later on.

¹⁰ Lyman and Xiong et al. were not able to find any word with *ndlh* in their dictionaries. The two words we are giving are the only words we know using *ndlh*.

<i>Ntaiv</i>	<i>ntaiv</i>	stairs
<i>Ntub</i>	<i>ntub</i>	wet

3.2.2 *m vs. hm, ml vs. hml, n vs. hn, ny vs. hny* GH/HL do not preaspirate the consonants *m, ml, n,* and *ny*. Therefore, there are no *hm, hn, hml,* and *hny* sounds in GH/HL. This is a typical distinctiveness between GH/HL and WH. This trait has generated one of the most ferocious debate on how to spell the name of the Hmong people. The Hmong name has been spelled with an initial *h* because the Hmong intellectuals who fought to have their people recognized as Hmong (the name they give themselves) and not Miao (their name in China) or Méo (Laos, Vietnam, Thailand) were White Hmong. This name has remained as is until now, but for a couple of decades now, the Green Hmong and Hmong Leng intellectuals have tried to change it, or at least change their groups, into Mong, which only makes sense from their point of view. This will not be debated here because it would be off topic. The author only stressed the phonetic difference for a better understanding of the debate. Nevertheless, if WH's *hm, hml, hn,* and *hny* almost¹¹ always correspond to respectively GH/HL's *m, ml, n,* and *ny,* the contrary does not always apply. For example:

(10)	GH/HL	WH	English
	<i>Miv</i>	<i>miv</i>	cat
	<i>Mlom</i>	<i>mlom</i>	statue
	<i>Neeb</i>	<i>neeb</i>	spirit
	<i>Nyuaj</i>	<i>nyuaj</i>	difficult

One may find other examples of words using different consonants between GH/HL and WH, but we put them in section 2 in this paper.

3.3 *Vowels* For the vowels, there is no rule of one vowel in WH turning into another vowel in GH/HL. One must learn them one by one. The author will try to present the most common ones hereafter though.

3.3.1 *ia vs. a* Like briefly mentioned in part 2.1.2, a lot of occurrences follow this change of WH's *ia* becoming *a* in GH/HL. But once again, one should not make this a rule since *ia* is used in GH but not in HL. In addition, *a* in GH/HL does not always become *ia* in WH. Let us remind the examples given above and add some more about *a* not becoming *ia*:

(11)	GH	HL	WH	English
	<i>tab</i>	<i>tab</i>	<i>tiab</i>	skirt
	<i>lab</i>	<i>lab</i>	<i>liab</i>	red
	<i>qab</i>	<i>qab</i>	<i>qaib</i>	chicken
	<i>nqaj</i>	<i>nqaj</i>	<i>nqaij</i>	meat
	<i>kiab</i>	<i>kab</i>	<i>kiab</i>	quiet nature baby, also a girl's name
	<i>nyiaj</i>	<i>nyaj</i>	<i>nyiaj</i>	silver
	<i>ab</i>	<i>ab</i>	<i>ab</i>	baby
	<i>qhab</i>	<i>qhab</i>	<i>qhab</i>	ethnonym designating a people living in the jungle

3.3.2 *a vs. aa* The *a* and *aa* vowels are also a regular correspondence between GH/HL and WH. A frequent mistake that young White Hmong do is to wrongly assume that every *a* word in WH corresponds to an *aa* word in GH/HL. The numerous examples do not contradict their assumption:

(12)	GH/HL	WH	English
	<i>Kaab</i>	<i>kab</i>	insect
	<i>Paaj</i>	<i>paj</i>	flower
	<i>Naab</i>	<i>hnab</i>	bag

¹¹ There are a few exceptions like *hnoos* that is said *nqu* (to cough) in GH/HL.

For the first example (insect), the author has heard some White Hmong scholars mistakenly believe that *kaab* is the corresponding HL word for *kiab* in GH and for *kab* in WH. WH's *kab* is said *kaab* in both GH and HL. This is the reason why it was reminded several times here that one should not make rules out of a few words that follow the same pattern. There are always exceptions that could contradict what one could assume. The best way to learn the differences between the three dialects is to learn the words one by one. But let us remind that *a* in WH does not always correspond to *aa* in GH/HL. In addition to the two examples given in section 1.2.1, here are some other examples:

(13)	GH/HL	WH	English
	<i>Mas</i>	<i>mas</i>	no meaning: oral pause
	<i>Sad</i>	<i>sad</i>	no meaning: particle used to ask for a confirmation (tag question)

3.3.3 *ai* vs. *a* *Ai* in WH becoming *a* in GH/HL is another frequent occurrence that should not be made into a rule. For instance:

(14)	GH/HL	WH	English
	<i>Qab</i>	<i>qaib</i>	chicken
	<i>Nqaj</i>	<i>nqaij</i>	meat

But there are a lot of occurrences where *ai* is pronounced in the three dialects as well:

(15)	GH/HL	WH	English
	<i>Laij</i>	<i>laij</i>	to plow
	<i>Faib</i>	<i>faib</i>	to share
	<i>Saib</i>	<i>saib</i>	to watch

As one can see, when learning another Hmong dialect, it is absolutely not recommended to assume some correspondences that would make the learning easy. Parts 2.2.1, 2.2.2, and 2.2.3 show how GH/HL's *a* sound can be treacherous. It can correspond to *ia*, *a* or *ai* in WH. In addition, some *ai* words in WH can be said *e* in GH/HL (WH's *tsaib no* → GH/HL's *tseb nua* for "last year") and vice-versa, some *ai* words in GH/HL can be said *e* in WH like: (GH/HL) *qai* → (WH) *qe* (egg). Now let us examine another famous pair of vowels.

3.3.4 *u* vs. *o* *U* and *o* may be, if not the most famous pair of vowels, at least the ones Hmong people use the most to make fun of how White Hmong who want to learn/speak GH/HL transform every *u* word in GH into an *o* word in WH¹². There are so many occurrences of this correlation that it is tempting to make it a rule. But once again, there are exceptions that prevent us to deduce a rule. Here are some examples and counterexamples:

(16)	GH/HL	WH	English
	<i>Tsuv</i>	<i>tsov</i>	tiger
	<i>Tum</i>	<i>tom</i>	to bite
	<i>Kuv</i>	<i>kuv</i>	I
	<i>Luv</i>	<i>luv</i>	car
	<i>Tom</i>	<i>tom</i>	there
	<i>Mom</i>	<i>mom</i>	hat
	<i>Kuam</i>	<i>kom</i>	so that
	<i>Huv</i>	<i>hauv</i>	in
	<i>Huv</i>	<i>huv</i>	clean

The six counterexamples show that some *u* in GH/HL stay the same in WH, and *o* words staying *o*

¹² Hmong people have used this difference in numerous movies and in a song that has become quite popular nowadays: <https://www.youtube.com/watch?v=DONMwHT7jJM>.

words in the three dialects. The *kuam/kom* (so that) example show that some *o* words in White may change into another vowel than *u*, while *huv/hauv* (in) shows that some *u* words in GH/HL may also change to another vowel than *o*. The polysemy of *tom* is another problem for the learning: when it means there, it is said “tom” as well in GH/HL, but when it means “to bite”, it is said *tum* in GH/HL. Same with *huv* (in or clean). Consequently, despite a large number of examples of GH *u* becoming WH *o* in the dictionaries consulted, it is not recommended to just assume that this is always the case.

4 Other changes

There are other vowels that can change from GH/HL to WH, but it would take too long to list them all here. These are a few examples:

(17)	GH	HL	WH	English
	<i>Tsua</i>	<i>rua</i>	<i>rau</i>	to
	<i>Nuav</i>	<i>nuav</i>	<i>nov</i>	here
	<i>Zag</i>	<i>zag</i>	<i>zaum</i>	time
	<i>Xyum</i>	<i>xyum</i>	<i>xyaum</i>	to try

For the first example (*tsua/rua/rau* = to), WH’s *rau* also means “six”. But in this case, it is said “rau” (in HL) and “tsau” (in GH), which is another example of confusion. In the same way, “here” can be said “no” as well, and if it this case, it will be “nua” in GH and HL. But if *no* was used to mean “cold”, then in GH and HL, it would be “no” as well.

5 Tone differences

We have seen in parts 2.1.1 and 2.1.2 the most noticeable and recurrent consonant differences between GH/HL and WH. But there are a significant number of other words that may change their consonant, their vowel, or sometimes the whole word, from WH to GH/HL. These changes are too random to draw a pattern that would ease the learning of the differences between GH/HL and WH. For example:

Table 2: Examples of lexical differences between GH/HL and WH

Green	Leng	White	English
<i>Puab</i>	<i>Puab</i>	<i>Lawv</i>	They
<i>Lug ntsuag</i>	<i>Lug ntsuag</i>	<i>Dab neeg</i>	Story
<i>Paug</i>	<i>Paug</i>	<i>Xauv</i>	Hmong necklace
<i>Laub</i>	<i>Laub</i>	<i>Hliv</i>	To pour
<i>Tauj qab</i>	<i>Tauj qab</i>	<i>Tauj dub</i>	Lemongrass
<i>Txug ncuva</i>	<i>Txug ncuva</i>	<i>Txog ntua</i>	All the way to
<i>Suav tawg</i>	<i>Suav tawg</i>	<i>Hluav taws</i>	Fire

These examples show how GH and HL are similar and, at the same time, how different they are from WH. It also shows how, like said earlier, we cannot just rely on some general rules to translate from one dialect to another. For instance, if one was to use the *d/dl* correspondence given earlier to translate from WH to GH/HL, *tauj dub* (lemongrass) would be *tauj dlub*. But Table 2 shows that this is not the case at all (*tauj qab* in GH/HL). In addition, some words may differ like the above example *choj* and *pam* (blanket), but also be the same: *choj* (GH/HL) and *choj* (WH) to say “bridge”. In this case, to be able to differentiate the two *choj* in GH/HL, one is going to use the context or the classifier (*tug choj*: the bridge, *dlaim choj*: the blanket). The polysemy of the Hmong words may not be a problem for Hmong speakers of the different dialects, but to a non-Hmong learner who would want to learn the three dialects, it would be another source of confusion.

6 Conclusion

It is our hope to have shown how Green Hmong dialect has been mistakenly identified as Hmong Leng

by most of the researchers and by the Hmong themselves. This in return has led the Green Hmong of America to be called “Hmong Leng who speak a weird version of Hmong Leng”, because there may be more Hmong Leng than Green Hmong in America. This is not the case and the author believes that some initiatives should be taken to teach the Hmong community about the linguistic differences between GH and HL. Although the disappearance of the *ɨ* sound, the most distinctiveness between GH and HL, seems inevitable in America and in the other countries where Green Hmong have migrated, it is still largely used in China. Perhaps because Mandarin has this sound as well? Nonetheless, our field observation of the Green Hmong speakers in the USA and in France leads to think that the disappearance of *ɨ* will occur to the profit of the *w* vowel rather than to the HL/WH’s *i* (*txwv* rather than *txiv*). Besides *ɨ*, the other distinctive feature that clearly distinguishes GH from HL is the use of the vowel *ia* in GH that HL does not use. Unfortunately, we have seen that these features are not systematically applied and one should not see them as rules that can help them learn the two dialects easily but rather as features that can facilitate the understanding of the two dialects. But the differences between GH and HL are far less important than the differences between GH/HL and WH.

On a consonantal level, the most famous difference between GH/HL and WH, which is also the only rule we can make here, is that GH/HL’s *dl*, *dlh*, and *ndl* always correspond to respectively *d*, *dh*, and *nt* in WH. GH/HL’s *ndlh* has no equivalent in WH. But as we have seen, it does not always work like this the other way around. The correspondence applies from GH/HL to WH only. And the second difference feature is the absence of pre-aspiration for *m*, *ml*, *n*, and *ny* in GH/HL while WH has *hm*, *hml*, *hn*, and *hny*. Besides these two consonantal differences, we have shown how words can quite frequently completely change between GH/HL and WH instead of differing at a consonantal or a vocalic level only.

Finally, the most difficult dialects to distinguish are probably GH and HL because of their high similarity. Regarding WH, even though it is the dominant dialect in America, and even though White Hmong scholars claim that it is the most spoken dialect (Lemoine 2014), early researchers like Tapp and Lemoine disagree with their statement and says that GH is the most used dialect in the world. This being particularly true in China. Lemoine agrees with Chinese linguists (Yang Zhengwen, Wang Fushi, Mao Zongwu) who say WH is a sub-dialect of GH. This statement could explain why in traditional locutions used in traditional chants such as the *txiv xaiv/txiv xaiv* (a series of chants sung to the descendants of a deceased person) or the shamanistic chants, White Hmong use GH terms. When we ask White Hmong speakers why they use GH/HL terms, they have no real explanation and usually say these are the words they have always been taught. Another common popular statement is that GH/HL speakers can understand WH better than WH can understand GH/HL. This statement is commonly asserted by GH/HL and WH speakers, and by Thao (1999) as well. An in-depth study of this phenomenon is necessary to explain this greater ability by GH/HL to understand the other dialect, so we can only make hypotheses to explain this. For example, we can use sociolinguistic theories that diatopic change has occurred after the Hmong crossed the Chinese border to settle in southern countries like Vietnam and Laos. The contact with other people and other languages might have led them to slightly change their words to create a new dialect. In return, this could explain the fact that there are some White Hmong in China who, despite claiming to be White Hmong, speak GH or HL only (Lemoine 2014). If this is the case, GH/HL being the original dialect might explain why the GH/HL speakers have a deeper understanding of the words? Nevertheless, whatever the reason, we hope that this paper leads linguists who want to study Hmong to study GH with more attention and not mix it up with HL.

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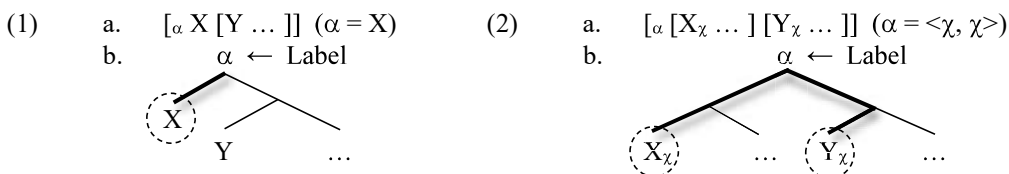
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Optional Raising and Labeling in ECM

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1 Introduction

In minimalist syntax, it has been assumed that hierarchically structured expressions or syntactic objects (SOs) are created by Merge and that Merge is constrained only by general principles of minimal computation or what are often called “third factor” principles, being formulated as simplest Merge. SOs created by simplest Merge are without labels since mother nodes and endocentric projections do not follow from Merge(α , β), which simply puts two SOs together and yields a new one, abiding by the Inclusiveness Condition (Chomsky 1995). However, SOs constructed in syntax must be identified for interpretation at the conceptual-intentional (CI) interface and for externalization at the sensory-motor (SM) level. Chomsky (2013, 2015) proposes that the identification is carried out by the labeling algorithm called Label, which, as illustrated in (1) and (2), determines the properties, hence “labels,” of SOs through minimal search:¹



In (1) and (2), circled elements are detected by minimal search Label when it is applied to the set marked as α . In the case of an X-YP set as in (1), Label locates as the label the closest head and in the case of an XP-YP set as in (2), it locates two heads (X and Y), both of which are equally close to Label; an XP-YP set can be labeled to the extent that X and Y agree, with agreeing features (in (2), “ χ ” of X and Y) taken as the label of α . If X and Y do not agree, XP-YP will not be labeled as minimal search is ambiguous and Label cannot detect a unique head.

Against this background, in this paper, I discuss optional raising-to-object in ECM sentences such as (3) and consider labeling in ECM:

- (3) The professor believes the student to be intelligent.

It has been argued that the ECM subject can stay in the ECM complement. This, however, poses a labeling problem since an XP-YP set is created in the complement by optional raising-to-object but it appears that agreement is not implemented. In this paper, I claim that the XP-YP set is labeled by agreement and that Merge plays a key role in ECM. I also argue that Merge explains parametric variation with ECM and its difference from raising-to-subject.

The present paper is structured as follows: in section 2, I discuss the optionality of raising-to-object. In section 3, I claim that XP-YP in ECM is labeled by agreement and that Merge plays a key role in ECM. In this section, I also discuss two consequences of the proposed analysis and show that parametric variation

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¹ In (1) and elsewhere, order is irrelevant, which is determined by externalization after Transfer. Tree representations are used for expository purposes and bold lines show minimal search by Label.

with ECM follows from the proposed analysis. In section 4, I discuss obligatory exit in raising-to-subject. In section 5, I summarize and conclude the paper.

2 Raising-to-Object in ECM

In this section, I discuss raising-to-object in ECM. Chomsky (2015) argues that raising-to-object or raising-to-Spec,RP is always forced for labeling purposes: R, a root, is weak as a label and cannot label on its own. To see this, consider (4):

- (4) The student read the book.

If the object moves and Spec,RP is created as in (5a), R strengthens and can serve as a label, with the result that a π -marked set can be labeled; if not (=5b), π will be left unlabeled and the derivation will be ruled out for the unlabeled SO, even though Label can locate R through minimal search (\rightarrow (1)):²

- (5) a. The student [read- v^* [the book [π R t]]] ($\pi = R$)
 b. The student [read- v^* [π R the book]] ($\pi = ?$)

Given this argument, labeling theory predicts that in ECM, the ECM subject will always raise out of the embedded clause, moving out to Spec,RP in the higher clause; otherwise, π will not be labeled. Consider (6):

- (6) a. The professor [believes- v^* [the student [π R [t to be intelligent]]]] ($\pi = R$)
 b. The professor [believes- v^* [π R [the student to be intelligent]]] ($\pi = ?$)

However, Lasnik, in a series of his papers (Lasnik 2001, 2003, 2004), argues that raising-to-object is optional in ECM. To see this, first consider (7) (Chomsky 1995:327):

- (7) a. (It seems that) everyone isn't there yet. [*every* > *Neg*; *Neg* > *every*]
 b. Everyone seems not to be there yet. [*every* > *Neg*; **Neg* > *every*]

In (7a), negation can take wide scope over the subject while it cannot in (7b). This contrast suggests the following two things: one is that negation can take scope over the subject when they are in the same clause; and the other is that a quantifier like *every* is not interpreted in its reconstructed positions when it has A-moved (see also Miyagawa 2001:329; cf. May 1977).

With this in mind, now consider ECM sentences in (8) (unless otherwise mentioned, the examples cited in this section are taken from Lasnik 2001, 2003, 2004):

- (8) a. I believe everyone not to have arrived yet. [*every* > *Neg*; *Neg* > *every*]
 b. I proved every Mersenne number not to be prime. [*every* > *Neg*; *Neg* > *every*]

In these examples, *everyone* can take scope under negation. This fact argues that the ECM subject stays in the same clause with negation, being in the embedded clause, and does not move out into the higher clause. This argument is supported by (9), where the ECM subject is passivized and does raise out into the higher clause. In this case, wide scope reading of negation over the ECM subject is not possible:

- (9) a. Everyone is believed [not to have arrived t yet]. [*every* > *Neg*; **Neg* > *every*]
 b. Every Mersenne number was proved [not to be t prime]. [*every* > *Neg*; **Neg* > *every*]

Optional raising-to-Spec,RP in ECM is also supported by the so-called *make-out* ECM sentence. Consider (10):

² R is eventually categorized as V by v/v^* (Chomsky 2004 et seq.). In (5) and elsewhere, “t” is used as a symbol for a copy created by movement or Internal Merge (IM).

- (10) a. Mary made John out to be a fool.
 b. Mary made out John to be a fool.

These examples show that the ECM subject *John* can come to the left of the particle *out* as well as to the right. Given that the particle *out* is part of the matrix verb *make* (*make-out*) and that verbs undergo head movement to v/v^* , it can be considered that the *nP* in question is in Spec-RP, with only the verb *make* affixed to the matrix v^* in (10a); in other words, the particle indicates the original position of the verb. (10a) is thus analyzed as (11):

- (11) [Mary T [v^* -made [John [R-out [to be [t a fool]]]]]]

If (10a) shows raising-to-Spec-RP, then it is reasonable to assume that there is no such raising in (10b) since *John* comes to the right of *out* and the position is in the embedded clause. This argument is supported by (12):

- (12) a. The mathematician made every even number out not to be the sum of two primes.
[every > Neg; *Neg > every]
 b. The mathematician made out every even number not to be the sum of two primes.
[every > Neg; Neg > every]

In (12), the ECM subject must take scope over negation in the embedded clause when it comes to the left of *out* while it can take scope under negation when it comes to the right. The scope facts in (12) argue that in (12b), the ECM subject does not raise out but stays in the embedded clause.

Licensing of negative polarity items as well as binding further argue for the same conclusion. Consider the following examples:

- (13) a. The lawyer made no witnesses out to be idiots during any of the trials.
 b. ?*The lawyer made out no witnesses to be idiots during any of the trials.
- (14) a. The DA made the defendants out to be guilty during each other's trials.
 b. ?*The DA made out the defendants to be guilty during each other's trials.

The ill-formedness of (13b) and (14b) will be explained if the ECM subject does not raise out but stays in the embedded clause. The subject, as it remains in the embedded clause, cannot c-command out into the adjunct in the higher clause, with the result that NPI licensing and binding fail. As evidenced by (15), the subject, if it is embedded in the lower clause, can neither license the NPI nor bind the anaphor in the higher clause:

- (15) a. ?*The DA proved [that no one was guilty] during any of the trials.
 b. ?*The DA proved [that two men were at the scene of the crime] during each other's trials.

Summarizing this section, I have argued with ECM that contra Chomsky (2015), raising-to-object or raising-to-Spec,RP, unlike raising-to-Spec,TP, is optional; the ECM subject can stay in the ECM infinitive, with both (6a) and (6b) empirically endorsed. In the next section, I discuss what this conclusion has to say about labeling in ECM.

3 Optional Raising and XP-YP in ECM

3.1 Labeling Problem It has been argued in the literature that the ECM subject moves to Spec,TP in the ECM complement when it does not raise out. This movement is explained by labeling. Consider this with (3). In the derivation, the *nP* *the student* and the predicate phrase are externally merged, which forms a set marked as β (=16a)). However, β , which is XP-YP, cannot be labeled as the heads of the two SOs merged do not agree in any features. If the *nP* moves out of β and turns into a copy as in (16b), the relevant set can

be labeled: copies, since they are part of a discontinuous element, are invisible to operations (Chomsky 2013:44) and minimal search Label can unambiguously locate the head of the predicate phrase as the label of β :³

- (16) a. [β [the student] [intelligent]] ($\beta = ?$)
 b. [α [the student] [to be [β t [intelligent]]]]

Notice, however, that the movement to solve the labeling problem will raise the same problem in the higher position. As shown in (16b), it will yield another XP-YP set (marked as α in (16b)). It has been argued that the ECM complement is TP (Chomsky 1986). If so, the set will not be labeled, either, in the absence of agreement as T does not have ϕ -features on its own but inherits them from C (Chomsky 2008).

This argument is supported by obligatory exit in raising-to-subject, where the embedded clause has also been assumed to be TP (Epstein, Kitahara and Seely 2014; see also Ott 2012). Consider (17):

- (17) a. *There seems to be likely [α a student [to be in the classroom]] ($\alpha = ?$)
 b. *There seems [α a student [to be likely to be in the classroom]] ($\alpha = ?$)
 c. [A student [seems [α t [to be likely [α t [to be in the classroom]]]]]] ($\alpha = T$)

If the *nP* terminates in intermediate Spec,TP positions as in (17a,b), α , XP-YP created by movement of *a student*, will not be labeled as the heads do not agree at all. Movement out of α allows the set to be labeled by yielding a copy in Spec,TP (=17c). Given that raising-to-Spec,RP is optional in ECM, which is empirically well founded, ECM will pose a labeling problem.⁴

3.2 Labeling of XP-YP If XP-YP can be labeled as far as X and Y agree, then labeling theory suggests that agreement occurs in the ECM complement to make XP-YP labeling possible when the *nP* terminates in the embedded Spec,TP. I argue that this is in fact the case. Since the infinitival clause is a “clause,” I propose that C and T are both merged in the ECM complement (Chomsky 1981, Ormazabal 1995, Rooryck 1997, Tanaka 2002 among others); contra Chomsky (1986), the embedded clause is structured in the same way as its finite counterpart, with (3) analyzed as (18a):

- (18) a. The professor believes [C [α the student [T ϕ [be [t intelligent]]]]]
 b. The professor believes [that [α the student [T ϕ -is [t intelligent]]]]

In (18a), just as in its finite counterpart (18b), thanks to the merge of C, T inherits ϕ -features from C and agrees with the ECM subject. Consequently, Label can locate agreeing heads when applied to α , which can be labeled $\langle \phi, \phi \rangle$. As in (18b), the ECM subject can terminate in the complement without causing a labeling problem.

The proposed analysis, though it can solve the problem of labeling in ECM, is faced with a problem. If C is merged, a phase is formed and phase impenetrability will arise due to cyclic Transfer: TP or α in the ECM infinitive, which is a phase-head complement, will be transferred at the phase level, which makes the ECM subject invisible and unavailable to higher computation. As shown in (19), the ECM subject can agree with the higher R in the embedded clause to have its Case feature valued as accusative; moreover, as I have discussed, it can optionally raise out of the ECM complement to Spec,RP in the higher clause, which is evidenced by examples such as (20), repeated from the last section:

- (19) a. I believe him/*he to be intelligent.

³ The predicate phrase in (16) is headed by small *a* and is labeled *a* by Label; it is more precisely represented as [*a*, *intelligent*] or [*a* [*intelligent*]], forming an X-YP structure. For expository convenience, [*intelligent*] is used instead of [*a* [*intelligent*]].

⁴ The optionality of raising-to-Spec,RP also raises a question of how R, without overt Spec, can label in (6b). Here, I follow Abe (2016) and assume that R can label without overt Spec. See Mizuguchi (2017) for a proposal to explain the labelability of R.

- b. I believe that he/*him is intelligent.
- (20) a. I believe everyone not to have arrived yet. [every > Neg; Neg > every] (=8a)
 b. The lawyer made no witnesses out to be idiots during any of the trials. (=13a)

The examples argue that phase impenetrability is not a problem for ECM.

I claim that phase impenetrability in ECM is solved by Merge. Merge, formulated in its simplest form, operates freely and can apply asymmetrically as well as symmetrically. Merge, applying symmetrically, merges two SOs and produces a single set (=21a) while Merge, applying asymmetrically, adjoins one SO to the other and yields an ordered pair (=21b):

- (21) a. $\{\alpha, \beta\}$ b. $\langle \alpha, \beta \rangle$

For the purpose of distinction, following Chomsky (2015), call the former set-Merge and the latter pair-Merge (see Oseki 2015 for pair-Merge; for (21b), see Fukui 2017 and Turlakakis 2003). In the ECM complement, I propose that C and T are not set-merged, which produces a CP-TP structure as in (18); instead, T is externally pair-merged to C, which amalgamates C and T and yields a composite head $\langle C, T \rangle$; and then $\langle C, T \rangle$ is set-merged with νP ; under simplest Merge, set-Merge and pair-Merge can apply in any order in syntactic workspace and pair-Merge, like set-Merge, can apply both externally and internally.⁵ (22), instead of (18), is yielded in the ECM complement, where the ECM subject moves to the Spec of $\langle C, T \rangle$:

- (22) [μ the student [$\delta \langle C, T \rangle$ [β to be t intelligent]]]

An SO, when pair-merged and adjoined to another SO, gets de-activated and is syntactically invisible: it is asymmetrically merged and is not on the same derivational plane as its host (Chomsky 2004, 2015). As shown in (23), C with T pair-merged to it is on par with C:

- (23)
$$\begin{array}{c} C \\ \wedge \\ \langle C, T \rangle \end{array}$$

$\langle C, T \rangle$, bearing the properties of C, works as a phase head. If so, what is cyclically transferred in (22) is β . Since the ECM subject moves out to the Spec of $\langle C, T \rangle$, which is a phase edge, it can avoid being transferred. As a result, it is available to computation in the higher phase; it can agree with the superordinate R for accusative Case valuation (=19a) and can move out of the ECM complement (=20) without any problems.⁶

Notice that the proposed analysis does not affect the labeling of XP-YP in ECM I have proposed. In (22), ϕ -features on C will not be inherited in the absence of T since T is externally pair-merged to C, with C keeping the features.⁷ Hence, $\langle C, T \rangle$ bears ϕ -features and it is the composite head which agrees with the ECM subject in the externally-merged position of the νP . When the subject moves and (22) is created, the XP-YP or μ can be labeled thanks to Label locating agreeing heads.

I have argued that T is externally pair-merged to C, which yields a composite head $\langle C, T \rangle$ and is a crucial ingredient of the proposed analysis of ECM. In fact, the proposal that heads (typically, C and T) are bundled into a single, composite head has been put forward in the literature. See Chou (2018), Erlewine (2017, 2018), Gallego (2014, 2017), Hsu (2017), Martinović (2015) and references cited therein, where this proposal is discussed with various empirical phenomena. The present paper argues that unlike what has been proposed, the bundling of heads or the creation of composite heads is not lexical or morphological but

⁵ For relevant discussion, see Epstein, Kitahara and Seely (2016). In this paper, unless otherwise mentioned, (pair-)Merge is external (pair-)Merge.

⁶ Note that the movement of the ECM subject out of the Spec of $\langle C, T \rangle$ does not incur a labeling problem with μ in (22): recall that $\langle C, T \rangle$ is syntactically on par with C, which can label on its own without overt Spec.

⁷ Given the analysis proposed here, under-inheritance follows from Merge. See Legate (2011, 2014), Ouali (2008) for under-inheritance and Mizuguchi (2018) for relevant discussion.

syntactic: it can be executed by Merge. Given that Merge is irreducible and that bundling can be taken care of by Merge, it follows that other assumptions proposed in the literature to produce composite heads can be wiped out in favor of the basic operation.⁸

I have proposed that XP-YP in ECM is labeled by agreement with $\langle C, T \rangle$. Given the proposed analysis, two implications will follow. One is that the Spec of $\langle C, T \rangle$ is a mixed position. As shown in (24), when the ECM subject raises out of the ECM complement, it will move via the Spec of $\langle C, T \rangle$; otherwise, it will not be visible to higher computation since β is cyclically transferred and the embedded subject becomes invisible to syntax:

- (24) The professor believes- v^* [_{RP} the student [_{R ϕ} [_{μ} t [_{δ} $\langle C, T \rangle$ [_{β} to be t intelligent]]]]]]

Recall that $\langle C, T \rangle$ is syntactically on par with C. If so, the Spec position will be a phase edge (i.e., an \bar{A} -position) and the movement in (24) will be an instance of improper movement since the Spec of RP is an A-position. It has been argued that improper movement is banned. Consider (25):

- (25) **Improper Movement Ban (IMB)**
 \bar{A} -movement of a constituent X cannot be followed by movement of X to an A-position.
 (Safir 2017)

It can be considered that improper movement causes interpretive ill-formedness at the CI interface as it yields a non-uniform chain (Chomsky and Lasnik 1993, Fukui 1993; see also May 1979).

I argue that the Spec of $\langle C, T \rangle$ will be an A-position if ϕ -features play a key role in defining A-positions (Chomsky 2007, Obata and Epstein 2011, van Urk 2015 among others). Building on earlier discussions in the literature, I propose that A- and \bar{A} -positions are defined by (26):

- (26) The nP is in an A-position if it is merged with an SO headed by a head bearing ϕ -features; otherwise, it is in an \bar{A} -position.

(26) says that a sister relation with a ϕ -bearing SO, which is the basic relation established by simplest Merge, yields an A-position for the nP (or leads to A-properties of the nP at the interfaces). Recall that $\langle C, T \rangle$ bears ϕ -features in the absence of feature-inheritance. Given (26), the Spec of $\langle C, T \rangle$ constitutes an A-position as the composite head bears ϕ and the ECM subject is merged with δ headed by $\langle C, T \rangle$; the movement in (24) will not be an instance of improper movement. Under the proposed analysis, the Spec of $\langle C, T \rangle$ is both an A-position and an \bar{A} -position: it is an A-position as $\langle C, T \rangle$ bears ϕ for under-inheritance; it is also an \bar{A} -position since $\langle C, T \rangle$ is syntactically on par with C and bears the properties of C (see Diesing 1990, Torrego 1984, Uriagereka 1988 and van Urk 2015 for relevant discussion).

The other implication is that ϕ -feature agreement does not value Case. It has been argued in the literature that Case is valued upon ϕ -feature agreement (Chomsky 2000). If the ECM subject agrees in the ECM complement, then its Case will be valued as nominative. Recall from (19) that the ECM subject receives an accusative Case, which suggests that ϕ -feature agreement with $\langle C, T \rangle$ does not value Case. Following Epstein, Kitahara and Seely (2012) and Pesetsky and Torrego (2001) among others, I claim that nominative Case valuation is executed by tense: Case is valued as nominative via ϕ -feature agreement to the extent that an agreeing head bears tense. This argument is supported by the fact that R is also engaged in ϕ -feature agreement and Case valuation. If ϕ -feature agreement values Case, Case values assigned would be the same and there would be no distinction between nominative and accusative. I argue that ϕ -feature agreement is required in Case valuation since tense is interpretable and does not work as a probe: ϕ enables tense to agree with the Case feature of the nP when it probes and locates its goal for agreement; in other words, tense takes a free ride on probing ϕ , which makes it look as if ϕ -feature agreement values Case. In the ECM complement, which is infinitival, $\langle C, T \rangle$ does not bear tense. Hence, ϕ -feature agreement with $\langle C, T \rangle$ does not lead to valuation of the Case of the ECM subject. The ECM subject does not get de-activated and can agree with R

⁸ See also van Urk (2015) for the argument that C is a composite probe, which can be explained by external pair-merge of T to C under the proposed analysis.

in the higher clause for accusative Case valuation.

The argument that *n*P_s can agree with multiple ϕ -probes if they are not de-activated is supported by hyper-raising in Bantu languages. Consider (27) from Lubukusu and Lussamia:⁹

- (27) a. Chisaang'i chi-lolekhana mbo chi-kona. [Lubukusu]
 10animal 10SA-seem that 10SA-sleep.PRS
 'The animals seem to be sleeping.'
- b. Efula yi-bonekhana i-na-kwa muchiri. [Lussamia]
 9rain 9SA-appear 9SA-FUT-fall tomorrow
 'It seems that it will rain tomorrow.'
- (Carstens and Diecks 2013)

Carstens and Diercks (2013) persuasively argue that in (27), the embedded clause out of which the *n*P is raised is a finite clause exhibiting a full range of tense and agreement; they also argue that the examples in (27) are examples of raising and not those of copy raising. Then (27) shows that the surface subject agrees in ϕ in the embedded clause as well as in the matrix clause. Diercks (2012) claims that Case is lacking altogether in Bantu languages. If so, the *n*P never gets de-activated even if it agrees with a tensed ϕ -probe in the embedded clause and it can agree again in the higher clause. (27) argues that a single *n*P can agree with multiple ϕ -probes if it is not de-activated for Case valuation, supporting multiple agreement in ECM.

3.2 Parametric Variation with ECM In this section, I discuss parametric variation with ECM and argue that it is straightforwardly explained by the proposed analysis. It has been observed that ECM is not possible in French. Consider (28):

- (28) *Tu crois Jean être le plus intelligent. [French]
 you believe Jean to-be the most intelligent
 'You believe Jean to be the most intelligent.'
- (Davis 1987)

I claim that the difference between (28) and its English counterpart can be deduced from Merge or how it applies in the derivation: in non-ECM languages like French, C and T are set-merged, which produces (29):

- (29) [_K C [_{α} [_{*n* ϕ} ...]] [T _{ϕ} [_{β} ... t ...]]]] ($\alpha = \langle \phi, \phi \rangle$)

In the process of derivation, α , which is a complement of C, is cyclically transferred and gets impenetrable; the subject is made inaccessible to higher computation. Consequently, in (28), it cannot agree with the matrix R and cannot have its Case feature valued:

- (30) [_{R ϕ} [_K C [_{α} [_{*n* ϕ} ...]] [_{λ} T [_{β} ... t ...]]]]]
 \times Agree

Though labeling of XP-YP in ECM is not problematic in French as well as in English, (28) is ruled out for unvalued Case (and unvalued ϕ of the matrix R), hence in violation of Full Interpretation.

The proposed explanation is supposed by the fact that ECM in French can be salvaged by \bar{A} -movement while it cannot by A-movement. Consider (31) and (32):

- (31) Quel homme crois-tu être le plus intelligent? [French]
 which man believe-you to-be the most intelligent
 'Which man do you believe to be the most intelligent?'
 (Davis 1987)
- (32) *Pierre a été cru avoir acheté des fraises. [French]
 Pierre has been believed to-have bought some strawberries

⁹ Abbreviations: SA = subject agreement; FUT = future; PRS = present. Arabic numerals preceding nouns indicate noun class and those preceding SA show the noun class of the agreement.

‘Pierre has been believed to have bought some strawberries.’

(Bošković 1995)

In (31), the subject is \bar{A} -moved while in (32), it undergoes A-movement. ECM in (31) is salvaged by \bar{A} -movement because it moves the ECM subject to Spec,CP, a phase edge, in the embedded clause in the derivational process, thanks to which the subject is not transferred. In the relevant Spec position, it is visible to computation in the higher phase and can agree with the matrix R to have its Case feature valued:

$$(33) \quad [v^* [R_\phi [\sigma [t_\phi \dots]]] [\kappa C [\alpha t [T [\beta \dots t \dots]]]]]$$

\swarrow Agree

On the other hand, when the ECM subject is A-moved as in (32), the movement will be ruled out as it is improper movement. In (32), just as in (31), the subject will move to the embedded Spec,CP in order to move out into the higher clause; otherwise, it will get inaccessible to computation in the higher clause for phase impenetrability. Notice, however, that ϕ -features are inherited from C to T in (32) since T is set-merged in the embedded clause and is available for feature-inheritance; C derivationally loses ϕ -features and the subject is not merged with a set headed by a ϕ -bearing head. The relevant Spec position is thus an \bar{A} -position. When the subject moves from the Spec to the matrix Spec,TP, it will undergo improper movement:

$$(34) \quad [C [\text{subject} [\dots [\sigma t [\kappa C [\alpha t [T_\phi [\beta \dots t \dots]]]]]]]]]$$

\uparrow A-movement \uparrow \bar{A} -movement

The movement in (34) violates Improper Movement Ban in (25) and consequently, (32) is ruled out, even though the Case feature of the subject can be valued thanks to ϕ -feature agreement with a higher probe in (32) just as in (31) (the matrix T in (32) and the matrix R in (31)).

Notice that the English counterpart to (32) is not ill-formed. Consider (35):

(35) The student is believed to be intelligent.

The example argues that movement of the ECM subject does not undergo improper movement; that is, it suggests that (32) and (35) are structured differently by Merge, which endorses the proposed analysis of ECM. Unlike in (32), in (35), T is not set-merged but is externally pair-merged to C in the ECM infinitive, and the composite head bears ϕ -features for under-inheritance, which makes the Spec of <C, T> an A-position and the derivation in (36) does not violate (25):

$$(36) \quad [C [\text{The student} [\text{is believed} [\mu t [\delta \langle C_\phi, T \rangle [\beta \text{be} [t \text{intelligent}]]]]]]]]]$$

\uparrow A-movement \uparrow A-movement

Parametric variation with ECM suggests that the infinitival clause is not uniform across languages. This is in fact argued for in Chomsky (1981), where a language-specific rule of S'-deletion is proposed to account for ECM and non-ECM languages: in English, S'-deletion removes S' and the embedded clause turns into S.¹⁰ Under the proposed analysis, parametric variation with ECM is deducible from Merge, not from deletion. This is desirable in that deletion removes a portion of the existing structure and violates the No-Tampering Condition (NTC), one of the third factor principles:

(37) **The No-Tampering Condition (NTC)**

Merge of X and Y leaves the two SOs unchanged.

(Chomsky 2008:138)

External pair-Merge can explain the non-uniformity of the infinitival clause in a way satisfying NTC.

¹⁰ For recent discussion, see Pesetsky (2016), who proposes a deletion operation called Exfoliation and argues that deletion of CP by Exfoliation makes subject extraction out of the embedded clause possible. See also Mizuguchi (2018) for the discussion of how clause size is reduced and why clause reduction matters for subject extraction.

The proposed analysis also suggests that parametric variation with ECM is not lexical in the sense of Borer (1984) and Chomsky (1986, 1995) but syntactic (i.e., it follows from third factor compliant applications of operations or Merge in our case). In both ECM and non-ECM languages, C and T are merged into the derivation, with the exact same features on these two heads; moreover, the lexicon does not have two types of C heads (C and $\langle C, T \rangle$) and hence the relevant variation does not boil down to the lexical variation in the lexicon: that is, English has $\langle C, T \rangle$ as a C head in addition to C while French does not have $\langle C, T \rangle$. Instead, $\langle C, T \rangle$ is created by Merge and how C and T are merged in the derivation determines whether a language allows ECM or not. As demonstrated, ECM is possible when T is externally pair-merged to C and (21b) is generated in the embedded clause, which allows the ECM subject to avoid being transferred and agree with the higher R for Case via ϕ -feature agreement. On the other hand, if (21a) is produced by Merge, the ECM subject will be kicked out of syntax since the embedded TP is transferred and sent off to the interfaces, being invisible to computation in the higher clause; ECM will be ruled out for unvalued features (i.e., the Case feature of the ECM subject and ϕ -features of the higher R). The two modes of Merge are both compliant to third factor applications of Merge, with parametric variation with ECM deducible from the way the structure-building operation Merge applies to C and T in the course of the derivation.¹¹

If Merge applies freely to yield both (21a) and (21b), it is predicted that $\langle C, T \rangle$ can be created in the embedded clause in languages like French as well; only a stipulation can block the pair-merge. Then the next question is why $\langle C, T \rangle$ is ruled out in languages where ECM is not possible. I argue that selection, which constrains head-complement relations and is required in some form or other, answers the question at hand. In ECM languages like English, ECM predicates can select $\langle C, T \rangle$ (or the set labeled “ $\langle \phi, \phi \rangle$ ” or “ ϕP ”); on the other hand, the counterparts in non-ECM languages like French can select only C (or a set without a ϕ label: $\neg\phi P$). Thus, if T is externally pair-merged to C in non-ECM languages, the derivation will be ruled out in violation of a selectional relation between the predicate and its complement.

4 Some Remarks on Raising-to-Subject

In the discussion so far, I have discussed optional raising-to-object in ECM, arguing that external pair-merge of T to C gives an answer to the question why halting in the embedded clause is possible with ECM. In this section, I discuss obligatory exit in raising-to-subject. Recall from (17), which is repeated below for convenience, that in raising-to-subject, unlike in ECM, the *n*P cannot halt in intermediate positions:

- (17) a. *There seems to be likely [α a student [to be in the classroom]] ($\alpha = ?$)
 b. *There seems [α a student [to be likely to be in the classroom]] ($\alpha = ?$)
 c. [A student [seems [α t [to be likely [α t [to be in the classroom]]]]]] ($\alpha = T$)

Given labeling theory, these examples argue that XP-YP produced in intermediate positions through halting of the subject cannot be labeled, which suggests that ϕ -features are not available and that ϕ -feature agreement is not executed; in the absence of ϕ -feature agreement, minimal search Label, when applied to α , will be ambiguous and cannot determine a unique label, which causes labeling failure. Given that the raising complement, just like the ECM complement, is a clause, I assume that C and T are merged in the raising infinitive (see the references cited in section 3). I claim that in raising-to-subject, C is externally pair-merged to T (Mizuguchi 2016, Sugimoto 2016), instead of T being externally pair-merged to C. (38a), not (38b), is yielded in the embedded clause:

- (38) a. [$\delta \langle T, C \rangle$ [β ...]] b. [$\delta \langle C, T \rangle$ [β ...]]

In (38a), C gets syntactically de-activated due to its pair-merge to T and its ϕ -features are not available. Consequently, $\langle T, C \rangle$ cannot agree with the subject, with the result that XP-YP created by movement of the subject, which is μ in (39), cannot be labeled, which explains the ill-formedness of (17a) and (17b):

¹¹ For relevant discussion, see Epstein, Obata and Seely (2017) and Obata, Epstein and Baptista (2015), who argue that parameters of UG follow from the way operations apply within the confines of third factor principles.

(39) $[_\mu \text{ subject } [_\delta \langle T, C \rangle [_\beta \dots t \dots]]]$ ($\mu = ?$)

If the subject moves out and turns into a copy, which is invisible to Label, as in (40), then Label can unambiguously locate $\langle T, C \rangle$ through minimal search. Assuming that $\langle T, C \rangle$ is labelable and can label without overt Spec, μ can be labeled, which explains (17c):¹²

(40) $[\text{subject } \dots [\dots [_\mu t [_\delta \langle T, C \rangle [_\beta \dots t \dots]]]]]$ ($\mu = \langle T, C \rangle$)

In both ECM and raising-to-subject, C is merged. However, how it is merged or pair-merged tells ECM from raising-to-subject as regards the availability of ϕ in their infinitival clauses, hence labeling of XP-YP. Optional and obligatory raising follows from Merge, which freely applies to yield both $\langle C, T \rangle$ and $\langle T, C \rangle$.

If Merge applies freely given simplest Merge, then the final question that needs to be answered is why T is not pair-merged to C in raising-to-subject. As with parametric variation with ECM, I suggest that selection plays a role and explains the difference between raising-to-subject and ECM: raising predicates select $\langle T, C \rangle$ (or a set without a ϕ label: $\neg\phi P$) while ECM predicates select $\langle C, T \rangle$ (or a set with a ϕ label: ϕP). The creation of $\langle C, T \rangle$ in the raising infinitive will lead to a violation of selectional relation between a raising predicate and its complement.

5 Conclusion

Lasnik (2001, 2003, 2004) persuasively demonstrates with a number of empirical examples that raising-to-object is optional in ECM. This poses a problem to labeling as XP-YP is produced in the ECM complement. In this paper, I addressed this problem and claimed that XP-YP in the ECM infinitive is labeled by agreement. I have argued that C is selected in the ECM complement and that the composite head $\langle C, T \rangle$ is created by external pair-merge of T to C; the ECM subject moves to the Spec of $\langle C, T \rangle$, which agrees with the ECM subject for under-inheritance of ϕ . I have shown that the proposed analysis can not only solve labeling of XP-YP in the ECM infinitive; it can also circumvent phase impenetrability, allowing the ECM subject to agree with the superordinate R and to raise out to Spec,RP in the higher clause. As implications of the proposed analysis, I have argued that the Spec of $\langle C, T \rangle$ is a mixed (A/\bar{A}) position and that ϕ -feature agreement does not value Case. Not only XP-YP labeling in ECM but also parametric variation with ECM and obligatory exit in raising-to-subject follow from Merge under the assumption that selectional restrictions are required in one form or other.

In conclusion, the present paper illustrates the significance of Merge in language and endorses the basic hypothesis in the minimalist program, which is that that language is explained by Merge and interfaces with the CI and SM systems (Chomsky 2010, 2017 among others).

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¹² Mizuguchi (2017) claims that T is weak as a label because of its unvalued ϕ . Assuming that this analysis is correct, $\langle T, C \rangle$ can label on its own without overt Spec since the composite head, which is on par with T, does not have unvalued ϕ -features due to C being pair-merged to T.

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An Analysis of Deadjectival Nominalization: A DM-theoretic View

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1 Introduction

The interaction between syntax and morphology is a major theme of recent studies in the generative framework. In a current theory of antilexicalism, Distributed Morphology (DM), the core properties of word construction are attributed to its syntactic structure while the role of its formal make-up is consigned to the morphological module, due to an economy constraint which requires information available to each stage of computation to be narrowly restricted (Embick 2010). A representative of the phenomena involving the syntax-morphology interface is nominalization, and analyses of deverbal derived nouns (Marantz 1997, Harley and Noyer 2000) and deverbal compound nouns (Harley 2009, Morita 2016) have been proposed in the DM-framework. The present study proposes a DM-theoretic analysis of deadjectival nominalization in Japanese to elucidate essential aspects of the syntax-morphology interplay. After classification of deadjectival nominalizers based on a detailed observation of deadjectival nominals extracted from a large-scale corpus in §2, their syntactic aspects (§3) and their morphological facets (§4) are illuminated and accounted for.

2 Classification of Japanese deadjectival nominalizers: two-level distinction

Although rather fragmentary observations have been made on Japanese deadjectival nominalizers (Arakawa 1986, Ito and Sugioka 2002), there has been no systematic analysis of these nominalizers. We will attempt a comprehensive analysis of them; after in-depth observation of deadjectival nominal suffixes in this section, theoretical analysis of them is conducted within the framework of DM in the next sections.

As (1) shows, State-noun forming suffixes in Japanese are classified into two main types according to the semantic, morphological, and morphosyntactic criteria:

(1)	two types of deadjectival nominalizers			
	(i) semantic	(ii) morphological	(iii) morphosyntactic	nominalizers
	level 1: idiosyncratic	unproductive	non-argument-inheriting	<i>-mi</i> , <i>-ke</i>
	level 2: compositional	highly productive	argument-inheriting	<i>-sei</i> , <i>-sa</i>

Let us look at each case in more detail. The deadjectival abstract nominalizers *-mi* and *-ke* are among level 1 affixes, which have fully lexical meanings, occur only sporadically, and “disinherit” related arguments. For instance, *-mi* includes the meaning of ‘a touch or ring of,’ as in *ataatakami* ‘a touch of warmth’ and *-mi* is of very limited use: no hapax legomenon is found among 34 *-mi* derivatives (types) attested in Balanced Corpus of Contemporary Written Japanese (BCCWJ), a 105-million-word corpus. Additionally, *-mi* does not inherit the argument structure of its base, as in *Taro-no* (**suugaku-eno*) *yowami* ‘Taro’s weakness (in mathematics).’ A similar observation applies to the suffix *-ke*: *nemuke* is composed of *nemu(-i)* ‘sleepy’ and *-ke* ‘a hint or sign of’ and only 2 *-ke* derivatives (non-hapaxes) are detected in BCCWJ.

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In comparison, the level 2 nominalizers of *-sei* and *-sa* exhibit regular characteristics. To begin with, their semantic and morphosyntactic properties should be identified. Both *-sei* and *-sa* have the meaning ‘state or quality’ (STATE): *goohoo(-na)* ‘legal’ plus *-sei* equals *goohoo-sei* ‘legality’ and *karen(-na)* ‘lovely’ plus *-sa* equals *karen-sa* ‘loveliness.’ In addition, they may inherit the arguments of their bases, as in *erareta kekka-no riron-tono tooitsu-sei* ‘the uniformity of the result obtained with a theory’ and *Taro-no Hanako-eno shinsetsu-sa* ‘Taro’s kindness to Hanako.’

There is certainly a good argument that level 2 nominalizers are morphologically creative. Psycholinguistic evidence indicates that while highly frequent words are lexically stored and easily accessible, infrequent ones are generally created by some rule (Hay 2003:77-81). Therefore, the hapax legomena (token frequency 1) drawn from a large corpus can be a significant barometer of lexical inventions (Baayen and Renouf 1996). For measuring the creativity of each type of nominalizer, the hapax nominals under discussion are extracted by a computer research for BCCWJ. As a result of the research, we have found 60 types of *-sei* hapaxes (e.g. *hanshookanoo-sei* ‘falsifiability’) and 70 types of *-sa* hapaxes (e.g. *shirimetsuretsu-sa* ‘incoherence’) in BCCWJ. Moreover, they often involve contextually-induced online formation of nominals, as exemplified in (2).

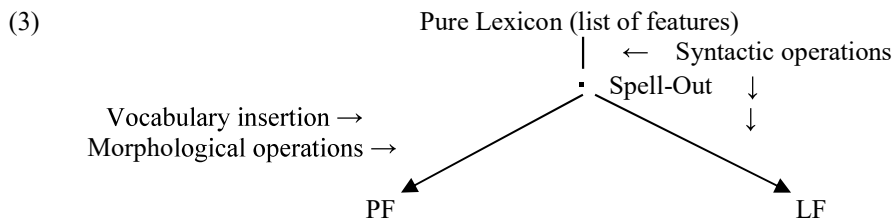
- (2) a. *osuinu-wa nandomo dassoo-shite ... roojin-no ie-ni modotte-shimatta ...*
 male dog-TOP many times escaped old man-GEN home-to returned
kika-sei-ga tsuyoku ...
 home-returning-quality-NOM strong
 ‘the dog escaped many times ... returned to the old man’s home ... it has a strong disposition to return to its beloved home ...’ (BCCWJ)
- b. *kidoairaku-o sooshitsushita omen-noyooni ugokanai hyoojoo-to*
 emotion-ACC have lost mask-like motionless look-and
seishinkatsudoo-no fukappatsu-sa-ga tokuchoo-de ...
 mind-GEN inactive-ity-NOM characteristic-be
 ‘An expressionless look like a (Noh) mask that has lost an emotion and the inactivity of mind are the characteristics ...’ (BCCWJ)

In (2a), the inherent quality or disposition which is explicitly anticipated by the preceding clause is expressed concisely by the transiently constituted form *kika-sei*. The same argument applies to example (2b). The data on hapax and online nominalization therefore argue for great creativity of *-sei/-sa*, which clearly distinguishes them from level 1 nominalizers like *-mi* and *-ke*.

3 Syntax of deadjectival nominals

3.1 An antilexical model: DM This section demonstrates that the distinct semantic and morphosyntactic behaviors of the two types of nominals are attributable to the difference of their syntactic representations. Before proposing a new analysis, let us briefly describe a grammatical model on which our analysis relies.

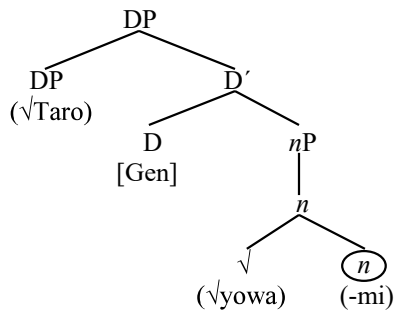
Although lexicalism places word formation exclusively within the lexicon (Di Sciullo and Williams 1987), the overall parallelism of combinatory rules in word and sentence construction has brought the rise of antilexicalism, according to which major word construction processes take place outside the lexicon. A leading antilexical model is DM, whose system may be schematized in (3) (cf. Halle and Marantz 1994):



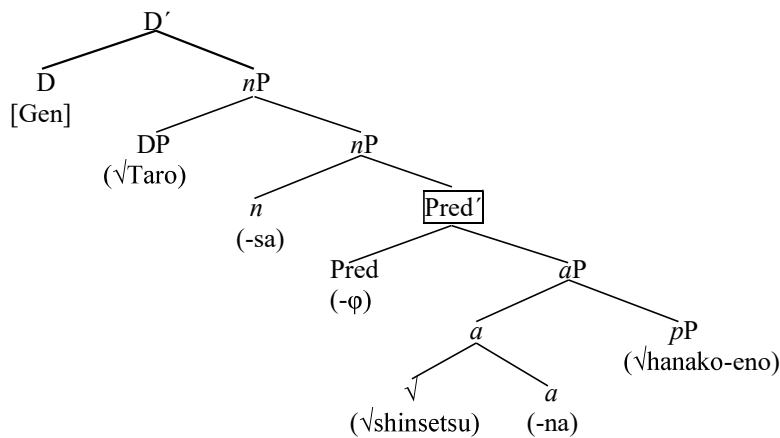
Two major claims are conspicuous in this scheme. One is late insertion: lexical items in Vocabulary are inserted into the terminal nodes of a syntactic representation, motivated by an economy condition which requires only relevant information to be accessible at each point of computation (Halle 1994:3). The other is postsyntactic morphology: the syntactic output requires some readjustments which could be language-particular. A series of operations such as merger and impoverishment are postsyntactic and apply to the syntactic output to construct a word structure. Thus, universality of syntax is pursued by prolonging lexical insertion and morphological operations beyond Spell-Out.

3.2 Syntactic structures Turning now to the syntactic derivation of level 1 and level 2 nominals, we assume the thesis that the domains for word formation are classified according to the height of attachment of a head morpheme (Arad 2003). We also assume Baker (2003:35)'s predication structure. Given these assumptions, both types of nominals are structurally distinguished; the underlying structure of “low” nominals (level 1) and that of “high” nominals (level 2) are given in (4) and (5), respectively. Additionally, the syntactic representation of the clausal equivalent is given in (6).¹

- (4) low nominal: Taro-no (*suugaku-eno) yowami ‘Taro’s weakness (in mathematics)’

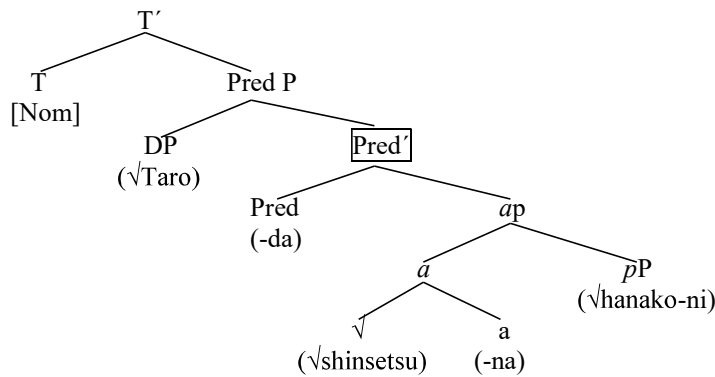


- (5) high nominal: Taro-no Hanako-eno shinsetsu-sa ‘Taro’s kindness to Hanako’



¹ Root (√) is defined as bound morpheme that becomes the core of a word. In each structure, lexical items in parentheses are specified only for ease of exposition. No lexical item is actually inserted at the level of syntax.

- (6) clausal structure: Taro-ga Hanako-ni shinsetsu-da ‘Taro is kind to Hanako’



3.3 Evidence The evidence for the two-level structural distinction in nominalization comes from the morphological behavior of each nominalizer: its locus in derived words and compounds and its relation to context-dependent nominalization. Let us first consider the relative positions of *-sei/-sa* and other affixes. The high nominalizer *-sei* productively attaches to suffixed words such as *nikutai-teki* ‘physical’ (although the suffix *-teki* is usually truncated) and prefixed words such as *hi-ronri-teki* ‘illogical,’ *hu-kakujitsu-na* ‘uncertain,’ and *mu-mujun-na* ‘non-contradictory.’ Similarly, *-sa* productively combines with adjectives ending in suffixes like *-poi* ‘apt to’ and *-rashii* ‘having the qualities of’ (cf. *okori-ppo-sa* ‘aptness to get angry’ and *dansei-rashi-sa* ‘manliness’) and those with prefixes like *ko-* ‘small/somewhat,’ *usu-* ‘somewhat,’ and *o-go-* ‘politeness’ (cf. *ko-gitana-sa* ‘the state of being somewhat dirty,’ *usu-kimiwaru-sa* ‘the state of being somewhat weird,’ and *o-kiraku-sa* ‘the state of being carefree (politeness)’). According to the criteria previously described, *-poi*, *-rashii*, and *o-go-* are judged to be level 2 affixes. For example, *go-* affixes freely to an adjective just to express politeness, inheriting the complement of the adjective, as can be seen from *Hanako-ni go-shinsetsu-na* ‘kind (politeness) to Hanako.’ The main point to note is that the level 2 nominalizers *-sei/-sa* can be added to adjectivals which are derived by level 2 affixes, whereas no affixes can attach to nouns ending in *-sei* or *-sa*; that is, *-sei/-sa* take place outside the *aP* projection which contains a set of level 2 affixes, as indicated in (5) above. In contrast, it is clear that the level 1 nominalizers *-mi/-ke* are inner layers, since they only attach to roots, as displayed in (4).

Secondly, level 2 nominalizers can attach to compounds, while level 1 nominalizers cannot, as exemplified in *tabako-kusa-sa*/**tabako-kusa-mi* ‘the state of having the smell of tobacco.’ More concretely, *-sei* can combine with “Noun+(Sino-Japanese)Adjective” compounds (e.g. *seika-shikoo-sei* ‘result-orientedness’) and “Verb+(Sino-Japanese)Adjective” compounds (*hanshoo-kanoo-sei* ‘falsifiability’). Likewise, *-sa* can suffix to “Noun+(Native)Adjective” compounds (*shiryo-buka-sa* ‘thoughtfulness’) and “Verb+(Native)Adjective” compounds (*sodate-niku-sa* ‘the state of being difficult to raise’). It can be argued therefore that *-sei/-sa* are outside the *aP* projection within which relevant compounds are derived. The last case is particularly interesting in that this type of compound corresponds to *tough* construction in English. In Japanese, *tough* construction is expressed with “Verb+(Native)Adjective” compounds, as in *otokonoko-wa [sodate-nikui]_{Adj}* ‘boys are difficult to raise,’ and so “*tough* compounds” are naturally derived from their underlying clausal structures.² Fully productive attachment of *-sa* to these clausal structures confirms the occurrence of *-sa* in a position close to *Pred*.³

Lastly, context-induced nominalization, which we have already observed, gives independent evidence to the two-level syntactic distinction. High nominals, but not low nominals, can participate in this kind of word creation. In example (7), the verbal predicate *inchiki-kusai gyoo-dearu* ‘is a phony-looking line’ is

² It is not clear why “*tough* nominalization” is impossible in English (**Boy’s difficulty to raise*), but a remark may be made about the contrast: there are two variants of the Japanese equivalent of the English word *difficult*, *muzukashii* and *-nikui*. The latter form does not occur alone, but occurs only in combination with a root, which necessarily coins a *tough* compound such as *sodate-nikui*. By contrast, there are no such variants in English.

³ The underlying structure can be something like: “[_√otokonoko [_{n-sa} [_{Pred-φ} [_√niku [_√hanako-no [_{OP} [_{PRO} [_{to} [_√sodate t_i]_{vP}]_r]_{CP}]_{CP}]_{aP}]_{Pred}]_{nP}]_{nP}.” Further evidence for the head *Pred* within level 2 nominals is semantic: they imply a copular verb, as can be seen from *Taro-no Hanako-eno shinsetsu-sa* ‘Taro’s state of being kind to Hanako.’

subsequently expressed by the corresponding novel level 2 nominal *kono gyoo-no inchiki-sei-o* ‘the phoniness of this line’:

- (7) ... ikanimo inchiki-kusai gyoo-dearu ... *kono gyoo-no inchiki-sei-o* ...
 really phony-looking line-be this line-GEN phony-ness-ACC
 ‘... is a really phony-looking line ... the phoniness of this line ...’ (BCCWJ)

We can then say that the essence of predicate nominalization is to copy the Pred’ within a preceding TP in a nominal environment (cf. (5) above) and that only level 2 nominalizers can involve this process.

3.4 Consequences The proposed analysis has two main consequences. The first consequence is that the contrastive properties of both nominals follow automatically from the occurrence of their nominalizers in two different syntactic positions. An “inner” nominalizer directly merges with a root to produce a word (*n*) as demonstrated in (4) and it may have idiosyncratic meanings, since the domain below the category head *x* is reserved for lexical meanings; a root is assigned an interpretation in the context of the first categorial head of the root, which is then retained throughout the derivation (Marantz 2013). By contrast, “outer” nominalization (*shinsetsu-sa*) in (5) produces a phrase (*nP*) and so it has only compositional meanings. Thus at LF, an interpretation of each nominal is properly obtained on the basis of structure (4) or (5): the idiosyncratic meaning of ‘Taro’s touch of weakness’ and the compositional meaning of ‘Taro’s state of being kind to Hanako’ are gained from (4) and (5), respectively. Morphologically, direct attachment of an inner nominalizer to a root in (4) leads to unproductive word formation, since the unpredictable bases of the suffix are specified item-by-item in its lexical entry. In comparison, an outer nominalizer constructs complex words creatively, because it attaches to a functional category in much the same way as an inflectional affix in the underlying structure of (5). Morphosyntactically, outer affixation, unlike inner affixation, is typically characterized by a combinatory process whereby the features of its constituents including argument features are regularly composed. Accordingly, an outer nominalizer can inherit the arguments of a base adjective, but an inner nominalizer cannot. It should be stressed that an outer nominalization in (5) and its clausal counterpart in (6) have common predicational and head-complement relations, which are crucially derived from their common core layer (Pred’).

Secondly, our antilexical approach provides a unified and elegant account of the overall similarity of a “high” nominal and its clausal counterpart, thereby resolving theoretical and empirical problems inherent in lexicalism (Aronoff 1976, Selkirk 1982). The first theoretical problem for lexicalism is that it makes the nominalization theory too redundant. In our antilexical model, the high nominal of (5) and its clausal equivalent of (6) have essentially the same syntactic representations, which are built up by unified combinatory rules. As the underlying structures of both predicates and their nominalizations are constructed by the same device, the system of grammar becomes more economical. This measure, however, cannot be carried out in the lexicalist framework where the derived noun *shinsetsu-sa* is formed by a word formation rule in the lexicon and inserted under the N-node before syntactic derivation. Another theoretical problem for lexicalism concerns creativity. We have already seen the creative aspects of level 2 nominals and they originate in the underlying syntactic configurations of these nominals. In the lexicalist position, creative nominalizations, together with unproductive ones, should be treated in the lexicon. Such a treatment, however, would undermine the homogeneity of the module, since the lexicon is generally defined as a set of listed items.

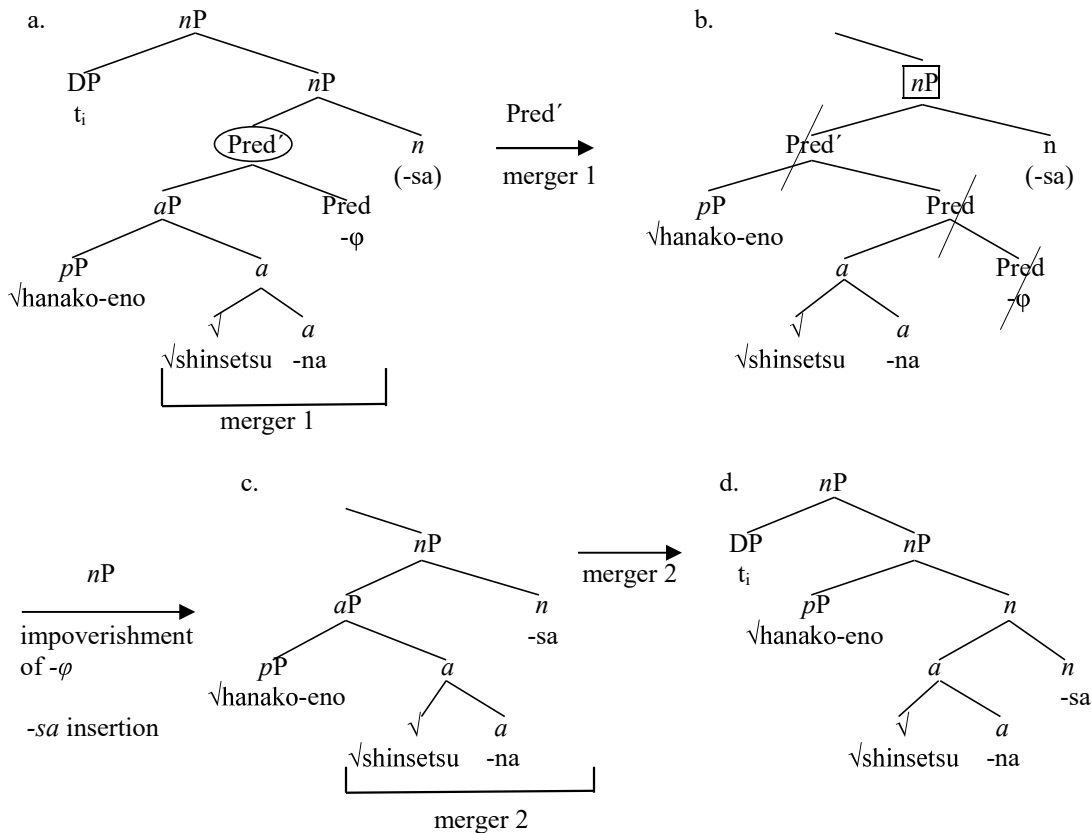
Empirically, the context-dependent word formation described above may pose a problem for the lexicalist theory. Under the thesis of “syntactic atomicity of words” of lexicalism, a word-internal element is not allowed to relate to a word-external syntactic element. Counterexamples to this, though, are obtained in the cases of context-induced nonce nominalization; in (7) above, the nominal *kono gyoo-no inchiki-sei* is transiently constructed from prior syntactic materials, with the base adjective of the derived noun *inchiki-sei* being connected with the preceding adjective *inchiki-kusai*. This case is also treated well in the antilexical approach, since the underlying structure of a level 2 nominal undergoes syntactic computation. In sum, the antilexical approach may overcome the overall failure of lexicalists to grasp the syntactic facets of level 2 nominalization.

4 Morphology of deadjectival nominals

4.1 Readjustment of syntactic structures We have shown how the syntactic representations of level1/2 nominals are made up in the DM model. We are now in the position to consider how a syntactic output is constructed into a word form, taking a level 2 nominal as an example.

In syntax, an underlying structure of a nominal such as (5) may undergo a range of syntactic operations including the movement of “subject” (*Taro*) to the Spec of DP. The adjusted syntactic output is then sent to morphology, part of the PF component, where it is required to be constructed into a word form according to a set of morphological manipulations. Specifically, on the PF side of the grammar after Spell-Out, the syntactic output needs to be readjusted by linearization, vocabulary insertion, and the operations of merger and impoverishment. Thus, the nominal *Taro-no Hanako-eno shinsetsu-sa* is derived in a purely mechanical way:

(8) Morphology (PF-side)



First, the linear order is determined: in Japanese head comes last both in syntax and in morphology. After the determination of the linear order, vocabulary insertion takes place phrase-basedly in ascending order: vocabulary items are inserted into the terminal nodes in the Pred' domain, resulting in (8a). Here the “boundness” property of the zero-morpheme $-\phi$ comes into play: merger 1 (merger of Pred and a) is morphologically forced to apply to generate structure (8b).⁴ Merger is defined as the process of combining adjacent constituents (including one that is already derived via merger) in terminal nodes into a zero-level

⁴ It is not clear whether Vocabulary insertion (VI) precedes or follows morphological operations. It may depend on construction types; for some cases, it is better for VI to precede morphological operations, and for the others, VI should follow them. To formalize the relation of both processes however remains an open question.

kept to a minimum; features in parentheses such as “(Gradable/Ungradable)” in (15) are actually not specified.

(15) internal features and selectional conditions of *-sei/-sa*

	internal features	subcategorization features			base forms	
<i>-sei</i>	(affix ^N) STATE	A/AN	Sino-Japanese	Inward	(Gradable/Ungradable)	<i>X-teki</i>
<i>-sa</i>	(affix ^N) STATE DEGREE	A/AN	(Sino-Japanese/ Native)	(Inward/ Outward)	Gradable	(* <i>X-teki</i>)

Within the scheme advocated here, this specification can be formalized into the lexical entry of each affix, as demonstrated in (16) and (17). Additionally, the lexical entry of *-mi* is given in (18). The internal features and license environment of the affixes are listed in (i) and (ii), respectively. Their complements are specified in (iii). (The proposed formalization of lexical entries is partly built upon the systems of Harley and Noyer 2000, Emonds 2000, and Embick 2010.)⁷

(16) *-sei*: (i) [state], (ii) *n*, (iii) +<*a*, Sino-Japanese, Inward>, $a = \{\sqrt{\text{kanoo}}, \dots, a^{-teki}, \dots\}$

(17) *-sa*: (i) [state][degree], (ii) *n*, (iii) +<*a*, Gradable>, $a = \{\sqrt{\text{shinsetsu}}, \dots\}$

(18) *-mi*: (i) [state][result], (ii) *n*, (iii) +<Root, Native, Gradable, Inward>, Roots = $\{\sqrt{\text{yowa}}, \dots\}$

The lexical entry of *-sei* in (16) designates something like ‘the deadjectival State nominalizer *-sei* connects just to Sino-Japanese words signifying the inner world and exclusively adjoins to *-teki* forms.’ The lexical entry of *-sa* in (17) essentially means that ‘the deadjectival State (Degree) nominalizer *-sa* attaches to (both native and Sino-Japanese) gradable words (signifying both the inner and outer world).’ And the lexical entry of *-mi* in (18) essentially indicates that ‘the deadjectival State (Result) nominalizer *-mi* is added to each of the specified native roots.’

By the competition among rival nominalizers, a proper one is inserted into the *n* node. To begin with, the level 1 nominalizer *-mi* is chosen on an item-by-item basis; it is selected for a set of roots that it specifies. Second, the choice between *-sei* and *-sa* is made according to the restrictions which stem from the insertion conditions of *-sei/-sa*; *-sa* attaches to both native and Sino-Japanese bases while *-sei* attaches only to Sino-Japanese bases and so only *-sa* is chosen for native bases. Similarly, *-sei* is selected exclusively for ungradable adjectives while *-sa* is solely selected for “outward”-denoting bases. Third, a nominalizer is licensed for a given morphological form of base; only *-sei* is chosen to make abstract nouns of *X-teki*. We may say then that competition for a choice from nominalizers is carried out according to two kinds of “blocking”: (a) the most productive nominalizer for a given class of base blocks the attachment of rival nominalizers to the base (Class-blocking), and (b) when a nominalizer is added to a given root, its rival nominals are pre-empted (Item-blocking) (cf. Aronoff 1976).

5 Conclusion

An analysis of deadjectival nominals in Japanese is carried out in the framework of DM: (i) after confirming the distinct properties of two types of nominals, the contrast is shown to follow straightforwardly from the structural difference of the nominals and (ii) substantial clarification and formalization of the insertion conditions are succinctly provided, under which a nominal form is processed to obtain a proper phonological form. The results of this study have shown that while syntactic computation of deadjectival nominalizations is made universally, their morphological readjustment and vocabulary

⁷ We assume the thesis that a subcategorization element has to do with a word category, but not a phrasal category (Emonds (2000: 45)). Accordingly in the lexical entry of *-sa*, its complement is specified as “*a*,” but not “*aP*.”

insertion can be language-specific semi-regular processes, thereby reinforcing the theory of “well-distributed” morphology.

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Labeling Algorithm, Agreement, and Pro-form *no* in Japanese

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1 Introduction

This paper contains some remarks on the syntax of the pro-form *no* in Japanese. Focusing on the interaction of *no* and adnominal quantifiers, especially pre-nominal quantifiers, it deals with the following observation. The pro-form *no* needs to be associated with at least one modifier within its domain, but an adnominal quantifier does not contribute to this requirement under the ‘numeral’ reading as opposed to the ‘property’ reading. The paper will consider if a labeling approach to syntax (Chomsky 2013, 2015) can shed some new light on this phenomenon. It is argued that what is unique about pre-nominal quantifiers in Japanese - commonly viewed as a language without agreement - is that they do have an agreement property.

2 Pro-form *no* ‘one’ and adnominal quantifiers in Japanese

As pointed out by Kamio (1983) and others, the pro-form *no* cannot occur on its own (1) and needs to occur with some modifier, such as a relative clause and a postpositional phrase (2).

- (1) a. (ookina) ie
big house
‘a/the big house’
b. *(ookina) no
big one
‘a/the big one’
- (2) a. *(Hanako-ga tukutta) no
Hanako-NOM made one
‘the one that Hanako made’
b. *(Nihon kara) no
Japan from one
‘the one from Japan’

The following description is taken from Murasugi (1991: 61), which is in turn based on Kamio’s (1983: 85) observation.

- (3) Where *no* appears as a head nominal, it has to be associated with at least one modifier under NP’ (= N’).

The particular formulation given in (3) is intended to capture the fact that not all pre-nominal elements can ‘license’ *no*. In particular, quantifiers do not ‘license’ *no*.

- (4) Kinoo-wa san-ko-no nimotsu-ga todoita.
Yesterday-TOP three-CL-GEN package-NOM arrived

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*Kyoo-wa {takusan/go-ko} no-ga todoita.
 Today-TOP many/5-CL} one-NOM arrived
 ‘Yesterday, three packaged arrived. Today, many/five arrived.’

Based on Kamio’s insight (1983), Murasugi (1991) (see also Hiraiwa (2016)) argues that a pre-nominal quantifier occupies Spec, QP, which occurs on top of NP, and hence is located ‘too high’ to qualify as a licenser of the pro-form *no*. Adjectives (also relative clauses, PP modifiers etc.), on the other hand, occur within NP as shown in (5a) and hence qualify as viable modifiers in the sense of (3).

- (5) a. [DP [NP big *no*] D] (*ookina no* ‘a big one’)
 b. *[DP [QP 3-CL-GEN [NP *no*] Q] D] (**san-ko no* ‘three ones’)

While a paradigm like (4) tells us that the location of a numeral quantifier may be higher than that of other modifiers, it does not necessarily mean that the former occupies an NP-external position. Besides, it is known that the word order between a pre-nominal quantifier and other adnominal modifiers is quite free in Japanese, as shown in (6) and (7).¹

- (6) a. *ookina san-ko-no ishi*
 big 3-CL-GEN stone
 ‘(lit.) big three stones’
 b. *san-ko-no ookina ishi*
 3-CL-GEN big stone
 ‘three big stones’
- (7) a. *Hanako-ga totta san-mai-no syashin*
 Hanako-NOM took 3-CL-GEN photo
 ‘three photos that Hanako took’
 b. *san-mai-no Hanako-ga totta syashin*
 3-CL-GEN Hanako-NOM took photo
 ‘three photos that Hanako took’

Note that it is not the concept of number itself that renders pre-nominal quantifiers exceptional in the domain of the pro-form *no* ‘one’: ordinal numerals do qualify as viable modifiers of *no*.

- (8) *Kyoo-no konsaato-wa dono kyoku-mo yokatta kedo, ...*
 Today-GEN concert-TOP which tune-all good.was though
 ‘Although each and every tune in today’s concert was good, ...’
 a. *saisyo-no kyoku-ga tokuni yokatta desu.*
 first-GEN tune-NOM particularly good-was be
 ‘the first tune was particularly good.’
 b. *saisyo no-ga tokuni yokatta desu.*
 first one-NOM particularly good-was be
 ‘the first one was particularly good.’

There is another puzzle to be considered. A combination of a pre-nominal quantifier and the pro-form *no* does not always lead to ungrammaticality. It is fine under what Hiraiwa (2016) dubs the ‘property’ reading. The following example has the reading in which Taro bought a set of 5 books, typically a five-volume set of books.

- (9) *Taro-wa go-satsu no-o katta.*
 Taro-TOP 5-CL one-ACC bought
 *‘Taro bought 5 books.’ (‘numeral’ interpretation)
 ‘Taro bought a 5-volume set.’ (‘property’ interpretation)

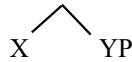
¹ One might say that pre-nominal quantifiers in Japanese undergo covert movement out of NP to the domain of QP, but that needs independent justification.

We would like to know why the choice of the reading matters here. In what follows, I would like to consider if the recent label-based syntax (Chomsky 2013, 2015 etc.) can shed some light on these questions.

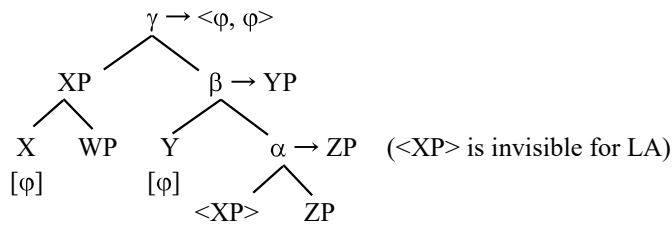
3 Analysis

3.1 Labeling Algorithm Let us outline the labeling system to be entertained below. The operation Merge essentially yields two configurations.² For $SO = \{X, YP\}$ as shown in (10), where X is a head (lexical item, or LI) and YP is a non-head, labeling algorithm (LA) in the form of minimal search trivially determines X as the label of SO. Now consider (11). For $SO = \{XP, ZP\}$, where neither is a head, minimal search fails to determine a label, and the configuration needs to be somehow “modified” to avoid labeling failure. For example, if one of them, say, XP, moves out, its copy becomes invisible for LA, and the label of α in (11) becomes that of ZP. However, movement of XP into the domain of Y would create another configuration of the same kind, where, again, minimal search fails to identify a head. Chomsky argues that if XP and YP share a prominent feature F, then the label of SO is determined as $\langle F, F \rangle$. For cases where this prominent feature is φ -feature, we can say that the label of SO is $\langle \varphi, \varphi \rangle$.

(10) $\alpha \rightarrow XP$ (via ‘minimal search’)



(11)



An interesting question arises concerning the label of β in (11), which in the traditional X-bar schema corresponds to Y' . This is a configuration of the form $\beta = \{Y, \alpha (= ZP)\}$, and, ordinarily, Y provides a label. But Chomsky (2013, 2015) suggests that some heads, such as T in English, are too weak (or defective) to provide a label. Chomsky argues that this consideration deduces the EPP property. For $\beta = \{T, vP\}$, no label can be provided if T is weak. In that case, the system takes a phrase, XP, and externally or internally merge it with β , which would create $\gamma = \{XP, \beta (= \{T, vP\})\}$. And if XP and β share some prominent feature such φ -feature, the label of γ is determined as $\langle \varphi, \varphi \rangle$. What about the label of β ? I will assume that φ -feature sharing strengthens the weak nature of T, thus allowing Y to provide a label for β (see Saito 2016).

This poses an interesting question for languages without φ -agreement (such as Japanese). If φ -agreement plays such a significant role in resolving the labeling problem of an XP-YP configuration, how can a language without φ -agreement correctly identify a label in, for example, the subject-predicate configuration? Saito (2016) argues that, in such a language, some properties such as suffixal case and an inflection on a predicate play a role similar to that of φ -features. Suppose that XP but not YP of an XP-YP configuration bears suffixal Case or an inflection on a predicate. Saito argues that it renders XP “opaque” for minimal search and, consequently, it is YP that “projects.” In this sense, such elements serve as “anti-labeling” devices.

(12) a. $\{XP\text{-ga/-o/-no}, YP\}$
 b. $\{XP\text{-infl}, YP\}$

For a reason that will become clear below, I will slightly modify Saito’s implementation of the “anti-labeling” device. Instead of saying that a suffixal case and an inflection on a predicate on XP renders it opaque (invisible for LA), I will assume that it instructs LA to determine a label on the basis of the other member, Y(P) (see also Takano 2019). Let us look at concrete examples. In (13a), we have an X-YP configuration, and minimal search can identify *kaban* “bag” as the sole head (also, the inflection on *kirei* ‘beautiful’ serves

² I will set aside the case where $SO = \{X, Y\}$ where both are heads.

as an anti-labeling device). When another modifier, such as *ano kodomo-no*, ‘that child-GEN’ of (13b), is additionally merged, we obtain an XP-YP configuration where minimal search fails to find a head, but the genitive marker *-no* instructs LA to determine a label on the basis of the other member.

- (13) a. [[totemo kireina] kaban]
 very beautiful.ADN bag
 ‘a very beautiful bag’
 b. [[ano kodomo-no] [[totemo kirei-na] kaban]]
 that child-GEN very beautiful.ADN bag
 ‘That child’s very beautiful bag’

3.2 Pro-form *no* and labeling Turning now to the pro-form *no*, I will stipulate the following, based on (3).

- (14) Pro-form *no* cannot provide a label on its own. It needs to combine with some phrasal adnominal modifier.

Perhaps this restriction can be tied to the idea that the pro-form *no* is some sort of light noun (Hiraiwa 2016), lacking a fair amount of substance. Note in this connection that Chomsky (2015) suggests that a root is too weak to serve as a label because it lacks certain properties such as categorial information, and thus needs to be supplemented (or enriched) with an agreeing element. We might be able to apply a similar logic here and say that the pro-form *no* is too weak (or ‘defective’) to provide a label on its own and needs to be supplemented with a modifier. I will leave the precise nature of (14) open here. Note that although (14) may sound like a mere restatement of (3) in terms of the label-based syntax, it in fact allows us to see the uniqueness of pre-nominal quantifiers among adnominal modifiers.

When *no* is combined with a modifier, which I take to be always phrasal (cf. the idea expressed by the X-bar schema of the form $X' \rightarrow X YP$), we get $\{no, YP\}$.³ In (15a), in which the pre-nominal modifier *kireina* ‘beautiful.ADN’ and pro-form *no* are merged, the adnominal inflection on the former acts as an anti-labeling device, instructing the other member, *no*, to project. This is where the modification of Saito’s original concept of the anti-labeling device becomes important, because if the function of an anti-labeling device is to render its host invisible, we would end up with *no* alone, which lacks the ability to provide a label on its own. I will thus proceed with the slightly modified version of Saito’s idea mentioned above.

- (15) a. $\alpha \rightarrow nP$
 (totemo) kireina $\alpha \rightarrow nP$
 ‘(very) beautiful.ADN’ ‘one’
 b. $\beta \rightarrow nP$
 takai $\beta \rightarrow nP$
 ‘expensive.ADN’ $\alpha \rightarrow nP$
 kireina $\alpha \rightarrow nP$
 ‘beautiful.ADN’ ‘one’

When another modifier is added as shown in (15b), the inflection on the modifier *takai* ‘expensive’ instructs LA to determine the label on the basis of α .

3.3 Adnominal quantifiers and agreement Let us return now to the question of why pre-nominal quantifiers fail to ‘license’ *no*. I assume, following Saito et al. (2008) (see also Huang and Ochi (2014)), that they occur within NP, just like other adnominal modifiers. But if structural height does not distinguish pre-nominal quantifiers from other modifiers, what does? I would like to argue that it is their agreement property.

³ It is sometimes suggested that a modifier (or an adjunct) is introduced by an operation called pair merge. Postulation of such an extra device should be avoided if possible.

Although the standard view in the literature about Japanese is that it lacks ϕ -features altogether (Fukui 1988, Saito 2016), pre-nominal quantifiers (in contrast to post-nominal and floating quantifiers) are exceptional in this regard. As Sauerland and Yatsushiro (2004, 2017) and Watanabe (2017) point out, while a post-nominal quantifier (16b) and a floating quantifier (16c) are insensitive to the singular/plural distinction of the denotation of the noun with which they are associated (*hon* ‘book’ in this case), a pre-nominal quantifier (16a) only permits the ‘plural’ reading and excludes the singular interpretation.

- (16) a. Boku-wa subete-no hon-o yonda.
 I-TOP all-GEN book-ACC read
 ‘*I read all of the book.
 ‘I read all of the books.’
- b. Boku-wa hon subete-o yonda.
 I-TOP book all-ACC read
 ‘I read all of the book.
 ‘I read all of the books.’
- c. Boku-wa hon-o subete yonda.
 I-TOP book-ACC all read
 ‘I read all of the book.’
 ‘I read all of the books.’

Following Watanabe (2017), I take this point to mean that a pre-nominal quantifier and a noun must establish an agreement relationship with respect to (but perhaps not limited to) number (i.e., [+ plural]).

The idea that pre-nominal quantifiers in Japanese bear an agreement feature helps us explain the curious fact, noted by Ochi (2012) and Huang and Ochi (2014), that they cannot be stacked up within a single nominal domain.⁴

- (17) a. *subete-no hyaku-satsu-no hon
 all-GEN 100-CL-GEN book
 ‘all 100 books’
- b. *hyaku-satsu-no subete-no hon
 100-CL-GEN all-GEN book
 ‘all 100 books’
- c. hyaku-satsu-no hon subete
 100-CL-GEN book all
 ‘all 100 books’

In order to express the relevant reading, a post-nominal quantifier has to be employed, as shown in (17c). I will save the discussion of post-nominal quantifiers for section 3.4. Now the ungrammaticality of (17a, b) falls out rather naturally if merge of a prenominal adnominal quantifier, because of its agreement property, has to resort to labeling via feature sharing.

- (18) * $[\beta$ subete-no $[\alpha$ hyaku-satsu-no hon]]
 [F] [F] [F]
 a. label of α : <number, number>
 b. label of β : ?

When *hyaku-satsu* ‘100-CL’ and *hon* ‘book’ are merged, they undergo feature sharing. Hence, α is labeled <F, F>. But then β cannot be labeled because *hon* has already gone through feature sharing at the derivational stage α . Case (an anti-labeling device), on the other hand, allows multiple stacking (Kuno 1973, Saito 2016).

⁴ While (17a) is unacceptable under the intended reading indicated in the text, this example is actually acceptable on another reading, ‘all sets of 100 books.’ See section 3.6.

- (19) Bunmeikoku-ga dansei-ga heikin-zyumyoo-ga mizikai.
 civilized.country-NOM male-NOM average-life.span-NOM short
 ‘It is in civilized countries that male’s average life span is short.’

According to Saito (2016), this stacking is possible in languages like Japanese that lack agreement. As shown below, the label of α is determined due to the presence of a suffixal case on *dansei* ‘male.’ The label of β is determined exactly in the same manner.

- (20) [β civilized country-NOM [α male-NOM [... short]]]]

Such considerations raise an interesting question. Take *hyaku-satsu-no hon* ‘100-CL-GEN book’ as an example. According to Saito, Japanese lets a suffixal case (and inflection on a predicate) on XP to serve as an anti-labeling device, thereby providing the instruction to the system that the other member of the pair “projects.” Yet the preceding discussion suggests that we find in the same language a small set of elements that inherently possess agreement properties. So, LA has a decision to make upon facing a configuration where both an anti-labeling device (*-no* attached to *hyaku-satsu* ‘100-CL’) and an agreement property ([+plural] feature) are detected. Which one does LA resort to in such a case? Assuming that the former is the unmarked option for Japanese, I would like to suggest that LA goes with the marked option here: LA automatically resorts to the agreement-based strategy when a pre-nominal quantifier and a nominal head are combined.⁵

Let us be more precise. According to Chomsky (2015), labeling via feature sharing requires an XP-YP configuration. The idea is that the two elements that share a prominent property, such as agreement, have to stand in a symmetrical relation. An XP-YP configuration fits this description, but not an X-YP configuration. Accordingly, I assume that pre-nominal quantifiers (unlike other, non-agreeing pre-nominal elements in Japanese) undergo local movement to create the required XP-YP configuration:

- (21) [β 100-CL [α <100-CL> hon]]

The quantifier *hyaku-satsu* ‘100-CL’ moves and remerges with α (= N’ in the traditional sense), giving rise to β (= NP).

Now let us return to the question of why pre-nominal quantifiers fail to ‘license’ *no*. In order to establish a possible link between the agreement property of pre-nominal quantifiers and their inability to license *no*, we might say that *no* has no agreement property. Things are not so simple, however. First, although the pro-form *one* in English also cannot be ‘licensed’ by a quantifier (e.g., **two ones*), it inflects for plural (e.g., *these ones*), suggesting that nominal pro-forms are in principle capable of establishing the number agreement. Second, as noted by Murasugi (1991), a pre-nominal quantifier and the pro-form *no* do co-occur as long as another modifier merges with *no* first: observe the contrast between (22a) and (22b).

- (22) a. *yon-ko-no marui no*
 four-CL-GEN round one
 ‘four round ones’
 b. **marui yon-ko no*
 round four-CL one
 ‘(lit.) round four ones’

Let us therefore assume that the pro-form *no* can participate in feature sharing as long as it is part of an XP-YP configuration. In (22a), the sister of *yon-ko* ‘four-CL’ is a phrasal element, *marui no* ‘round one.’ We thus have an XP-YP configuration, and labeling via agreement sharing can proceed successfully. In (22b), the sister of *yon-ko* ‘four-CL’ is *no*, a head. We have an X-YP configuration, which needs to be “modified” via movement of YP (= *yon-ko* ‘four-CL’): see (21). The ungrammaticality of this example suggests that this movement creates a problem. Perhaps the defective character of *no* stated in (14) helps us understand this point. As shown in (23), α remains unlabeled even after the movement of the quantifier, because the copy of *yon-ko* ‘four-CL’ is invisible for LA and *no* cannot provide a label on its own.

⁵ Alternatively, LA has to consider both options.

(23) [β 4-CL [α <4-CL> *no*]]

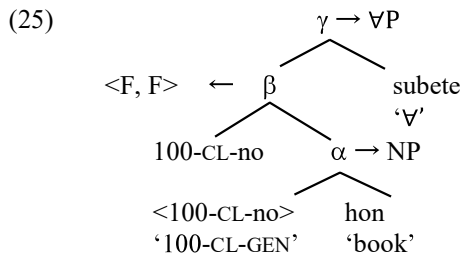
All in all, (22b) is bad because of (i) the requirement that a label be determined via agreement sharing upon the introduction of a pre-nominal quantifier, and (ii) the defective character of *no* stated in (14).⁶

One point needs to be addressed here. Recall our discussion of (11). If $Y = T$ in English, it is too weak to provide a label but ϕ -agreement helps designate Y as the provider of label for β . But we must say that the same strategy is not available for the pro-form *no*. Apparently, it cannot be enriched by agreement, although further study on this point is needed.

3.4 Post-nominal quantifiers in Japanese As for a post-nominal quantifier in Japanese, it does not show agreement properties (see (24a)), nor does it show any “anti-stacking” effects: see (24b).

- (24) a. Boku-wa hon subete-o yonda.
 I-TOP book all-ACC read
 ‘I read all of the book.’ / ‘I read all of the books.’
 b. hyaku satsu-no hon subete
 100 CL-GEN book all
 ‘all 100 books’

Following Kawashima (1998), Murasugi (1991), Ochi (2012) etc. (see also Watanabe 2006, 2008), let us assume that a post-nominal quantifier is a head selecting a nominal projection to its left. Let us look at (25), which is the structure for (24b). When the pre-nominal quantifier *hyaku-satu-no* ‘100-CL-GEN’ and *hon* ‘book’ are merged, the former undergoes movement to create an XP-YP configuration. The label of α is determined by *hon* ‘book’ because the copy of the quantifier is not visible for LA. The label of β is provided via feature sharing. And the system has no problem in determining the label of γ because this is an X-YP configuration.



Indeed, post-nominal quantifiers can be stacked (Kawashima 1998, Ochi 2012), which is expected if they systematically create a $\{YP, X\}$ configuration upon external merge.⁷

- (26) hon hyaku-satsu subete
 book 100-CL all
 ‘all 100 books’

⁶ The distribution of the English pro-form *one* (e.g., *two *(red) ones*) may be analyzable in the same spirit, assuming that cardinals in this language are also modifiers within NP (see Giusti 1991). Alternatively, cardinal numerals in English may take an NP as complement, as in (i) below, in which case merging a cardinal numeral and the pro-form *ones* is excluded because the latter is without a label.

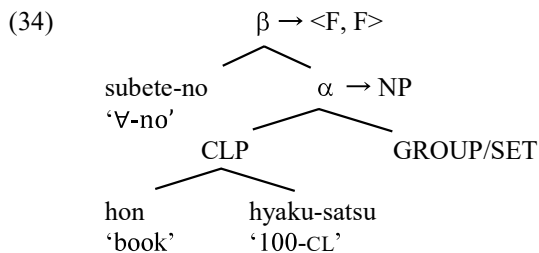
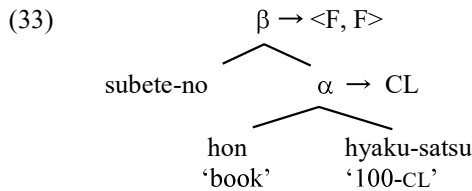
- (i) [$_{NumP}$ three [$_{NP}$ books]].
 (ii) {three, ones}

⁷ See Watanabe (2006) and Huang and Ochi (2014) for detailed analyses of the post-nominal numeral classifier (to be briefly discussed at the very end of this paper). In order to simplify the discussion, I will just assume here that a post-nominal numeral classifier acts as a head.

- (32) subete-no hon hyaku-satsu
 all-GEN book 100-CL
 a. *‘all 100 books’
 b. ‘all sets of 100 books’

What is puzzling is that we do get the same range of interpretive possibilities here as we did in (29), although there should be no labeling problem in this case even if the two quantifiers modify the same noun, *hon* ‘book.’ Suppose that the structure of this example is as indicated in (33). When *hon* ‘book’ and the post-nominal *hyaku-satsu* are merged, the classifier head provides a label. The label of β can be provided as a result of the agreement relation between the universal quantifier and α . No labeling problem arises, and yet we do not obtain the reading in (32a)

This implies that the correct structure for (32) is not (33) but something like (34), which contains a hidden noun with the meaning of ‘group’ or ‘set.’



If correct, it would mean that *subete-no* ‘∀-GEN’ modifies this hidden noun, not *hon* ‘book.’ Of course, postulation of a hidden noun raises a host of questions. Among other things, why is the structure in (33) disallowed? Perhaps, the distribution of the pre-nominal quantifier is restricted to an NP-internal position, as suggested by Huang and Ochi (2014), although we would like to know why it cannot occur in the domain of CL, an extended nominal projection. Also, once we allow a hidden noun of this sort to be in the lexicon of Japanese, we need to explain its very limited distribution. For example, the following example means ‘I discarded most of the apples,’ but it cannot mean ‘I discarded most sets of apples,’ which indicates that the hidden noun introduced above is not available in this case (and in many other cases).

- (35) Boku-wa hotondo-no ringo-o suteta.
 I-TOP most-GEN apple-ACC discarded
 ‘I discarded most of the apples.’

I must leave this an open question.

4 Concluding remarks

I have proposed in this paper that the inability of a pre-nominal quantifier to serve as a legitimate ‘licensor’ of the pro-form *no* follows from the following considerations. First, unlike other adnominal modifiers in Japanese, pre-nominal quantifiers in this language bear an agreement property. Second, because of the defective nature of *no*, local movement of its dependent results in labeling failure. Third, while labeling via anti-labeling device in the sense of Saito (2016) is the norm for Japanese, LA resorts to the more marked option (i.e., labeling via agreement sharing) upon facing an XP-YP configuration where both an anti-labeling device and an agreement property are detected at the same derivational stage. As a result, when a pre-nominal

quantifier is the sole element (or the first element) to merge with *no*, labeling failure ensues because LA in such cases automatically resorts to labeling via agreement sharing, which requires a pre-nominal quantifier and *no* to stand in a symmetrical relation of XP-YP, which leads to labeling failure because of the defectiveness of *no*.

While many questions need to be addressed and resolved, the idea entertained in this paper has some theoretical consequences. In particular, although we have focused on number agreement here, classifiers may be an instantiation of another type of agreement. After all, the selection of one classifier as opposed to others depends on the type (or “classification”) of the noun that it accompanies. Interestingly, Corbett (1991) reports that classifiers and genders, which belong to the ϕ -agreement system, are found in language of different morphological types. Isolating languages, which lack agreement, typically have classifiers but lack genders. Fusional types (such as those in the Indo-European family) tend to have gender systems but lack classifiers. Agglutinating languages fall between these two ends, with some of them possessing classifiers and others possessing genders. As Corbett (1991: 137) suggests, classifier systems and gender systems “may perform similar roles in languages of different morphological types.” If so, merge of numeral classifiers and a noun may also involve an additional agreement relation.⁸ This conception of classifier may have an implication for an analysis of the post-nominal numeral classifier. According to Watanabe (2006) (see also Huang and Ochi (2014)), this construction has as its head a classifier (CL), which takes an NP and a numeral as its complement and specifier, respectively. Furthermore, it involves obligatory movement of this NP-complement to the edge of the nominal domain. The driving force of this nominal-internal movement has been unclear, but the current perspective on labeling may provide a clue. As before, let us suppose that LA is automatically geared toward the labeling-via-agreement option upon detecting an element with some agreement properties, and that includes a classifier.

- (36) a. hon hyaku-satsu
 book 100-CL
 ‘100 books’
 b. [_{β} 100 [_{α} hon satsu]]
 c. [_{δ} hon [_{β} 100 [_{α} ~~hon~~ satsu]]]

Here *hon* ‘book’ and the CL *satsu* need to enter into an agreement relationship. As shown in (36c), movement of *hon* ‘book’ creates an XP-YP configuration, and δ is labeled $\langle F, F \rangle$.⁹ We could thus say that this movement is triggered for providing a label. Hence it is obligatory.

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⁸ As Kamio (1983) points out, demonstratives also do not license *no*. Note in this connection that Chinese demonstratives are accompanied by a classifier. If Japanese demonstratives turned out to be accompanied by a classifier (a phonetically null classifier, in this case), we would have an explanation for this restriction.

- (i) *Ano hon-wa takai ga, kono-wa yasui.
 that book-TOP expensive but this- TOP cheap
 ‘That book is expensive but this one is cheap.’

⁹ We also know why the post-nominal classifier fails to ‘license’ *no*, a fact noted as a problem by Murasugi (1991: 92) for her analysis.

- (i) Taro-ga *(takai) no futa-tsu-o katta.
 Taro-NOM expensive one two-CL-ACC bought
 ‘Taro bought two *(expensive) ones.’

Since pro-form *no* cannot provide a label on its own, the complement of the classifier head remains unlabeled.

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Constructing Naturalistic Artificial Languages for Language Acquisition Research

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1 Introduction

Artificial language learning (ALL) paradigms have been employed as a methodological tool in language acquisition research for around fifty years. Benefits of using ALL paradigms are that prior language experience can be finely controlled, target linguistic structures can be isolated for investigation while the influence of non-target linguistic variables is held constant, and the artificial language (AL) can be limitlessly manipulated to perform additional experiments. One of the primary criticisms of using ALL in language acquisition research is that ALs are too limited in size and complexity to involve the same processing mechanisms used in natural languages (Ingram & Pye, 1993; Saffran, 2001). For example, most ALs contain “vocabularies” of a handful of consonants or shapes that abide by rules to generate “sentences,” which are merely strings of letters or shapes lacking a semantic component. A review of the literature found that even the most naturalistic AL used thus far contained only fifty-one words from four different parts of speech (Hudson Kam and Newport, 2005).

Still, ALL methods have been increasingly used to examine questions related to explicit and implicit learning, to compare the acquisition of typological patterns in first and second language acquisition (SLA) (Culbertson, 2012), and to test predictions of word order universals formulated in Greenberg (1963) (Culbertson et al., 2012). To date, ALL has not been as widely used to research morphological or syntactic questions as it has phonological ones, especially syntactic questions related to predictions of Universal Grammar (UG) (Chomsky 1965; Chomsky 1975). This is no surprise, given that many ALs lack the grammatical complexity to probe questions related to morphology or syntax.

This paper describes the process, successes, and struggles of constructing four naturalistic (i.e. modeling the richness and complexity of phonology, semantics, morphology, and syntax found in natural languages) ALs for the purpose of morphosyntactic experimental research. Additionally, this paper assesses the use of a web-based platform for administering the language training and tests.

2 Background

This paper details the process used to construct four ALs used in a web-based experiment that tested the adult (English = native language) SLA of morphosyntactic properties of naturalistic ALs. Because there is no established methodology employing robust, naturalistic artificial languages, in order to construct the ALs the researcher had to rely on resources provided by the constructed language community, composed primarily of linguists and lay people who construct languages for television, video games, and science fiction novels.

Naturalistic ALs were a necessary part of the experimental design as the question under investigation was the learnability of “rogue grammars,” or grammars purported to fall outside of UG and thus not exist in any natural languages. One rogue (but naturalistic in its complexity) AL and three naturalistic ALs were constructed, and the learnability of the four ALs was compared to test predictions of the Morphological Uniformity Hypotheses (Jaeggli & Hyams, 1988; Jaeggli & Safir, 1989), a theoretical construct attached to the Null Subject Parameter (Chomsky, 1981; Hyams, 1989). See Schroeder (2017) for details of the experiment.

In contrast to most ALs currently used in experimental research, these four ALs are morphologically complex, very different from English, and syntactically similar to naturalistic languages (with the exception

of the single grammatical element that makes the rogue AL rogue). Using ALs with these qualities in generative language acquisition research is essential to overcoming criticisms of more typical ALs that undermine the strength and generalizability of empirical findings. Additionally, as alluded to above, naturalistic ALs that are typologically different from English enable experimentation on the longstanding question of learners' access to UG in first and second language from a new angle: the comparable learnability of rogue grammars.

2.1 *Benefits of Artificial Language Learning (ALL) Paradigms* ALL paradigms are an extremely useful methodological tool in language acquisition research. They are commonly used to probe biases or constraints on learning, as a complement to typological data, or to investigate statistical learning. ALL paradigms have been used across all domains of language but are less often used for syntax and morphology. In the domain of phonology, topics investigated with ALL paradigms include vowel harmony (Finley & Badecker, 2010), dependency length (Newport & Aslin, 2004), and velar palatalization (Wilson, 2006). Morphological and syntactic questions that have been explored using ALL paradigms include word order harmony (Culbertson et al., 2012), case marking (Fedzechkina et al., 2011), the Tolerance Principle and plural formation (Schuler et al., 2016), and the regularization of inconsistent grammatical morphemes (Hudson Kam and Newport, 2005). Experimental design usually entails one brief session of exposure and testing in the AL, but some paradigms entail training and testing over multiple days (e.g. Hudson Kam and Newport, 2005).

There are many benefits to using ALL paradigms. For one, prior language experience can be finely controlled for as one can guarantee all participants enter the experiment with exactly the same (i.e. zero) experience with the AL. Additionally, the target structure(s) under investigation can be isolated while other linguistic variables can be manipulated or held constant as needed per the experiment at hand. As it is extremely difficult to control for the influence of linguistic variables other than the one under investigation when using natural languages, manipulating naturalistic ALs to perform a targeted comparison of structures or patterns of interest while controlling for the influence of other confounding factors holds special appeal. Further, the acquisition of typologically rare (or even non-occurring) patterns can easily be probed using naturalistic ALs. Additionally, once a base of vocabulary and foundational syntactic rules are developed for an AL, that AL can be limitlessly expanded or modified as needed for additional experimentation. For example, the frequency and type of input that learners receive on both target and non-target structures can be carefully manipulated from experiment to experiment.

2.2. *Overcoming Criticisms of ALL Paradigms* One of the major criticisms of ALL paradigms is that they do not activate naturalistic learning mechanisms (Ingram & Pye, 1993; Saffran, 2001). Because most ALs are extremely English-like in both grammar and sound inventory, a related criticism is that even if ALL paradigms activate naturalistic learning mechanisms it is the “English-specific” ones only. Last, the simplicity of many ALs makes them poorly suited to many linguistic questions. A sampling of ALs used in the literature shows that many lack naturalistic complexity (i.e. minimal number of parts of speech and low phrase structure complexity) or variety (i.e. are primarily modeled after English). This sampling is summarized in Table 1. Still, the work accomplished by these ALs has strongly established the value of ALL paradigms across many domains of linguistic inquiry.

Constructing naturalistic ALs that model the complexity of natural languages beyond that represented by English overcomes the primary criticism of ALL paradigms – that experimental findings may not be generalizable because they do not activate naturalistic language learning mechanisms – but is not without its own drawbacks. It is important to find the right balance between constructing an AL with naturalistic complexity and one that has too much complexity that it becomes too tedious or time-consuming to construct or that would be too difficult for learners to acquire in an experiment of reasonable length.

One solution to overcome the tedious and time-consuming nature of naturalistic AL construction is to outsource the construction process to dedicated conlangers, or members of the constructed language (conlang for short) community that construct robust ALs for non-scientific use. Doing so could allow language acquisition researchers to explore a larger scope of linguistic questions than currently possible with less naturalistic ALs without having to dedicate as much time themselves to complex stimulus creation.

Given that a pool of dedicated conlangers to which stimuli creation can be outsourced is not currently available, the goal of this paper is to share one process used to construct naturalistic ALs that differ

substantially from English. Ideally, sharing this process will provide an example for others to consult as they pursue constructing their own ALs for use in language acquisition experiments.

Table 1: Characteristics of Past Artificial Languages

Work	Lexicon Size	# of Parts of Speech	Referential Meaning	Relation to English	Highest Phrase Structure Complexity
Reber, 1967	N/A	0	no	English letters	finite state grammar
Gómez & Gerken, 1999	4	0	no	phonotactics	finite state grammar
Hudson Kam & Newport, 2005	51	5	yes	all nonce words	S → (neg) V N N
Wilson, 2006	82	0	no	subset of sound inventory	N/A
Finley & Badecker, 2010	19	0	no	syllables	N/A
Fedzechkina et al., 2011	16	2	yes	phonotactics	S → N N V
Culbertson et al., 2012	20	3	yes	all nonce words	DP → N Adj
Kapa, 2013	16	2	yes	all nonce words	S → V N N
Schuler et al., 2016	10	2	yes	all nonce words	S → <i>gentif</i> N
Schroeder, 2017	29	7	yes	4 semi-cognates	S → S Comp S

3 The Naturalistic AL Construction Process

3.1 Motivation For context, the experiment for which the ALs described below were constructed was testing for a new strain of evidence on the question of access to UG in SLA. Briefly, a rogue grammar (other terms include “illicit” and “wild”) is one purported to lie outside of UG and claimed to be “unlearnable” to adult learners if 1) language acquisition proceeds on the basis of UG and 2) there is no access to UG in SLA (Thomas, 1991; Klein, 1995; Hamilton, 1998). Because a rogue grammar by definition is not naturalistic, no extant natural language stimuli can be used to test this hypothesis. As such, in order to test the specific hypotheses under investigation (see Schroeder, 2017 for details), four ALs needed to be created: three naturalistic and one rogue. Additionally, because the ALL paradigm used was testing a few different hypotheses through comparing the learnability of the four different ALs, the ALs required a few other characteristics that influenced the language construction process. First, all of the ALs needed to have similar learnability across everything (phonology, lexicon, verbal paradigms, etc.) except the rogue aspect. Second, nothing else besides the specific element making the rogue grammar rogue could be rogue, either in isolation or combination. Last, all of the ALs needed to contain naturalistic complexity not based on English.

3.2 Resources A variety of resources were used throughout the AL construction process. First, *The Art of Language Invention* by David Peterson (2015) provided a good starting point, offering practical tips to avoid constructing a language too similar to English like creating verbs before nouns and adding or removing entire classes of sounds when working with the sound inventory. In addition, joining a conlang mailing list¹ offered insight into the sorts of issues that other conlangers contemplated. For example, one tip gleaned from this group was considering how the culture of the people that speak the AL under construction

¹ <https://listserv.brown.edu/archives/conlang.html>

might influence the structure of its linguistic system. This tip was incorporated into the present ALs in the way that some of the semantic categories differed from English.

Special attention was paid to creating the grammars. The World Atlas of Language Structures Online² (WALS) and the Universals Archive³ (Plank & Filimonova, 2000) were continually referenced, especially when incorporating the target rogue structure (and ensuring that no grammatical elements other than the target structure were rogue either in isolation or combination with each other). WALS and the Universals Archive are both extensive compilations of data from a large and diverse set of languages that document the typologies of individual languages (WALS) as well as how different structures pattern together (or not) and the typological frequency of these patterns (i.e. absolute and statistical universals in the Universals Archive). Last, an important part of the process entailed consulting other experienced ALL researchers⁴ identified in the literature.

3.3 Sound Inventory The sound inventory of the ALs was the first aspect constructed. Taking care to construct a sound inventory sufficiently different from English was an important, early step to avoid the final product being too similar to English. As mentioned above, the sound inventory differed from English’s in regards to entire classes of sounds. For example, unlike English, the AL sound inventory contains no voiced stops. After abiding by the guideline of working with entire sound classes (as opposed to building the sound inventory one phoneme at a time), the only thing guiding the choice of phonemes was individual preference for what to include or exclude. See Tables 2 and 3 for the sound inventory. After viewing examples from Peterson (2015), other aspects of the AL phonology were constructed. Phonotactic constraints, phonological rules, repair strategies, and syllable structure were built, again driven by the researcher’s individual preference and creativity (see Tables 4-7, respectively).

Table 2: Consonant Inventory

	Labial	Dental	Alveolar	Palatal	Velar	Uvular	Glottal
Stop	p		t		k	q	
Fricative	f v		s z	ʃ ʒ			h
Affricate			ts	tʃ dʒ			
Nasal	m		n				
Glide			ɹ j		w		
Lateral			l				

Table 3: Vowel Inventory

	Lax		Tense	
	Front	Back	Front	Back
High			i	u
Mid			e	o
Low			a	

Table 4: Phonotactic Constraints

fricatives and affricates can be word internal but not word final codas
/r/ can only cluster in onset after /t/ and /k/
/q/ can only be followed or preceded by /a/ or must be the beginning or end of a word
NB (nasals cannot be followed by back vowels)
#u (initial vowel constraint /u/)
e# (final vowel constraint /e/)
long vowels are contrastive in word internal position only
no diphthongs / sequential vowels

Table 5: Phonological Rules

² <http://wals.info/>

³ <https://typo.uni-konstanz.de/archive/intro/index.php>

⁴ I would like to give special thanks to Jennifer Culbertson for her advisement on the ALs.

when followed by a coda, /i/ becomes /i:/ and /e/ becomes /ɛ/
if a long vowel is followed by a coda, it is a lengthened lax vowel

Table 6: Repair Strategies

If /o/ needs to be lengthened, change it to a long /u/
If /e/ needs to be lengthened, change it to a long /i/
If a word ends in /e/, change it to /a/

Table 7: Syllabic Information*

Syllable structure	(C) (G) V (C2)
Possible syllables	V, CV, CVC2, CrVC2, CVC2, VC2

*Letters used here, e.g. C, G, V, and C2 refer to phonemic sets, which are not published here. Contact the author for more information.

Next, the orthographic system was created. Orthography was required because the experimental design entailed only written input. The orthography was created to be as straightforward as possible so that as much as possible each symbol corresponded to only one phoneme (see Table 8). Since the experiments were conducted via written language only, there are some instances in which learners may have not learned the correct symbol-phoneme associations and instead transferred symbol-phoneme associations from English. Due to the lack of auditory representations of the AL, no stress system was created.

Table 8: Orthography *

IPA	Orthographic Symbol
ʈ	c
ɹ	r
ʃ	x
ʒ	j
ʧ	ch
ɟ	j
ɰ	y
a:	ā
i:	ī
u:	ū

* All phones are written using their IPA symbol unless indicated otherwise above.

3.4 Root System and Verbs Next, in order to have a vocabulary creation mechanism in place that would avoid producing English-like words, 34 tri-consonantal roots (each with a different semantic association) were constructed. The root system was modeled somewhat after Arabic, given the researcher’s familiarity with Arabic and the fact that it is very structurally different from English in many key aspects (e.g. phonology, morphology, and syntax). As mentioned above, during the root construction process, creativity was inspired by envisioning the culture of those who might speak the ALs. This tactic was inspired by the conlanging community, in which it is common to build a new language alongside a new people with a unique culture. Doing this resulted in roots with semantic categories that did not align neatly with English’s, providing a foundation for vocabulary creation that contained naturalistic complexity different than English in both semantics and phonology. See Table 9 for the full list of word roots.

At the advice of Petersen (2015), verbs were the first word class created. Verbs were created by adding two interstitial vowels to each tri-consonantal root. Vowels were chosen by selecting ones that sounded like they fit naturally and still conformed to the phonotactic constraints. All infinitives ended in *t*, e.g. the root *q-t-n* meaning “speech/talk” became *qatinat* = “to speak.” Additionally, following advice of the conlanging community and Petersen (2015), some of the verbs were modified in a way that would seem realistic were the language given the chance to evolve over several generations of speakers. For example, *yenilat* “to be”, being a verb that would be used with high frequency, was shortened to *yenat*. (i.e. with high frequency use over time, the internal *il* was dropped to make the word easier to pronounce).

Table 9: Word Family Roots

#	Root	Semantics
1	n-j-l	knowledge; education
2	h-l-y	possession; ownership; control
3	q-t-n	to speak; to make known
4	x-r-t	nourishment
5	t-n-k	belief; imagination
6	m-n-w	productivity; energy
7	y-n-l	to exist; to embody
8	y-s-r	ink; permanence
9	w-p-n	discovery; to disentangle ideas
10	k-l-l	acceptance; open-mindedness
11	z-l-h	satisfying; appealing to the palate
12	s-f-n	discipline; self-improvement
13	h-q-l	life
14	p-l-l	time; calendar
15	n-q-k	familial love
16	p-s-m	love between friends; joy
17	r-ch-q	romantic love; security
18	j-l-l	sharpness; intelligence; intimidation
19	l-s-s	evil; chaos
20	n-v-m	beauty; light
21	j-s-k	goodness
22	l-q-k	tall; big
23	s-r-r	small; short
24	f-ch-p	tale; story; fable
25	f-k-n	struggle; obstacle; challenge; difficulty
26	c-k-n	child-like wonder and joy
27	p-s-w	important; high; elevated; honored
28	t-w-j	attention-grabbing; noticeable; full of light
29	m-r-l	scholarship; inquiry
30	s-q-k	codification; organization
31	m-t-j	teaching; instruction; guidance
32	h-m-w	practice
33	h-k-n	complications; unknown
34	l-n-y	human; life-giving

3.5 Derivational Formulas and Other Parts of Speech To facilitate the construction of other words beyond the “foundational” verbs created from adding interstitial vowels to the tri-consonantal roots, 11 derivational formulas were constructed (see Table 10). Nouns, adjectives, and additional verbs were created from the foundational verbs using the derivational formulas. Unexpectedly, creating and applying the derivational formulas was an extremely tedious process given the need to comply with the phonological rules, phonotactic constraints, and repair strategies. Thus, building up the lexicon became an extremely recursive process in that the phonology of the language was at times revised in order to allow a derivational formula to “work.” In cases where a derivational formula achieved the desired effect on some but not all roots, the derivational formula was changed accordingly. This part of the language construction process was very time-consuming and required great attention to detail. Documentation was completed in Excel and required careful combing over of all vocabulary already created every time a new change was introduced (to either the phonology or a derivational formula) to ensure internal consistency of the lexicon and that no phonological rules were violated.

Table 10: Derivational Formula

#	Derivation	Semantic Product
1	flip the first two vowels and lengthen the new second vowel	"one who receives X"
2	delete second vowel and last \t\	makes an infinitive verb a noun
3	add the {-li} suffix (where possible drop the end vowel first)	makes a noun a person who is a "doer" of that noun
4	{qa-} prefix	place of "X"
5	change first vowel to an \a\ and clip the rest after third consonantal root	"one" of X from an infinitive verb
6	lengthen the first vowel	a set of something from a "one" of something noun
7	add the {ol-} prefix	specifies male of something
8	add the {il-} prefix	specifies female of something
9	add the {-na} suffix (if already ends in \n\ just add \a\; if it ends in \a\ first clip the \a\ then add {-na})	makes a noun an adjective
10	add the {-hu} suffix; if already ends in \u\ just add \h\	makes X plural
11	add the {-so} suffix and drop the final vowel when possible	intense degree of something (creates an adjective)

Because they carry less concrete semantic meaning than nouns, adjectives, and verbs, other lexical items such as the pronouns, quantifiers, a conjunction, and a complementizer were not constructed using the tri-consonantal roots and derivational formulas but rather were simply created using the sound inventory and phonotactic constraints. Additionally, in an effort to simplify the language learning task for participants, a few English cognates were included. For example, the verb “to think” is *tinkat* (originally was formulated using a derivational formula but then was revised to be more of a cognate) and the word for “many” is *menna*. The cognates were added in order to make the lexicon of the ALs easier to learn, in hopes that learners would be more likely to master the grammar, the target of the experiment.

3.6 Syntax and Morphology Although all four ALs shared a lexicon, they differed in some components of their grammars. Table 11 lists the phrase structure rules used across the ALs. All four ALs have SVO word order and, for the purposes of simplifying both the AL construction process and the language learning task for participations, only simple present tense was used. To ensure that no rogue aspects were unintentionally introduced into the ALs, WALS was consulted frequently during the grammar construction process and care was taken to avoid using any typologically rare individual structure or typologically rare combination of structures (with of course the exception of the rogue variable under investigation). Syntactic and morphological rules were kept as similar as possible across all four ALs to avoid introducing any variables other than the one being tested that might result in different learnability levels of the four ALs. One major syntactic element that was purposely modified across the ALs due to the research question was null subjects (i.e. two of the ALs allowed null subjects and two did not).

Table 11: Phrase Structure Rules

NP → N
NP → N Conj N
NP → ∅ (G2 and G3 only because they are [+NS])
QDP → Q NP
VP → V
VP → V A
VP → V NP
VP → V QDP
S → NP VP
S → QDP VP
S → S Comp S

Although in natural languages most morphological categories exhibit allomorphy (Peterson, 2015), allomorphs were not included in the lexicon that participants were exposed to in order to simplify the

language learning task for participants. Due to the specific hypotheses under investigation, a great deal of attention was paid to the construction of the verbal inflectional paradigm (simple present tense only) of each AL. Again, to ensure naturalness, WALS was consulted and a model verbal paradigm from a natural language was chosen for each of the ALs. Verbal paradigms were constructed with the following goals in mind: use English's paradigm as a model for one AL only, choose model paradigms that are as typologically frequently occurring as possible, construct paradigms that fit the morphological uniformity and person/number syncretism features required of the experimental question, and minimize learnability differences across paradigms (e.g. use the same inflectional morpheme in the same position across paradigms when possible). Additionally, an effort was made to keep the paradigms as learnable as possible since learners' master of the verbal paradigms was a necessity to test the hypotheses under investigation. For example, the morpheme {-ap} appears at least once in each paradigm and is the most frequently occurring morpheme between all of the paradigms. This was done because past work has shown that learners master morphemes most readily when they salient but not too complicated (Frigo & McDonald, 1998), which the combination of one vowel and one consonant fulfills well. Table 12 shows the juxtaposition of the three verbal paradigms used for the four ALs (two of the ALs shared a paradigm due to experimental needs).

Table 12: Simple Present Tense Verbal Paradigms

	English	Paradigm Pattern	G1
infinitive	<i>to walk</i>		<i>qatinat (to say)</i>
1SG	walk	A	qatin
2SG	walk	A	qatin
3SG	walks	B	qatinap
1PL	walk	A	qatin
2PL	walk	A	
3PL	walk	A	qatin

	Spanish	Paradigm Pattern	G2
infinitive	<i>hablar (to talk)</i>		<i>qatinat (to say)</i>
1SG	hablo	A	qatin
2SG	hablas	B	qatina
3SG	habla	C	qatinap
1PL	hablamos	D	qatinayam
2PL	habláis	E	
3PL	hablan	F	qatinam

	Iraqw	Paradigm Pattern	G3
infinitive	<i>máw (to leave)</i>		<i>qatinat (to say)</i>
1SG	máw	A	qatin
2SG	méer	B	qatinap
3SG	méer	B	qatinap
1PL	mawáan	C	qatinayam
2PL	meerá	D	
3PL	mayá	E	qatinam

3.7 Trimming Once the entire lexicon and the four grammars had been constructed, there were a total of close to 100 words and 34 roots. Once again, to minimize participants' learning task, the lexicon and grammars included in the experiment were trimmed to the smallest number of words and grammatical elements needed to fulfill the experimental objectives. The trimmed lexicon used in the experiments contained 29 words: six verbs, four nouns plus plural forms of three of the nouns, three adjectives, eight pronouns, three quantifiers, one conjunction, and one complementizer. Of the original 11 derivational

formulas, only five were contained within the subset of the lexicon used experimentally. Although one original intent of using derivational formulas to construct the lexicon was that learners may be able to learn them to more easily master the lexicon, only one derivational formula appeared in the experiments applied to more than one word. Thus, trimming the lexicon to use only a subset in the experiments virtually eliminated any possibility that learners would recognize patterns resulting from the derivational formulas and use them to aid learning.

Even though the entire lexicon was not used in the experiments, there are benefits to having created the ALs with a larger lexicon that was then trimmed down for use in the experiments. First, because the subset of the lexicon used comes from a larger and more internally consistent lexicon (e.g., derivational formulas and phonological rules went through refinement as they were iterated during the creation of each new word), it is more naturalistic. Second, if needed, the larger lexicon can be used to pursue follow up experiments as needed or to explore additional research questions. Future experiments that may use a larger portion of the lexicon might be able to benefit from the root system and derivational formulas if learners can take advantage of the systematic nature of the derivational formulas to learn the AL.

4 Discussion

4.1 Reflection on the Construction Process As discussed above, there are many benefits to using naturalistic ALs in language acquisition research. Namely, prior language experience can be tightly controlled for (something virtually impossible to hold constant in SLA research) while the only linguistic variable(s) is the target structure(s) under investigation. Additionally, post-experiment, several participants reported that they greatly enjoyed participating and would be interested in any additional studies. However, using naturalistic ALs is not without its disadvantages. For one, constructing them can be very time consuming. The construction process detailed here took about three months and it was difficult to ensure careful recordkeeping throughout the process, particularly during the recursive steps. The desires 1) to hold as many elements constant across the four ALs as possible and 2) to avoid adding linguistic structures unrelated to the research question to the already sizeable learning task for participants resulted in a few concerns with the naturalness of the ALs (e.g. lack of noun and adjective gender, absence of articles, infinitive formation). Last, given that the experiment required four different learning and testing sessions, a web-based model was chosen, which introduced a few drawbacks.

4.2 Evaluation of Web-Based Delivery First, although using a web-based platform allowed for ease of data collection, it potentially decreased data quality. It was impossible to monitor or control that participants completed the experiments in a consistent manner (e.g. type of environmental surroundings, whether or not they complied with a restriction against note-taking during the experiment, the rate at which they completed the learning sessions, etc.). Further, in a laboratory setting, one can ensure that participants comprehend instructions correctly and can be available to answer any questions. Using the web to deliver task instructions resulted in the possibility that participants may not have fully read or understood the specific instructions given for different portions of the experiment. For example, there were some sections of the learning sessions that required participants to click on an icon to reveal additional information (e.g. an English translation), and some participants may not have known they could take advantage of this if they did not fully read the instructions.

Moreover, there were a fair number of instances where user-specific technical errors had to be troubleshot remotely, which no doubt resulted in disruption to learning sessions and inconvenience to the participant. And, given that some participant responses were free response, decisions had to be made regarding how to categorize errors. For example, in some cases it was hard to know whether an incorrect response reflected a truly incorrect representation of a linguistic form or if it might just be a spelling error or typo. Importantly, participant experience and motivation should also be considered. Completing a language learning task online on one's own laptop in one's own familiar surroundings is quite different than doing so in supervised laboratory setting. While the online setting might have made participants more relaxed and made the task more naturalistic, it is possible that it might also have resulted in a level of informality and disengagement that would not occur in a more traditional laboratory environment.

5 Conclusion

ALL paradigms are a promising method by which to probe a variety of linguistic questions. Moving towards more naturalistic ALs further increases the scope of questions able to be examined using ALL. Specifically, some promising future directions are examining cross-linguistic influence and the impact of typological distance on second and third language learning and investigating language learning across development, as ALL paradigms can be made very engaging and child-friendly (e.g. through the use of a game-like model). Additionally, ALs could be used to investigate processing constraints of interest to psycholinguists or to tease apart aspects of language that may be attributed to domain-specific vs. domain-general mechanisms. In the field of speech neuroscience, one intriguing new direction is using naturalistic language stimuli to examine the contributions of multiple variables within the same dataset through the use of complex mathematical analysis such as encoding models (Hamilton & Huth, 2018). Following this model, robust ALs could be created to contain several target linguistic features and the neural correlates of the various features could be examined using the same dataset.

To maximize the chances of naturalistic ALs being used in the ways just mentioned, it is important to make the naturalistic AL construction process and stimulus delivery as efficient and effective as possible. This will likely require outsourcing AL construction to experienced conlangers, partnering with experts in computer-based language instruction or experienced second language instructors to deliver in person instruction, and, if computer-based instruction is used, collaborating with computer scientists to finely control characteristics of the language input (e.g. frequency and randomization of input across participants and across ALs if multiple ALs are used per experiment) and to explore using adaptive learning techniques.

Collaborating with others outside of the field of linguistics proper on naturalistic AL experimental work will expand the ways in which language acquisition research can develop, in regards to both methodology and the substantive content of the questions that can be investigated. Stronger partnership with psycholinguistic and neurocognitive researchers, second language practitioners, pioneers in computer-based language learning technologies, and the constructed language community may be a productive way to yield new findings about language acquisition.

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The Use of Word Order and Determiners to Mark Information Structure in Adult and Child Saudi Arabic

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1 Introduction

Information structure, also called information packaging (Chafe, 1976), is the information included in a conversation between a speaker and a hearer. This information – essential for the speaker and the hearer to understand each other (Birner & Ward, 2006) – is comprised of both old and new information. Old information refers to the information that has been mentioned before in the discourse, so the addressee has had previous access to it. New information, on the other hand, refers to the information that is new to the listener; thus, it has not been mentioned before in the discourse.

Information structure can be expressed through word order, using “topic-focus,” “topic-comment,” and “theme-rheme” constituents. Each one of those constituents marks either new or given referent. It can also be marked using definiteness and the indefiniteness of the noun phrase (Clark & Clark, 1977). Information structure can also be identified using morphological markers attached to the left or to the right of the noun phrase (NP) to mark new-versus-old information. It can also be expressed using prosody including stress, rhyme, and intonation, to mark the accenting of a word to clarify if that word is old or new information.

Previous studies show that adult speakers typically order old referents (mentioned in prior discourse) before mentioning new referents (introduced for the first time) when communicating with their interlocutors (Arnold, Losongco, Thomas, & Ginstrom, 2000; Bock & Irwin, 1980; Ferreira & Yoshita, 2003). But in child language, contradictory findings reveal that children prefer “old before new” (Gruber, 1965; Menyuk, 1969), “new before old” (Baker & Greenfield, 1988; MacWhinney & Bates, 1978) or no significant ordering preference (MacWhinney & Bates, 1978). Recent studies using a similar experimental paradigm of elicited conjoined noun phrases suggest that there may be a universal early cognitive or communicative tendency influencing children’s production crosslinguistically, i.e. dispreference for the “old-before-new” order in child speech in languages such as English, Spanish, and German, but the “new-before-old” order in children may be influenced by language-specific properties (e.g. Ceja Tel Toro, Chen, & Narasimhan, 2016; De Ruyter, Narasimhan, Chen, & Lack, 2018; Narasimhan & Dimroth, 2007). Children do not achieve adult-like preference for the “old-before-new” word order until a late age, around age nine years (Dimroth & Narasimhan, 2012), which suggests that the appropriate use of word order according to the informational needs may be a late acquired linguistic strategy.

This study revisits the preference for different word orders in adult and child language and examines whether it also manifested in the speech of monolingual child and adult speakers of Saudi Arabic. In particular, we examined Jizani Saudi Arabic (henceforth Saudi Arabic), a dialect of Saudi Arabic spoken in the southwest of Saudi Arabia. Very little research has been conducted on adult and child speech production in relation to information structure in Saudi Arabic. And even less research can be found on different dialects of Arabic. Only one study (Alzaidi, 2014) explored how word order and information structure interact in adult Hijazi Saudi Arabic, a dialect spoken in the west of Saudi Arabia, and focused on how adults mark information structure using prosody.

We also extend the analysis to the use of determiners such as definite articles, another commonly used syntactic category to distinguish old versus new referents. Standard Arabic (e.g. Schulz, 2004) has a definite article *al-* or *l-*, which is prefixed to the noun, but there is no indefinite prefix. A noun phrase is always indefinite and new until *al-* is attached to it, which makes it old (Al-Wardi, 2008). Jizani Arabic uses *al-* as the definite article and in some vernaculars of Jizani Arabic *am-* is also used for specific and unique referents in contrast to *al* which is used for generic referents (Hamdi, 2015). Similar to standard Arabic, a noun phrase without the definite article *al-* or *am-* is always indefinite and new.

Our study is the first experimental and developmental work that compares monolingual adult and child speakers of Saudi Arabic in their use of syntactic means such as word order and definite articles to mark old versus new referents. It will shed light on how general and robust the preference for the “old-before-new” order is crosslinguistically, as expected of a natural, universal principle (Clark & Clark, 1977), and how it is

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influenced by language-specific discourse properties, as well as how other syntactic means such as definite articles are employed to distinguish old versus new referents in adult and child speech production.

2 The current study

Against the aforementioned background, our study aims to answer three main questions. (1) Do monolingual children of Saudi Arabic prefer the “old-before-new” word order like adults in referring to old and new referents? (2) Is there a developmental change in the preference for the “old-before-new” word order with the increase of age in monolingual children of Saudi Arabic? (3) Do monolingual adults and children of Saudi Arabic use definiteness and the indefiniteness of the noun phrase to differentiate old versus new referents?

If the “old-before-new” preference is a natural, language-independent principle, we would expect both the children and the adult speakers of Saudi Arabic prefer this order. If, however, the “new-before-old” word order is a cognitive or communicative preference in early child speech as indicated by previous studies (e.g. Ceja Tel Toro et al., 2016; De Ruiter et al., 2018; Narasimhan & Dimroth, 2007), we would expect children learning Saudi Arabic exhibit either a preference for the “new-before-old” or no preference for the “old-before-new” word order, similar to their English-, Spanish- or German-learning counterparts.

2.1 Methodology We conducted an elicited production of conjunct noun phrases, adapting the stimuli and procedure from the original study of German-learning children by Narasimhan and Dimroth (2008). The participants were 54 male and female native speakers of Saudi Arabic. Three different age groups of participants were recruited (N=18 per group), 4-year-olds (mean age 4;7, age range 4;6-5;11, 9 females & 9 males), 6-year-olds (mean age 6;4, age range 6;0-7;5, 9 females and 9 males), and a control group of adults (mean age 28, age range 22-24, 9 females and 9 males).

The stimuli were 23 pairs of common inanimate objects (e.g. *ball* and *clock*) and 3 single objects (part of the fillers) presented in slides on a laptop, including a total of 32 trials with 6 warmups, 12 target trials, and 14 fillers. The objects in the target pairs were matched in physical properties, such as color and shape, to avoid potential bias during the experiment. A norming study was first conducted with 38 adult native speakers of Saudi Arabic to collect the conventional names for the 24 target inanimate object pictures. The nouns for the target objects were also controlled for the number of syllables, ease of pronunciation, and gender. All 24 nouns for the target pictures received high agreement (mean proportion of agreement 97%). Table 1 presents the labels (nouns) for the pairs of objects in the 12 target trials. To ensure that the nouns for the target objects are familiar to young children learning Saudi Arabic, we also checked the frequencies of the target nouns in an Arabic child corpus, the Kuwaiti Arabic (Alqattan, 2015) (70 children, age range 1;4 to 3;7 years) in The CHILDES database (MacWhinney, 2000), which is the only Arabic child corpus that contains data from children as old as 3;7. Since our youngest age group are older than those in the Kuwaiti Arabic, we further checked the kindergarten Arabic book (Mousa, 2007) to be sure that the target nouns are among the common ones for age 4 years and above.

Table 1. Labels of object pairs used as stimuli

Object Label 1	Gender	English Gloss	Object Label 2	Gender	English Gloss
<i>tufahah</i>	Feminine	apple	<i>jubahah</i>	Feminine	cheese
<i>kurah</i>	Feminine	ball	<i>saʔah</i>	Feminine	clock
<i>kursi</i>	Masculine	chair	<i>jawal</i>	Masculine	mobile phone
<i>baab</i>	Masculine	door	<i>kupz</i>	Masculine	bread
<i>baidah</i>	Feminine	egg	<i>muzah</i>	Feminine	banana
<i>saboon</i>	Masculine	soap	<i>shurab</i>	Masculine	sock
<i>sahan</i>	Masculine	plate	<i>fustan</i>	Masculine	dress
<i>milʔaqah</i>	Feminine	spoon	<i>mikadah</i>	Feminine	pillow
<i>wardah</i>	Feminine	flower	<i>shukah</i>	Feminine	fork
<i>sayarah</i>	Feminine	car	<i>shajarah</i>	Feminine	tree
<i>saikal</i>	Masculine	bicycle	<i>sakiin</i>	Masculine	knife
<i>tawilah</i>	Feminine	table	<i>tayarah</i>	Feminine	airplane

We chose the popular kid’s cartoon character Mickey Mouse to present the objects to engage the children during the experiment and to encourage all the participants to produce full sentence in their descriptions in order to elicit the use of definite articles. In every target trial, Mickey Mouse always presents the first (i.e. old) object with both hands in the middle to control any spatial bias. In the following slide where a new object is shown with the previous object, Mickey Mouse holds both the old and new objects simultaneously with each in one of Mickey’s hands (see Figure 1). We counterbalanced the right or left hand in presenting the old or new objects in the second slide in each target pair of slides to avoid potential space bias. In half of the trials the new objects appear in the right hand of Mickey Mouse and in the other half the old objects appear

in his right hand. All stimuli (target and filler trials) were also randomized and counterbalanced into 8 different orders.



Figure 1. Sample stills of a pair of target objects from the experimental stimuli (first slide on the left and second slide on the right)

Each participant was tested individually in a quiet room and was first shown Mickey Mouse holding one object by his two hands (e.g. car) (see Figure 1) and asked, “What do you see on the screen?” After he/she (henceforth “she”) replied, the experimenter repeated exactly only once what the participant said. In the following slide, the participant was shown the same Mickey Mouse holding the old object using one hand and a new object using the other hand (e.g. car and tree) and was asked the same question “What do you see on the screen?” and her responses were recorded. All participants were instructed to reply in full sentences. The procedure with the children was slightly different in a child-friendly manner to keep them engaged. The experimenter introduced a helper (confederate), Bashear, who was sitting on a chair behind the laptop and could not see the screen. Each child was first invited to make friends with Bashear and was asked if she would like to help her learn what she had seen. All the children agreed to help. Stickers were used as rewards during the experiment to engage the children to continue the task. The whole procedure was audio recorded.

Each response to the target pairs of objects was coded for (1) the ordering of the referents, “old-before-new” or “new-before-old” and (2) the use of definite article *al-* or no article (indefinite). A total of 648 (54 participants x12 target trials) conjunct noun phrases and a total of 1296 nouns (54 participants x12 target trials x 2 nouns per conjunct phrase) were coded and entered into statistical analyses.

2.2 Results We first present the results of word order preferences by different age groups. The overall proportions of different word orders by each age group are presented in Figure 2. The child groups and the adult group differ in their preference for the word order in referring to the old and the new referents. The 4-year-olds preferred the “new-before-old” word order (mean proportion 74.5%), which contrasts sharply to the 6-year-olds (mean proportion 33.8%) and the adults (mean proportion 21.3%). The adult participants preferred the “old-before-new” word order (mean proportion 78.7%). The 6-year-olds stood in-between the adults and the 4-year-olds with an increased preference for the “old-before-new” word order (mean proportion 66.2%) and a decreased preference for the “new-before-old” word order (mean proportion 33.8%) compared with the 4-year-olds. The results thus reveal a developmental change in the increased use of the “old-before-new” word order with the increase of age.

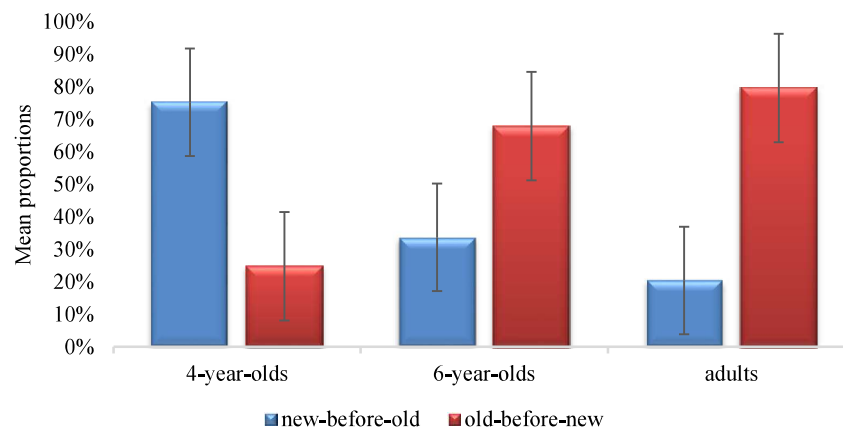


Figure 2. The mean proportions of the use of old versus new in adult and child speakers of Saudi Arabic

To see whether the observed differences between the three age groups are significant, we conducted a mixed-effect logistic regression model (Baayen, 2008) to examine *age* as the main predictive variable for the production of “new-before-old” and “old-before-new” word order (the outcome variable). Participants,

gender, individual trials, and stimulus order (i.e. different versions of the counterbalanced and randomized stimuli) were entered as random variables. The results (see Table 2) show a significant effect of age on the word order preference ($\beta = 2.880$, $Z = 8.77$, $p < 0.005$). The adult group differ significantly from the 4-year-olds ($\beta = -3.934$, $Z = 31.601$, $p < 0.000$) and the 6-year-olds ($\beta = -1.365$, $Z = 11.739$, $p < 0.000$). There are no significant differences due to the random variables (see Table 2).

Table 2. The effect of age on the choice of different word order by child and adult speakers of Saudi Arabic

	Estimate	HPD intervals		Std. Error	Z Value	P Value
		lower	upper			
Intercept	2.880			0.972	8.771	0.003**
Participant	-0.042	0.926	0.993	0.018	5.430	0.020*
Gender	0.270	0.912	1.883	0.185	2.131	0.144
Stml order	0.016	0.933	1.107	0.044	0.141	0.708
Trial	-0.009	0.970	1.013	0.011	0.665	0.415
Age: Four	-3.934	0.005	0.077	0.700	31.601	0.000***
Age: Six	-1.365	0.117	0.558	0.398	11.739	0.001***

A second logistic regression was conducted to further compare the two child groups and the results (see Table 3) show that they also differ significantly from each other ($\beta = -0.672$, $Z = 21.849$, $p < 0.000$).

Table 3. The effect of age on word order by the 4- and 6-year-old speakers of Saudi Arabic

	Estimate	HPD intervals		Std. Error	Z Value	P Value
		lower	upper			
Intercept	-0.672			0.144	21.849	0.000***
Age=4years	1.746	3.782	8.694	0.212	67.653	0.000***

The results thus provide further evidence for the robust preference for the “old-before-new” preference in adult speech but not in child language, as reported in the prior research (e.g. Ceja Tel Toro et al., 2016; De Ruiter et al., 2018; Narasimhan & Dimroth, 2007). In addition, it also reveals a developmental change from around 4 to 6 years in the increased use of the “old-before-new” word order, even though the 6-year-olds are not yet fully adult-like.

Let's now move on to the use of the definite article *al-*. All the participants produced full sentences as instructed in the experiment, which allows us to examine whether the definite article *al-* was used to mark old referents. A total of 1296 responses were coded for with or without the definite article *al-*. Counter to our expectation, the majority of the nouns were not used with an article and the definite article *al-* was used infrequently, a total of 147 (11.33%) tokens across all the participants. There is a slight increase of use with the increase of age, 6.48% (4-year-olds), 11.1% (6-year-olds), and 17% (adults). All the 147 tokens of *al-* were produced by a total of 8 individuals from each age group, three 4-year-olds, two 6-year-olds, and one adult. Most unexpectedly, those participants also used *al-* on both the old and the new referents equally, suggesting *al-* was not used to differentiate the old and the new referents.

We conducted another mixed-effect logistic regression model (Baayen, 2008) to see if the use of *al-* can be predicted by independent variables such as *age*. Participants, gender, individual trials, and stimulus order were entered as random variables. The results (see Table 4) show a significant effect ($\beta = 2.187$, $Z = 5.391$, $p < 0.02$), but only the 4-year-olds produced significantly fewer *al-* than the adults ($\beta = 1.629$, $Z = 5.247$, $p < 0.005$). There is also a surprising effect of gender ($\beta = -0.808$, $Z = 18.149$, $p < 0.001$). Since only 8 participants used the determiner across all three groups, this gender effect cannot be generalized. There are no significant differences due to the random variables (see Table 4).

Table 4. The effect of age on use of *al-* by child and adult speakers of Saudi Arabic

	Estimate	HPD intervals		Std. Error	Z Value	P Value
		lower	upper			
Intercept	2.187			0.942	5.391	0.020*
Participant	0.016	0.981	1.051	0.018	0.776	0.378
Gender	-0.808	0.307	0.646	0.190	18.194	0.000***
Info=male	0.000	0.599	1.669	0.261	0.000	1.000
trial	-0.001	0.978	1.020	0.011	0.010	0.922
Age: Four	1.629	1.265	20.557	0.711	5.247	0.022*
Age: Six	0.727	0.874	4.900	0.440	2.733	0.098

3 Discussion and conclusion

We investigated how information status of referents affects the choice of word order and the use of the definite article *al-* in the speech of child and adult speakers of Saudi Arabic. Our results provide another piece of evidence from Saudi Arabic that adult speakers have a strong preference for the “old-before-new” word order. Children, on the other hand, favor the “new-before-old” word order, which corroborates the findings

in the previous studies of German- and Spanish-learning children (Ceja Tel Toro et al., 2016; Narasimhan & Dimroth, 2007). Our results also reveal a clear developmental change around 6 years with a significant decline in the “new-before-old” word order and an increase in the “old-before-new” order, despite that the 6-year-olds still were not fully adultlike in their choice of word order. This finding also supports that the appropriate use of word order according to the informational needs is a late acquired linguistic strategy (Dimroth & Narasimhan, 2012). So why do Arabic children and adults differ in their preference for word order to refer to old and new referents?

This developmental difference might be attributed to cognitive factors such as the salience of novel entities to children, or communicative factors such as sensitivity to the informational need of the addressees (Chen & Narasimhan, 2018). It may also be related to a preference of children at one-word and two-word stages to produce the most important elements in the situation, focusing on those that are new and omitting the old non-informative element of the discourse (Baker & Greenfield, 1988). Chen & Narasimhan (2018) further argue that in addition to the cognitive factors or communicative factors, language-specific properties also play an important role in the crosslinguistic variation in the degree of preference for the “new-before-old” word order. For example, English-learning 4-year-olds do not prefer the “old-before-new” word order, but they also show no preference for the “new-before-old” order at rates significantly above chance (Chen & Narasimhan, 2018). Therefore, there is strong evidence for the dispreference for the “old-before-new” order in child speech crosslinguistically, but the “new-before-old” order may be influenced by language-specific properties.

Arabic is a free word order language with the basic SVO order and derived OVS, VOS, OSV and SOV word orders and different constituents of a clause can be dislocated by the speaker for communicative purposes (Abdul-Raof, 1998). Abdul-Raof (1998) proposes that adult Arabic speaker’s choice of word order is related to the discourse environment and speakers often choose the most appropriate word order to produce old and new referents. Thus, children learning Arabic may develop an early sensitivity to the intentional choice of word order as a frequent linguistic strategy to indicate old versus new information based on the input. It has also been suggested that children exposed to the flexible use of word order may be more inclined to use word order to express asymmetries in discourse-pragmatic prominence compared with children learning rigid word order language such as English (Chen & Narasimhan, 2018; De Ruiter et al., 2018). The strong reliance on word order in the 4-year-old Arabic child language is in line with the speech production of their age-matched counterparts learning German and Spanish, which both have a freer word order compared with English. German-learning children show a mean proportion of 62%-65% (Narasimhan & Dimroth, 2008) and the Spanish-English bilingual children (Ceja Del Toro, Chen, & Narasimhan 2016) showed a mean proportion of 81% for the “new-before-old” word order.

Regarding the use of the definite article *al-*, we found that both the child and the adult speakers of Saudi Arabic used it very infrequently and when *al-* was produced, it was used on both the old and the new referents. There is thus no evidence among the speakers to use the definite article *al-* to mark old versus new referent. This result seems contradictory to the finding in prior studies that adult speakers of Arabic use the definite article *al-* to mark old information (e.g. Al-Wardi, 2008). Such discrepancy could arise from the methodological differences between our study and the previous studies that either used native Arabic-speaking author’s intuition or naturalistic conversations. Our study is a controlled experimental elicitation, which may have offered an unnatural or inauthentic speech context that the participants did not feel the need to use the definite article *al-* to distinguish the old referents from the new ones. The participants might also have treated the old object in the second slide of each target pair as completely new. In addition to the methodological factors, children’s lack of use of the definite article *al-* on the old referents may be also confounded with their incomplete knowledge of the semantics of the definite article. Bloom & Lahey (1978) argue that English-learning children may lack the mastery of the proper use of the determiner to label given and new information even if they have learned that a definite article such as *the* refers to a specific referent and an indefinite article *a/an* refers to non-specific ones. A similar developmental trajectory was reported for Arabic-learning children in Israel, who were found to start to produce the definite article as young as age 2;0, but the mastering of the correct use of the determiner happens at later age when the child master the difference between old and new objects (Rosenhouse, 2000).

To conclude, this study supports prior research that there may be a universal early cognitive or communicative tendency influencing children’s production crosslinguistically (i.e. the dispreference for the “old-before-new” order in child speech), but the “new-before-old” order in child speech may be influenced by language-specific properties. Speakers of languages with a flexible word order such as Arabic may show a stronger reliance on word order compared with those with a rigid word order such as English. It may take a long time (above age 6) before children acquire adultlike usage of word order to mark old versus new information. Further crosslinguistic and developmental research is required to explore the range of variation in information structure-driven word order patterns and the use of a variety of linguistic devices including word order, determiners, intonation, discourse particles, construction type, case-marking, and referential form, among others.

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Bilingual Kazakh Children's Code Switching

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1 Introduction

Kazakhstan is a post-Soviet country comprising more than 100 cultural and language groups, where Kazakh-Russian bilingualism is widespread across its whole territory. The Constitution of the Republic of Kazakhstan designated the Russian language as an 'international' language; it functions in the society simultaneously with the official Kazakh language and serves as a lingua franca. Due to decades of russification and keeping the Kazakh language far away from science and other crucial fields of functioning during the Soviet time, Kazakhstan has had a problem of development and the actual use of Kazakh language, although now it is not as acute as before.

It is very common that Kazakh children have knowledge and competence in two languages, in spite of the fact that Kazakh and Russian are neither typologically, nor genealogically related languages. Kazakh has agglutinative structure, whereas Russian has inflected structure; Kazakh is one of more than forty Turkic languages in Altai family of languages, whereas Russian belongs to the eastern Slavonic branch of the Indo-European family of languages. However, social factors require Kazakh children to grow up bilingually, switching between the two most important languages for the population.

2 Overview

We recorded the oral speech of bilingual Kazakh children who were from nine to ten years old at the time of data collection. The informants were selected on the basis of bilingual criteria. Children were asked to describe a picture book, i.e. a story without words, about a little boy (the famous children's picture book "Frog, Where Are You?" by Mercer Mayer).

The bilingual children were attending the fourth grade of a school-lyceum in Almaty, Kazakhstan, which has both Kazakh and Russian classes. Based on the language of their education, we instructed children either in Kazakh (if a student was from the class taught in Kazakh) or Russian (if a student was enrolled in a Russian-speaking class) to describe the pictures and narrate a coherent story using the language which was more convenient for them.

During the child's description of the pictures, the researcher tried not to interfere in his/her story, giving him/her a free choice of the linguistic means of both languages possessed by the young bilingual narrator. The sample of bilingual informants contains both boys and girls. The data were collected in several separate sessions, taped down, and then transcribed using the CHAT transcription system (MacWhinney, 2000).

3 Framework

In bilingual acquisition processing the use of languages is considered to be a capability to handle two different language codes, and many studies have shown that code switching often either opposes or accompanies code mixing. According to linguistic literature, these two terms may interact and complement each other rather than oppose (O'Grady, Archibald, Rees-Miller, 2005), or sometimes code mixing is considered to be a certain type of code switching (Spolsky, 2008).

It is believed that code mixing happens during many stages of child's bilingual acquisition when phonological, lexical, morphological, etc. elements of two languages might happen to be parts of the same linguistic unit, e.g. a phrase, a sentence, or even a word (Comeau, Genesee, & Lapaquette, 2003). Code switching routinely refers to strategically motivated bilingual activity and involves communicator's pragmatic intentions (Reyes, 2004). Inferring from the definitions, we use terms of code mixing as if it is referred to a relatively unmotivated bilingual transition from one language to another during the process of

speech production, while code switching is a conscious choice between languages within the same discourse, although we believe that boundaries between them often overlap.

4 Children's Kazakh-Russian code switching

4.1 Bilingual children's competence In a system of bilingual competence, undoubtedly, the languages do impact each other. As a result, children's communicative competence consists of components of both languages. Discussion in linguistics, whether bilinguals have one common linguistic system or two, is also related to matters on code switching, which can validate that a bilingual child's competence is not that of two different monolinguals' sum, but a more complex phenomenon.

During the experiment, some children used code switching between and even within sentences, alternating Russian and Kazakh phrases and words, and sometimes even parts of words. This type of speech is also used by many adult speakers in Kazakhstani society, so it might be a reflection of social factors. We attribute that type of code switching as a situational one when interlocutor starts a conversation in Kazakh, then switches to Russian, and at the end returns to Kazakh. Usually, metacommunicative part, such as greetings, saying 'good-bye', addressing, etc. is expressed in Kazakh.

Based on the use of switching and mixing of language codes by the bilingual children, it was possible to determine the dominant language of a child at the current stage of language development. For children who managed to refrain from mixing linguistic resources within the framework of the single story, a conscious attitude toward language and the ability to manage a targeted choice of linguistic means were the main characteristics.

4.2 The principle of economy Kazakh bilingual children used their language skills and knowledge in Russian and Kazakh languages with varying degrees of success. Code switching was used by many bilingual children as a language tool in the implementation of their communication strategy, while code mixing was characteristic of spontaneous decisions to replace certain linguistic units of one language with appropriate ones from the different language. In our view, code switching and mixing in bilingual children's narratives fit within so-called 'the economy principle in language' (Anjomshoa, Sadighi, 2014). Bilingual children might make least effort to search for the appropriate word in the certain language and find what is right and correct; instead, it is easier just to pick up the units from the surface of their mental lexicon.

We have categorized the main types of code switching and mixing, which are the result of the principle of economy in language, we think. They were: using words from different languages in the same utterance (examples are given in 4.2.1), using word order of one language with the vocabulary of another, and combining a stem from one language with an affix from another, e.g.:

- (1) *CHI: bala men it bolotogha@ru+kz qulady
{the boy and the dog fell into (kz) the swamp (ru)}
- (2) *CHI: bala agashqa shyghyp
*CHI: duplogha@ru+kz aighailady
{the boy has climbed a tree and shouted into (kz) the hollow (ru)}
- (3) *CHI: it iskady@ru+kz
{the dog (kz) look (ru) -ed (kz) for}

The most frequently used single unit in code switching by bilingual children was shorter, in comparison with Kazakh, Russian word. It might be an adverb, e.g.:

- (4) *CHI: bala [=kz] uje [=ru] oianghanda , baqa qashyp ketti
{when the boy (kz) (has) already (ru) woken up (when the boy woke up), the frog had got away}

Also, it might be an interjection, with or without adverbs, e.g.:

- (5) *CHI: nu # potom [=ru] ol tasbaqany kordi [=kz]
{well ... then (ru) he saw a turtle (kz)}
- (6) *CHI: nu [=ru] # japalaq ushyps jur [=kz]
{well (ru) ... an owl is flying (kz)}

Shorter Russian conjunctions are used instead of Kazakh ones, too:

- (7) *CHI: i [=ru] it balany qulatyp tastady [=kz]
{and (ru) the dog made the boy fall (kz)}
- (8) *CHI: aghashqa shyghyp aldy [=kz] i [=ru] baqany tawyp aldy [=kz]
{climbed onto a log (kz) and (ru) found the frog (kz)}

We also found children responding in a language which was different from the language addressed to them. Some children, however, did not mix the languages.

4.3 Language dominance As we have mentioned above, at the moment of their narrating the story bilingual children had different dominant languages. Researchers, who investigated the link between children's language dominance and their mixed speech, pointed out that language dominance has a significant meaning in bilingual children's code switching (Genesee, Nicoladis, & Paradis, 1995). Bilingual children, attending classes where Russian is the language of instruction, usually have Russian as their dominant language, although their conversational Kazakh is fluent enough to narrate the story. Those bilingual children switch to Russian when cannot find appropriate Kazakh word in their lexicon; following are some examples of lexical switching to Russian during Kazakh narratives:

- (9) *CHI: olarda [=kz] semja [=ru] boldy [=kz]
{They were (kz) a family (ru)}
- (10) *CHI: mende bar eki [=kz] krovat' [=ru] # ulken [=kz]
{I have two (kz) bed(-s) (ru) ... big (kz)}
- (11) *CHI: ol balany [=kz] stolknul [=ru]
{he (kz) pushed (ru) the boy (kz)}
- (12) *CHI: bala uiyqtady , baqa [=kz] spuskaetsja # ubegaet [=ru]
{the boy is sleeping, the frog (kz) is getting down, getting away (ru)}

Some combinations of words, including collocations, often might be the subject of switching:

- (13) *CHI: bala [=kz] ideal'nyi [*] mesto [=ru] awlawgha kordi
{the boy has seen [=kz] an ideal place [=ru] for fishing}
- (14) *CHI: ogham jeti [=kz] skoro ispolnitsja [=ru]
{he (kz) is going to be (ru) seven (kz) soon (ru)}

For young bilingual narrators it is easier to name an animal in their dominant language, as they certainly know how to call an animal, e.g. children switch to the Kazakh language while the language of the story was Russian:

- (15) *CHI: a potom tam byla [=ru] borsyq [=kz]
{and then there was (ru) a badger (kz)}
- (16) *CHI: okazyvaetsja , tam byla [=ru] uki [=kz]

{it turned out that there was (ru) an owl (kz)}

- (17) *CHI: a potom [=ru] elik [=kz] podtolknula [*] # na [*] ozeru [*] [=ru]
{and then (ru) the deer (kz) pushed ... to lake (ru)}
- (18) *CHI: mal'chik i sobaka I [=ru] # baqa # balyq [=kz] # rybachili
{the boy and the dog and (ru) ... the frog ... (kz) were fishing (ru) fish (kz)}
- (19) *CHI: a potom krichala [*] [=ru] qurbaqa , qurbaqa [=kz] gde ty ?
{and then shouted (=called out) (ru), 'Frog, frog (kz), where are you?' (ru)}

Sometimes linguistic and cultural background, apart from language dominance, was explicitly reflected in the narratives. For instance, some children can give the boy a Kazakh name in spite of telling the story in Russian:

- (20) *CHI: jila-była [*] [=ru] jandos [=kz] i tuzik i ejo [*] [=ru] baqa [=kz]
{once upon a time there were (ru) Jandos (kz), and Tuzik, and her (=his) (ru) frog (kz)}
- (21) *CHI: asan [=kz] i ejo [*] sobaka [=ru] terezeni ashyp [=kz] krichali [=ru]
{Asan (kz) and her (his) dog (ru), opening the window (kz), were shouting (=calling out) (ru)}

4.4 Types of code switching It is well-accepted that there exist such types of code-switching patterns, as lexical, phonological, morphological, syntactical, etc. Along with that, taking into consideration the importance of discourse, we classified some pragmatic types of code switching in bilingual children Kazakh-Russian narratives; they are metalinguistic, demonstrating, and relief patterns.

Metalinguistic code switching includes those parts of utterances in which children comment on the narration using different language, e.g.:

- (22) *CHI: a eto kto ? [=ru] bughy ma ? [=kz] ja zabył kak po-russki [=ru]
{Who is it? (ru) Is it an elk? (kz) I forgot how in Russian (ru)}

Demonstrating code switching means that children demonstrate their linguistic skills in different language, using the utterance deliberately, although it is in a different language from their narrating one. For instance, the student, attending primary class in Russian speaking school, was demonstrating his speaking in Kazakh:

- (23) *CHI: u odnogo mal'chika byla sobachka , l'jagushka [=ru]
*CHI: oda ademi tosek bolghan [=kz]
{A boy had a dog, a frog (ru). He had a nice bed (kz).}

Another girl, who was learning English at that time, tried to demonstrate her English-speaking skills, but then she had to return to Russian:

- (24) *CHI: na ulitce noch
*CHI: the boy is playing [=en] # s sobakoi [=ru]
*CHI: the boy is sleeping [=en]
*CHI: l'jagushka potihon'ku vyhodit iz banki
{It's night outside (ru). The boy is playing (en) with the dog (ru). The boy is sleeping (en), the frog is quietly coming out of the jar (ru).}

One more type of code switching is related to the pragmatic strategy of relief, and we call it relief code switching. The child tries to use non-dominant language but feels uncomfortable, so he/she tries to ease the narration with a dominant language, which turns out to be more convenient to the child, so he/she decides not to return to the language which he has started with. For instance:

- (25) *CHI: u odnogo mal'chika byla sobachka , l'jagushka

*CHI: oda ademi tosek bolghan [=kz]
 *CHI: # potom [=ru] bala uqtady [=kz]
 CHI: potom ubejal []
 CHI: potom sobachka predupredil [] mal'chika
 *CHI: a ma- # a mal'chik byl rasstroen
 {A boy had a dog, a frog (ru). He had a nice bed (kz) ... Then (ru) the boy got asleep (kz). Then the frog came out from the jar, then got away. Then the dog warned the boy, but bo- ... but boy was upset}

5 Conclusion

The issues on Kazakh-Russian speaking bilingual children discussed above require further study and analysis, especially, we need to focus on quantitative data which is going to be the point to show the bigger picture. In this writing, we tried to draw attention to some results, such as second language interference in implementation of narratives by bilingual children, which involves the factor of language dominance. Predictably, the important role plays input; in our case, parents, teachers, any other interlocutors, i.e. Kazakh adults, who do code switching and code mixing, have some impact on the bilingual children's speech. In the process of narrating, some children were trying to simplify their approach, choosing the so-called 'language economy principle'. As a result of that, they could use declension or conjugation of one language for the words from another language. Indubitably, lacunae in non-dominant language vocabulary play their role in code switching, but at the same time, it is hard to overestimate young narrator's strategy implementation of both languages within bilingual child's competence. Depending on the real discourse, Kazakh-Russian bilingual children used metacommunicative and demonstrating types of pragmatic code switching, and relief code switching functioned as an indicator of the different type of children's code switching. Three conventional groups of children, i.e. with dominant Kazakh, with dominant Russian, and with relatively balanced Kazakh and Russian, respectively were distinguished. Kazakh bilingual children's code switching demonstrates that they use linguistic resources of both languages available to them to make their narrations explicit for interlocutors.

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Pronouns and Logophoricity in South Saami

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1 Introduction

This paper presents a primarily descriptive overview of some aspects of the pronominal system in South Saami, a Finno-Ugric language spoken in central Norway and Sweden with approximately 700 to 1000 native speakers (Scheller and Vinka 2016). The language has three distinct series of third person pronouns, whose nominative forms are given in (1). The overt pronouns appear in three numbers and in seven cases. Null- and D-pronouns can refer to both inanimate and animate entities, including humans. S-pronouns, however, can only refer [+human] entities, including entities that are perceived as [+human] in, for instance, fairy tale contexts. All pronouns are gender neutral.

(1)	[±animate]		[+human]
	<u>Null pronouns</u>	<u>D pronouns</u>	<u>S pronouns</u>
3S	pro	dihte	satne
3D	pro	dah (guaktah)	sátnoe
3P	pro	dah	sijjieh

The overarching goal of the paper is to elucidate how these pronouns interact in the overall system of reference-tracking in the language. It will be shown that the distributional patterns of the D and Null series closely resemble that of overt and covert pronouns in Italian-style pro-drop languages (Carminati 2002, Frascarelli 2007, Grimshaw and Samek-Ludovici 1996, Holmberg 2010). In (2), it can be observed that in order for the subject of the adjunct clause to refer to the matrix subject, it must be expressed by the null pronoun. If, on the other hand, the reference is intended to pick out the matrix object, the overt subject pronoun *dihte* is required in the adjunct clause.

(2)	Læjsa _i	Maarjam _j	dïervesji _i	gosse	pro _i */dihte* _{i/j}	gaatan	rastah	veedtsi. ¹
	L.NOM	M.ACC	greet.PST.3S	when	pro/D.3S.NOM	street.GEN	across	walk.PST.3S
	'Læjsa _i greeted Maarja _j , when she _{i/j} crossed the street.'							

S-pronouns are altogether impossible in (2), but are distributionally restricted to the complement CP of verbs of saying, thinking, believing etc. As shown in (3), an S-pronoun obligatorily refers to the subject of the attitude verb. In contrast, a D-pronoun cannot be anteceded by the higher subject, but is obligatorily

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The following abbreviations are used in the glosses: D=D pronoun, S=S pronoun, 1, 2, 3=person, s=singular, D=dual, P=plural, NOM=nominative, ACC=accusative, ILL=illative, GEN=genitive, INESS=inessive, REL=relative marker, REFL=reflexive, TR=transitive, DIM=diminutive, PRS=present tense, PST=past tense, PTC=participle, PROG=progressive, INF=infinitive, IND=indicative, SBJV=subjunctive.

¹ There is some speaker variation regarding the choice of postposition in this example; *byjjelen*, *rastah* and *dåaresth*, all meaning 'across,' have been suggested by native speakers.

contraindexed with it:

- (3) Piere_i jeehti satne_{i/*j}/dihte*_{i/j} edtja mãvhkam bïssedh.
 Piere.NOM say.PST.3S S/D/pro.3S.NOM will.PRS.3S pants.ACC wash.INF
 'Piere_i said that he_{i/j} will wash the pants.'

The pattern in (3) is familiar from West African languages, where designated logophoric pronouns are employed in exactly the same way as S-pronouns (Adesola 2005, Baker 2008, Safir 2004). It is therefore reasonable to assume that S-pronouns are logophoric. Hence, South Saami has two strategies for reference-tracking. On the one hand, we find overt and covert subject pronouns in non-logophoric contexts, (2), whose distribution is dictated by discourse grammatical considerations that are sensitive to whether a pronoun serves to express topic shift or topic continuity (Frascarelli 2007, Grimshaw and Samek-Ludovici 1996). This is the theme of section 2, which draws on Holmberg's (2010) and Frascarelli's (2007) work on null subject languages. Sections 3 to 5 focus on S-pronouns. Section 3 begins the exposition of S-pronouns by raising two questions. While the overall claim in this paper is that S-pronouns are logophoric, it is important to clarify how they differ from reflexive pronouns in the language. Based on distributional facts, including the absence of Anaphor Agreement Effects (Rizzi 1990), I conclude that a reflexive analysis would be on the wrong track. A related issue is mood selection. Unlike Icelandic (Maling 1984), subjunctive mood is not implicated in the licensing of S-pronouns. Section 4 outlines the basic tenets of a syntactic account of logophoricity, namely that a logophoric pronoun is licensed by a logophoric operator (see among several others, Adesola 2005, Koopman and Sportiche 1989). Once the theoretical stage is set, I show that S-pronouns behave like well-known instances of logophoric pronouns with regards to island insensitivity, multiple embeddings and interleaving effects. Section 5 provides a brief consideration of the effects that arise when pro-drop meets logophoricity. There is an interesting theoretical overlap between Holmberg's (2010) analysis of third person pro-drop and the theory of logophoricity, in that both assume that a referentially dependent third person pronoun is bound by a designated operator. A null subject pronoun may alternate with an S-pronoun in a logophoric context in South Saami. However, when this happens, some of the effects addressed in section 4 are blocked. I suggest that this is because the licensing of null subjects, as laid out in section 2, clashes with the licensing of logophoric pronouns. Finally, some concluding remarks are given in section 6.

2 Third person pronouns in non-logophoric contexts

It is a well-known fact that there are two types of Romance-style null subject languages. One type, so called consistent null subject languages, allow third person referential pro-drop, for instance Italian (Rizzi 1982, 1986) and Spanish (Zagona 1988). In another type, partial null subject languages, first and second person subjects may drop, whereas referential third person pro-drop is inaccessible, except in certain control-like contexts. Representative languages of this variety are, for instance, Finnish and Brazilian Portuguese, (Biberauer 2010, Holmberg 2005, 2010, Vainikka and Levy 1999). In this section it will be shown that South Saami is a consistent null subject language. The analysis pursued in this section assumes central aspects of Holmberg's (2010) account of third person referential pro-drop.

Romance-style null subject languages have in common the typological fact that finite verbs carry overt morphological subject agreement affixes, an observation that traces back to the earliest formulations of the classical null subject parameter and its predecessors (see for instance, Perlmutter 1971, Rizzi 1982, Rohrbacher 1999, Sigurdsson 2011). The South Saami finite verb nicely fit the description. Finite verbs inflect for two tenses, three numbers and three persons. Agreement affixes are realized as distinct morphemes and there are but a few cases of syncretisms, which moreover vary across conjugations. As shown in (4), the second person singular and the third person plural are syncretic in the present tense in the second conjugation, but not in the fourth conjugation, (5):²

² Vowels undergo ablaut and umlaut to varying degrees in different conjugations (Vinka 2000) and theme vowels undergo reduction when preceding an unstressed syllable, and sometimes a theme vowel may be subject to deletion. For general discussions, see Oltra-Massuet (1999) and Arregi (2000), and see Julien (2015) for a discussion about theme vowels in North Saami.

- (4) Second conjugation, present tense (gæljodh 'scream.Inf')
- | | <u>Singular</u> | <u>Dual</u> | <u>Plural</u> |
|--------|-----------------|--------------|---------------|
| 1.Pers | gæljoe-m | gæljoe-n | gæljo-be |
| 2.Pers | gæljoe-h | gæljo-den | gæljo-de |
| 3.Pers | gylje-Ø | gæljoe-jægan | gæljoe-h |
- (5) Fourth conjugation, present tense (lohkedh 'read.Inf')
- | | <u>Singular</u> | <u>Dual</u> | <u>Plural</u> |
|--------|-----------------|-------------|---------------|
| 1.Pers | lohke-m | luhkie-n | lohke-be |
| 2.Pers | lohk-h | lohke-den | lohke-de |
| 3.Pers | lâhka-Ø | lohki-jægan | luhkie-h |

A characteristic of consistent null subject languages is the fact that third person pro-drop applies whenever required (Chomsky 1981, Grimshaw and Samek-Ludovici 1996). Consider the South Saami example in (6). Here, the subject pronoun in the second clause in (6) refers to the subject of the first clause, namely Piere. In this context, the null third person pronoun is strongly preferred over the overt third person D-pronoun, which is obviative.

- (6) Jååktan Piere_i staarese minni.
 yesterday P.NOM town.ILL go.PST.3S
 Daesnie pro_i/dihte*_i gærjam öösti.
 there pro/D.NOM book.ACC buy.PST.3S
 Yesterday Piere_i went to town. There, he_i bought a book.'

In short, the existence of rich agreement along with the contrast between overt and covert third person subject pronouns is symptomatic of Italian-style consistent null subject languages (Belletti, Bennati and Sorace 2007, Carminati 2002, Frascarelli 2007, Grimshaw and Samek-Ludovici 1996).

Holmberg (2010) argues for a theory of consistent null subject languages that incorporates important insights from Frascarelli (2007). Simply put, there are two key ingredients in Holmberg's theory, namely anchoring in the T-domain and anchoring in the C-domain. To begin with, Holmberg suggests that overt third person pronouns are DPs. Thus, dihte in (7) raises to Spec,TP and values the ϕ -features on T. Holmberg also assumes that T in consistent null subject languages hosts a referential feature, D, which is valued by dihte.³ Then dihte raises, overtly or covertly, into the C-domain, and introduces a topic (Frascarelli 2007):

- (7) [CP <dihte> [TP dihte T [_{vP} t_{dihte} v VP]]]
 ↑ ↑
 topicalization ϕ -Agree and D

In contrast, Holmberg proposes that the null pronoun is a ϕ P. While Agree still has the effect that the pronoun values T's ϕ -features, pro does not raise to Spec,TP. For the purposes of this paper, it suffices to say that a ϕ P, unlike a DP, cannot satisfy T's referential feature. Following Frascarelli (2007), the derivation can be saved by the presence of a null topic operator, TOP, in the C-domain, which is coindexed with a topic present in the discourse. The topic operator and pro in turn are coindexed, and since T is ϕ -dependent on pro, TOP can agree with T and satisfy the referential feature, D.

- (8) [CP <TOP_i> [TP T_i [_{vP} pro_i v VP]]]
 | |
 D-Agree ϕ -Agree

The incorporation of discourse grammatical factors straightforwardly captures the distributional patterns of overt and covert subject pronouns, as shown in the authentic discourse in (9) through (11). The subject DP in (9) has raised to Spec,TP where it has entered an Agree relation with T that values its D and ϕ -features. Along the lines of (7), the DP has subsequently raised from Spec,TP to the C-domain, where it introduces

³ See Holmberg (2010) for a detailed discussion.

new a topic, which is indicated by underlining. Turning to (10), the D-pronoun dihte refers to the italicized object DP in (9) and thus it too introduces a new topic, again in accordance with (7). The final sentence, (11), hosts an in-situ pro subject, which agrees with T. Pro is coindexed with the null topic operator TOP, which as a result of being coindexed with the topic dihte in (10), values T's referential feature.

- (9) Gåeskie gonnoeh maakh; lægan aadtjen ohtje *niejtetjem*_k åådtjeme.
 aunt and uncle.NOM be.PRS.2D recently little baby girl.DIM.ACC get.PTC
 'My aunt and uncle just had a little baby girl.'
- (10) Dihte_k daan minngemes æjlegen kristesovvi.
 D.3S.NOM this last Sunday.GEN be.baptized.PST.3S
 'She was baptized last Sunday.'
- (11) Jih dellie <TOP_k> pro_k nommem åådtjoeji.
 and then pro.3S.NOM name.ACC receive.PST.3S
 'And then she received a name.' (Holm-Bull 1986:51)⁴

On a similar note, we can also establish that S-pronouns differ sharply from both D and null pronouns. The failure of satne in (12) to refer to the matrix subject Læjsa, suggests that it cannot be bound by a null topic operator. Furthermore, since satne cannot refer to the object Maarjam, it can be concluded that it also fails to introduce topic shift. Hence, S-pronouns are different.

- (12) *Læjsa_i Maarjam_j diervesji, gosse satne_{i/j} gaatan rastah veedtsi.
 L.NOM M.ACC greet.PST.3S when S.3S.NOM street.GEN across walk.PST.3S
 'Læjsa_i greeted Maarjam_j, when she_{i/j} crossed the street.'

The take-home message of this section, is that third person null and D subject pronouns in South Saami pattern along the same lines as overt and covert pronouns in more well-studied consistent null subject languages. Simply put, a third person null subject pronoun expresses topic continuity, whereas an overt subject pronoun signals topic shift. Some consequences of the analysis will be brought up in section 5. Now I will turn the attention to S-pronouns.

3 Some characteristics of the S-pronoun

Before I address the broader issues in section 4, I will begin the exposition of S-pronouns by raising two questions that deserve attention. One issue concerns the syntactic status of the S-pronoun, specifically whether it is a reflexive pronoun or not. The second issue concerns mood, and its possible effects on long distance anaphora.

The traditional literature is overall quite ambivalent in its treatment of third pronouns in South Saami. S-pronouns are given as the paradigmatic representative of third person pronouns⁵ and at the same time S-pronouns are also characterized as reflexive pronouns (Bergsland 1994:118, Hasselbrink 1981:122). However, even at a cursory look at the language, it can be established that S-pronouns do not behave like garden-variety reflexives. (13a) shows that an S-pronoun cannot take a local antecedent, and consequently it appears to fall under Condition B of the Binding Theory (Chomsky 1980, 1981). In fact, the same example shows that the bona fide reflexive jijtsemse is required when the intended binder is the local subject. It is thus suggestive that S-pronouns are binding theoretic pronouns, rather than anaphors. It is important to notice, however, that a careful reading of both Bergsland (1994:118) and Hasselbrink (1981:118) reveals that the notion of reflexivity that they intend, refers to the fact that an S-pronoun can be anteceded by the subject of a superordinate clause, (13b); we will return to this phenomenon presently.

⁴ Holm-Bull, Ella. 1986. Åarjelsaemien mubpie gærja. Saemien ööhpehtimmieraerie: Gærhkoe- jih ööhpehtimmie-departemente.

⁵ The reasons for this are in fact quite straightforward. For obvious reasons, null pronouns are not well-suited to illustrate inflectional paradigms. The traditional literature treats the D-series as demonstratives. Hence, the only pronouns that are morphologically well-behaved, are those in the S-series.

- (13) a *Piere_i jijtsemse_i/*satnem_i lyjhkoe.*
 P.NOM self.ACC/S.ACC like.PRS.3S
 'Piere likes/admires himself.'
- b *Laara_j jeehti Piere_i jijtsemse_i/*satnem_i_j lyjhkoe.*
 L.NOM say.PST.3S P.NOM self.acc/S.ACC like.PRS.3S
 'Laara_j said that Piere_i likes/admires himself_i_j.'

The fact that the S-pronoun can be long distance bound in (13b), could mean that it is not the right kind of reflexive to occur in (13a). It could be claimed that since the verb *lyjhkedh* 'like' is a non-reflexive verb, it would follow that the putative, morphologically simplex reflexive *satnem* is independently ruled in (13a) (see Maling 1984). In this context, the scale is rather expected to tip in favor of the morphologically complex reflexive *jiitsemse*, which consists of the reflexive component, *jiitse* 'self,' the accusative case morpheme *-m* and the possessive third person suffix *-se*.⁶ If so, the reverse would also hold, namely that *jiitsemse* is expected to be a poor candidate for a long distance reflexive, as verified by (13b) (see for instance, Huang and Liu 2001, Maling 1984).

An important caveat, however, is that South Saami altogether lacks an independent monomorphemic so called SE reflexive; rather, reflexive verbs, in the sense of Reinhart and Reuland (1993), are verbal and thus they cannot be accompanied by a reflexive pronoun, since the morphologically complex verb expresses the reflexive component (for instance, Lidz 2001). Thus, the reflexive verb *gäärvedidh* 'dress oneself' in (14) cannot take a reflexive object, nor can the non-reflexive verb *gaarvoehtidh* 'dress' in (15).

- (14) *Piere (*jiitsemse/*satnem) gäärve-d-i.*
 P.NOM self.ACC/S.ACC dress-REFL-PST.3S
 'Piere dressed himself.'
- (15) *Piere maanam/*jiitsemse/*satnem gaarvoe-ht-i.*
 P.NOM child.ACC/self.ACC/S.ACC dress-TR-PST.3S
 'Piere dressed the child/*himself.'

If we assume, for the sake of argument, that S-pronouns are true SE-reflexives, it would follow that their failure to be locally bound is an accidental consequence of the fact that reflexive verbs in the language have an incorporated reflexive component. If this is correct, we would expect that S-pronouns would display Anaphor Agreement Effects (AAE) (Rizzi 1990, Woolford 1999) when they are long distance bound. Simply put, the AAE expresses a prohibition against agreement between an inflectional head and an anaphor, which in particular rules out the existence of nominative subject reflexives in languages that exhibit rich agreement. This brings us back to Hasselbrink's (1981) and Bergsland's (1994) observations that an S-pronoun can be anteceded by the subject in a higher clause, as in (16a). However, as witnessed by (16a), the nominative S-pronoun successfully agrees with the finite verb. To verify that the finite verb in (16a) does not carry invariant default agreement, we notice that (16b) shows that in the presence of a plural nominative S-pronoun, plural agreement is triggered on the finite verb. In short, Anaphor Agreement Effects are not found with *satne*.

- (16) a *Dihte_i jeehti [CP satne_i_j edtjia mävham bïssedh].*
 D.S.NOM say.PST.3S S.S.NOM will.PRS.3S pants.ACC wash.INF
 'He said that he will wash the pants.'
- b *Dah_i jeehtin [CP sijjieh_i_j edtjieh mävham bïssedh].*
 D.P.NOM say.PST.3P S.P.NOM will.PRS.3P pants.ACC wash.INF
 'They said that they will wash the pants.'

In sum, although South Saami S-pronouns closely resemble long distance reflexives in languages like Icelandic, they are nonetheless equipped with morphosyntactic properties that distinguish them from morphologically simplex reflexive pronouns. Anticipating the next section, I assume that they are logophoric,

⁶ The usage of possessive suffixes in South Saami is highly limited and is restricted to non-possessive reflexive pronouns and kinship terms. For a discussion of grammaticalization patterns with possessive suffixes, see Piggott and Newell (2006).

in the sense of Safir (2004), among others.⁷

The second issue to address concerns mood. It is well-known that certain languages that accommodate long distance reflexives, for instance Icelandic (Maling 1984, Sigurdsson 1990, Thráinsson 1990) and Italian (Giorgi 2006, 2007), restrict their occurrence to subjunctive complement clauses, as shown by the contrast between (17) and (18). The complement clause of the factive verb in (17) only allows the indicative mood, and consequently long distance binding of the reflexive is illicit. On the other hand, the non-factive verb in (18) triggers the subjunctive mood in the complement clause, with the effect that long distance binding of the reflexive is possible.⁸

- (17) *Jón_i veit að María elskar sig_i.
 Jon knows that Maria loves(IND) REFL
- (18) Jón_i segir að María elski sig_i.
 Jon says that Maria loves(SBJV) REFL (Maling 1984:212)

In contrast to Icelandic, South Saami has no morphological indicative-subjunctive distinction. Rather, S-pronouns are permitted in the complement CP of both factive (19) and non-factive verbs (20):

- (19) a Piere_i daajra satne_i lea skiemhtje.
 P.NOM know.PRS.3S S.NOM be.PRS.3S sick
 'Piere knows that he is sick.'
- b Piere_i vuajna satne_i baatsa.
 P.NOM realize.PRS.3S S.NOM lag behind.PRS.3S
 'Piere realizes that he lags behind.'
- (20) a Piere_i jeehti satne_i lea skiemhtje.
 P.NOM say.PST.3S S.NOM be.PRS.3S sick
 'Piere said that he is sick.'
- b Piere_i veanhta satne_i baatsa.
 P.NOM think.PST.3S S.NOM lag behind.PRS.3S
 'Piere thinks that he lags behind.'

Although there are important intersecting areas between the distribution of the South Saami S-pronoun and long distance reflexives in Icelandic and Italian, there are important differences. For instance, long distance binding of the S-pronoun is neither contingent on the subjunctive mood, nor the presence of a subjunctive interpretation. Most importantly, the South Saami S-pronoun is not an ordinary reflexive pronoun in the language. As we shall see in the remainder of this paper, distributional properties suggest that S-pronouns are logophoric.

4 Logophoric contexts

In the previous section I argued that the South Saami S-pronoun cannot be viewed as a garden-variety reflexive pronoun and in this section I will pursue the hypothesis that it is better viewed as a logophoric pronoun.⁹ That is, they are pronouns that refer to the "person whose speech, thought or perceptions are reported" (Clements 1975). Logophoric pronouns are typically limited to the CP-complement of a verb of saying, thinking, believing etc.,¹⁰ and they are morphologically distinct from other third person pronouns in the same language (Safir 2004). Baker (1999) gives an example from Edo, a language that accommodates

⁷ However, see Sundaresan (2012).

⁸ Sundaresan (2012) points out that long distance binding in Tamil is not contingent on the subjunctive. Also, Sigurdsson (1990) notes that long distance reflexives in Faroese has the same properties as Icelandic, even though the former has lost the indicative-subjunctive distinction in the verbal system. Sigurdsson also points out (17) is fine for many speakers.

⁹ Adesola (2005, 2006) points out that "logophoric" pronouns may have non-logophoric usages. He brings to attention to the fact that the Yoruba logophoric pronoun may occur in non-logophoric contexts, in which case it serves as a discriminated topic, in the sense of Buring (1999). South Saami S-pronouns too can serve as subjects in simple main clauses (Vinka in prog), which causes a distinct point of view reading (Kuno and Kaburaki 1977, Kuroda 1973).

¹⁰ See Culy (1994) for an overview of cross-linguistic variation regarding of verbs that may trigger logophoricity.

two third person pronouns, namely the weak pronoun \grave{o} and the strong pronoun $\acute{i}r\grave{e}n$. (21) shows that when these two pronouns occur in a complement clause, $\acute{i}r\grave{e}n$ must refer back to the matrix subject Ozo , whereas \grave{o} cannot.

- (21) $\acute{O}z\acute{o}_i$ miãnmíã wèé $\acute{i}r\grave{e}n_{i/*j}/\acute{o}_{*i/j}$ kié èkhù.
 Ozo forgot that 3/3 opened door
 'Ozo_i forgot that he_{i/j} opened the door. (from Baker 1999)

The standard syntactic analysis of logophoricity goes back to Koopman and Sportiche's (1989) seminal paper on the topic, along with more recent developments (Adesola 2005, 2006, Baker 1999, 2008, Safir 2004, 2014). The consensus expressed in these works is that the C-domain of the complement CP of a logophoric verb hosts a logophoric operator, LOG, (22).¹¹ The operator LOG is controlled by the Agent DP of the logophoric verb, and the operator binds the logophoric pronoun. Thus, the logophoric operator is the key licenser of the logophoric pronoun.

- (22) [_{CP} $\acute{O}z\acute{o}_i$ forgot [_{CP} LOG_i [_{TP} $\acute{i}r\grave{e}n_{i/*j}$ opened the door]]]
 _____↑_____↑

With Edo as a backdrop, we notice that a comparable pattern is found in South Saami, (23). Just as the strong Edo pronoun $\acute{i}r\grave{e}n$ in (21) must be coindexed with the matrix subject, we recall that the South Saami S-pronoun too refers to a higher subject. Furthermore, on a par with the Edo pronoun \grave{o} , the South Saami D-pronoun is obligatorily obviative. On these grounds, it is reasonable to assume that the S-pronoun is logophoric, and that (23) should be analyzed along the lines of (22). We also notice that the weak null subject in (23) may anteceded by the matrix subject, however not necessarily so. This will be partially addressed in section 5.

- (23) $Piere_i$ jeehti $pro_{i/j}/dihte_{*i/j}/satne_{i/*j}$ edtja mávkhkam bíssedh.
 Piere.NOM say.PST.3S pro/D/S.3S.NOM will.PRS.3S pants.ACC wash.INF
 'Piere_i said that he_{i/j} will wash the pants.'

In the remainder of this section we will consider three pieces of evidence that supports the hypothesis that South Saami S-pronouns are logophoric, namely island insensitivity, effects in multiply embedded structures and interleaving effects.

4.1 Island insensitivity The syntactic analysis of logophoricity, (22), predicts that the distance between the logophoric operator and the logophoric pronoun is unbounded and insensitive to syntactic islands (for instance, Safir 2004). This is a trademark of all logophoric systems, as well as long distance reflexives (Giorgi 2007, Huang and Liu 2001, Maling 1984, Sigurdsson 1990, Thráinsson 2007). Clements (1975) shows in his classic minimal pair, that in Ewe, a logophoric pronoun is illicit in the relative clause in (24a), because the sentence fails as a whole to qualify as a logophoric context. However, if (24a) is embedded under a verb of saying, a logophoric context is created, and as a result the logophoric pronoun contained in the relative clause becomes fully grammatical, and it is anteceded by the highest subject.

- (24) a Ama_i do nku nyonuvi hi dze $e_i/*y\acute{e}_i$ gbo dyi
 Ama set eye girl wh stay e/yè side on
 'Ama remembered the girl that stayed with her.'

¹¹ A question regarding (22) is why the presence of LOG does not block wh-movement in (i):

- (i) [_{CP} Maam $Piere_i$ jeehti [_{CP} t_{maam} LOG_i satne_i edtja t_{maam} bíssedh]]?
 what.ACC P.NOM say.PST.3S S.NOM will.PRS.3S wash.INF
 'What did Piere say that he will wash?'

Although LOG and t_{maam} in (i) occur in A'-positions, they are featurally distinct. It is thus conceivable that once the wh-phrase has reached the intermediate position in the embedded CP, it is visible to a higher head that probes for [wh]. Since LOG is not equipped with a [wh]-feature, it does not intervene. Similar considerations apply to Frascarelli's (2007) analysis of topics, whose account is couched in a cartographic Rizziian view of the C-domain (Rizzi 1997).

- b Ama_i gblo be yè_i-do nku nyonuvi hi dze yè_i gbo dyi.
 Ama say that yè set eye girl wh stay yè side on
 'Ama said that she remembered the girl that stayed with her.'

Similar facts hold in South Saami, as shown by the contrast between (25) and (26). The pronoun *satne* is illicit in (25), where it occurs in a relative clause. If the subject of the relative clause is *pro*, (25) is perfectly grammatical, as expected. The effect that the choice of pronoun exercises on the grammaticality in this example, is comparable to what Clements (1975) reports for Ewe, (24a).

- (25) Piere_i dam gærjam lohke_inie,
 P.NOM D.ACC book.ACC read.PROG
 mij *satne_i/pro_i öösti Oslosne.
 REL S.NOM/pro buy.PST.3S Oslo.INESS
 'Piere is reading the book that he bought in Oslo.'

If (25) is embedded under a logophoric verb, as in (26), the third person pronoun *satne* is successfully licensed in the relative clause, and it refers to the subject of the logophoric verb, *Laara*. The logophoric pronoun is thus bound by the operator LOG, which in turn is controlled by highest subject. Thus, the relation between LOG and the S-pronoun is insensitive to the presence of the relative clause island.

- (26) Laara_i jeehti LOG_i Piere_j dam gærjam lohke_inie,
 L.NOM say.PST.3S P.NOM the.ACC book.ACC read.PROG
 mij satne_i/*_j öösti Oslosne.
 REL S.NOM buy.PST.3S Oslo.INESS
 'Laara said that Piere is reading the book that he (=Laara) bought in Oslo.'

A further example is given in (27), that shows that the relation between LOG and the S-pronoun is insensitive to an intervening island. (27a) is bad, because *satne* in the adjunct clause fails to be bound by a logophoric operator. In contrast, *satne* is properly licensed in (27b), in which (27a) has been embedded under a logophoric verb. Again, the pronoun must refer back to the subject of the logophoric verb; reference to the intermediate subject in (27b) is impossible.

- (27) a *Læjsa_i Maarjam_j diervesji, gosse satne_{i/j} gaatan rastah veedtsi
 L.NOM M.ACC greet.PST.3S when S.NOM street.GEN across walk.PST.3S
 'Læjsa_i greeted Maarja_j, when she_{i/j} crossed the street.'
 b Bræjh_{tak} LOG_k jeehti Læjsa_i Maarjam_j diervesji,
 B.NOM say.PST.3S L.NOM M.ACC greet.PST.3S
 gosse satne_k/*_i/*_j gaatan rastah veedtsi
 when S.NOM street.GEN across walk.PST.3S
 'Bræjh_{tak} said that Læjsa_i greeted Maarja_j, when she (=Bræjh_{tak}) crossed the street.'

In sum, the distance between LOG and the S-pronoun is unbounded and insensitive to islands.

4.2 Multiple embeddings A further diagnostic of logophoricity is found in multiple embeddings. Baker (2008:137) provides an example from Edo, that involves a doubly embedded structure, (28). The example shows that the logophoric pronoun *irèn* can either refer to the subject in the intermediate clause, *Úyi*, or the subject in the highest clause, *Ozo*. The pattern in (28) follows from the idea that a logophoric verb licenses a logophoric operator in its complement clause. Since there are two logophoric verbs in (28), and each one introduces a logophoric operator in its complement CP, there are two potential antecedents available for the logophoric pronoun.

- (28) Òzó_i ròró wèé Úy_i tá wèé Àdésúwà báá irèn_{i/j} òhó'ghé.
 Ozo think that Uyi say that Adesuwa accuse 3 of.lying
 'Ozo thinks that Uyi said that Adesuwa accused him of lying.'

Multiple embeddings in South Saami behave strikingly similar to Edo, (29). Here we find a doubly embedded structure, where the lowest clause contains an S-pronoun. On a par with (28), each logophoric verb introduces a logophoric operator in its complement CP, which gives rise to the effect that the S-pronoun can refer to either the intermediate subject *Laara*, or the highest subject, *Piere*.

- (29) *Piere*_i *veanhta* LOG_i *Laara*_j *jeehti* LOG_j *Maarja*_k *satnem*_{ij} *lyjhkoe*.
 P.NOM think.PRS.3S L.NOM say.PST.3S M.NOM S.ACC like.PRS.3S
 'Piere thinks that Laara said that Maarja likes him.'

What (28) and (29) show, is that although a logophoric pronoun must refer to the subject of a logophoric verb, a relation mediated by LOG, the pronoun need not refer to the most local antecedent. This is a trademark of logophoricity, and stands in sharp contrast to what happens in languages that allow, say, shifted first persons (Anand and Nevins 2004, Baker 2008, Deal 2018).

4.3 Interleaving effects The effect observed in (28) and (29) is further enhanced in multiply embedded structures where the lowest clause hosts two logophoric pronouns. Safir (2004:136) provides an example from Yoruba, (30a) and Baker (2008:138) gives an example from Edo, (30b). The crucial detail in these examples, is the fact that each logophoric pronoun may be anteceded by a different logophoric operator. Thus, comparably to (28) and (29), the logophoric pronoun that serves as the subject in the lowest clause, may be bound by either the intermediate subject or the highest subject. The remaining logophoric pronoun in the lowest clause is bound by whichever antecedent that does not bind the subject pronoun:

- (30) a Yoruba (Safir 2004:136)¹²
Olù rò pé Ade so pé òun rí iyá òun.
 Olu think that Ade say that 3 see mother 3
 i. 'Olu thinks that Ade said that he (=Olu) saw his (Ade's) mother.'
 ii. 'Olu thinks that Ade said that he (=Ade) saw his (Olu's) mother.'
- b Edo (Baker 2008:138)
Òzó tá wèé Àdésúwà ròró wèé ìrèn hoèmwén ìrèn.
 Ozo say that Adesuwa think that 3 like 3
 i. 'Ozo said that Adesuwa thinks that he (=Ozo) likes her (=Adesuwa)'
 ii. 'Ozo said that Adesuwa thinks that she (=Adesuwa) likes him (=Ozo)'

Interleaving effects of the kind illustrated in (30), are also observable in South Saami, which thus strengthens the claim that the language is logophoric in the same sense as Yoruba and Edo. (31) below is in all essentials parallel to the examples in (30). What we find here is a doubly embedded structure, where the lowest clause hosts two S-pronouns. Indeed, the subject S-pronoun may refer to either the intermediate or the highest antecedent, and the object S-pronoun is bound by whichever antecedent that does not bind the subject pronoun. Thus, (31) is two-way ambiguous:¹³

- (31) *Piere* *veanhta* LOG *Læjsa* *jeehti* LOG *satne* *satnem* *lyjhkoe*.
 P.NOM think.PRS.3S L.NOM say.PST.3S S.NOM S.ACC like.PRS.3S
 i. 'Piere thinks that Læjsa said that he likes her.'
 ii. 'Piere thinks that Læjsa said that she likes him.'

In sum, in this section we have argued that the South Saami S-pronoun is subject to the same licensing conditions as logophoric pronouns in more well-studied languages, such as Yoruba and Edo. The point is that a logophoric pronoun is licensed by a logophoric operator. Moreover, the distance between the operator and the pronoun is unbounded and insensitive to islands. We have also seen that in multiply embedded structures, an S-pronoun need not be bound by the closest operator, which furthermore gives rise to interleaving effects

¹² Two more readings of (30) are available, than are given in the translation:

- (i) a 'Olu thinks that Ade said that he (=Olu) saw his (Olu's) mother.'
 b 'Olu thinks that Ade said that he (=Ade) saw his (Ade's) mother.'

¹³ Recall from section 3, that the South Saami S-pronoun must be free in its local clause

of the same kind as those found in West African logophoric languages.

5 The interaction of S- and null pronouns

This section will briefly touch upon the interaction between null subjects and S-pronouns in logophoric contexts, an issue that so far has been set aside. (32) provides an illustration. What is significant about the occurrence of *pro*, is the fact that it may either refer to *Jávva* or *Pöövle*, which, as Holmberg (2010) points out, is characteristic of consistent null subject languages. A logophoric pronoun is also licit, but notice that it may only refer to *Pöövle*, which is also as expected.

- (32) I_j Jávva_i maam-akt jeahteme,
 NEG.PRS.3S J.NOM what.ACC-one say.PTC
 bene Pöövle_j jeehti pro_{i/j}/satne_{*i/j} sæjhta orre bijlem ástedh.
 but P.NOM say.PST.3S pro/S.NOM want.PRS.3S new car.ACC buy.INF
 'Jávva_i hasn't said anything, but Pöövle_j says that he_{i/j} wants to buy a new car.'

Both *pro* and *satne* are coindexed with an operator in the C-domain of the embedded CP in (32). However, the underlying motivations are different. Beginning with the null subject, T values its ϕ -features via Agree with the null *pro* ϕ P, which remains in Spec,vP. In section 2, it was claimed that one of the roles played by null topic operator in CP, is that it values T's referential feature. Recall that the operator itself is coindexed with an accessible topic. In (32) there are two candidates, namely *Jávva* and *Piere*. Compare this to the licensing of *satne* in (32). The logophoric pronoun *satne* is bound by the operator LOG, which resides in the C-domain. Following Adesola (2005) that logophoric pronouns are strong, it is reasonable to assume that *satne*, like D-pronouns, is a strong pronoun and thus a DP. Therefore, it raises to Spec,TP, where it Agrees with T for ϕ -features, and it values T's referential feature. Consequently, the operator LOG does not satisfy any formal properties of T. Another important difference between LOG and TOP lies in how they relate to their antecedents. LOG is controlled by an argument DP in a fashion that resembles obligatory control, with the result that only *Pöövle* is a legitimate antecedent to the S-pronoun in (32). TOP, however, is discourse grammatically coindexed with a topic, and therefore it may be construed with either *Jávva* or *Piere*. We also notice that *pro* can refer to either of the higher subjects in multiply embedded structures, such as (33). As in (32), I assume that *pro* is coindexed with an operator in the lowest CP, which in turn is coindexed with either *Jávva* or *Piere*.

- (33) Jávva_i veanhta Piere_j jeehti pro_{i/j} sæjhta orre bijlem ástedh
 J.NOM think.PRS.3S P.NOM say.PST.3S pro want.PRS.3S new car.ACC buy.INF
 'Jávva thinks that Piere said that he_{i/j} wants to buy a new car.'

In the previous section it was shown that multiple occurrences of S-pronouns in multiple embeddings give rise to interleaving effects, (31). However, if the most deeply embedded clause has a null subject and an S-object, as in (34), the interleaving possibility is suspended, with the result that the sentence is unambiguous. The only reading available, is the one where the null subject refers to the intermediate subject, *Piere*:

- (34) Læjsa_i veanhta Piere_j jeehti pro_{*i/j} satnem_{i/*j} lyjhkoe.
 L.NOM think.PRS.3S P.NOM say.PST.3S pro S.ACC like.PRS.3S
 a \checkmark 'Læjsa_i thinks that Piere_k said that he_k likes her_i.'
 b *'Lisa_i thinks that Piere_j said that she_i likes him_j.'

The licit reading (34a) arises when the accusative S-pronoun is bound by the highest operator, as shown in (35). The most deeply embedded operator is coindexed with T and *pro*, which is in-situ in Spec,vP. Since this operator and *pro* carry the same index, which is shared with T, the operator can successfully satisfy T's referential feature, along the lines in section 2.

- (35) Læjsa_i thinks [_{CP} OP_i Piere_j said [_{CP} OP_j [_{TP} T_j [_{VP} pro_j likes S.acc_i]]]]

The impossible reading (34b), on the other hand, would require that the accusative S-pronoun is bound by the lowest operator, whereas T and pro are coindexed with the highest operator, as shown in (36). The problem that arises in this scenario, is that the indexing of T and pro does not match the index of the closest operator, OP_j.

(36) Læjsa_i thinks [_{CP} OP_i Piere_j said [_{CP} OP_j [_{TP} T_i [_{VP} pro_i likes S.acc_j]]]]

As a result of the feature mismatch, the operator fails to satisfy the feature on T, and consequently, the intended interpretation is ruled out. Therefore, the occurrence of a null subject in the lowest clause leaves the logophoric pronoun no other choice than being construed with the highest operator.

6 Concluding remarks

This paper has presented an essentially descriptive overview of South Saami third person pronouns. It has been shown that the interaction between null subject pronouns and overt subject D-pronouns in the language matches the pattern found in consistent null subject languages, like Italian. South Saami also has a third series of third person pronouns, which I have called S-pronouns. The S-series is restricted to complement CPs of attitude predicates, and they obligatorily refer to the agent of the attitude predicate. This is a characteristic of logophoric pronouns in for instance West African languages like Edo and Yoruba. On these grounds I have argued for a logophoric analysis of the S-series. The logophoric analysis is supported by the fact that the distance between an S-pronoun and its antecedent is insensitive to islands, and that under the right conditions interleaving effects occur. I ended the paper by bringing up an observation that interleaving effects are suspended in sufficiently complex embeddings, where both a null subject and an S-pronoun are present.

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Domain of Suppletion: From Japanese Numeral

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1 Introduction

Suppletion is a phenomenon where two phonologically unrelated shapes are inserted to a single lexical item. The alternation of the shape of an item X is said to be triggered by another item Y , which is in the same domain. The determination of the domain draws much attention within the tenet of Distributed Morphology (Halle and Marantz (1993), Embick and Noyer (2007), Embick (2010), Bobaljik (2012), Bobaljik and Harley (2013) among others.) Regarding this issue, literature like Bobaljik and Harley (2013) proposes that the domain is sister relation and others like Moskal (2015) or Oseki (2016) proposes that the locality is something larger than the sister relation.

This paper discusses the domain of suppletion with Japanese numeral quantifiers, which consists of a numeral and a classifier. In the numeral quantifier construction, classifier shows suppletion depending on the lexical stratum of the number it appears with. In that construction, according to Watanabe's seminal work, this paper assumes that the numeral is generated in the different XP domain from the classifiers. This means that the suppletion observed in the classifier is triggered by an item outside its maximal projection, and the domain of suppletion is not what Bobaljik and Harley propose.

The organization of this paper is as follows. Section 2 provides the background of domain of suppletion. Section 3 observes the numeral system in Japanese and its theoretical contribution to the domain of suppletion. Section 4 supports the claim proposed in section 3 with Japanese polite expression called beatification. Section 5 concludes this paper.

2 Domain of suppletion

2.1 Background Suppletion is a phenomenon where single lexical item is realized as phonetically unrelated exponents. For instance, in English, \sqrt{go} has two independent phonological realization, *go* and *wen*, followed by the present tense morpheme $-(e)s$ or the past tense morpheme $-t$ as in (1).

- (1) a. Sam go-es swimming on Sundays.
b. Sam wen-t swimming on Sunday.

The phonological realization of \sqrt{go} is said to be conditioned by another lexical item within the same domain, namely $T_{[+past]}$, and moreover, the suppletive form shows up only if the $T_{[+past]}$ is affixed with the verb as in (2).

- (2) a. Did Sam go swimming on Sundays?
b. *Did Sam wen swimming on Sunday?

As the realization of the suppletive forms, Bobaljik (2012) proposes a stringent locality constraint. In

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Bobaljik (2012), a suppletive vocabulary item can be conditioned by features within the same maximal domain, but not across a maximal projection boundary as illustrated in (3).

- (3) Locality: β may condition α in (a), not (b):
 a. $\alpha \dots]_{X^0} \dots \beta$
 b. $\alpha \dots]_{XP} \dots \beta$

(Bobaljik 2012)

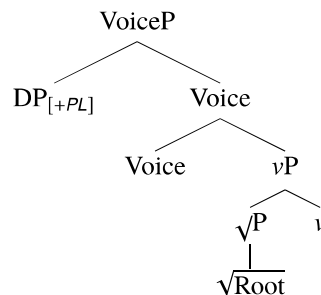
2.2 Hiaki Hiaki (Uto-Aztecan language) is an apparent counter example of the condition of suppletion as illustrated in (3). In this language the number feature, $[\pm PL]$, of subject DP triggers suppletion in a certain class of intransitive verbs (Bobaljik and Harley 2013). The following examples display the cases of Hiaki suppletive intransitive verbs. The examples in (4) exhibit the cases where a verb alters between *vuite-tenne* “run” and examples in (5) show the cases where a verb alters between *weye-kate* “walk” depending on its subject’s number feature $[+PL]$ ¹.

- (4) a. Aapo vuite.
 3SG run.SG
 ‘S/he is running’
 b. Vempo tenne.
 3PL run.PL
 ‘They are running.’
- (5) a. Aapo weye
 3SG walk.SG
 ‘S/he is walking’
 b. Vempo kate.
 3PL walk.PL
 ‘They are walking.’

(Bobaljik and Harley 2013)

Under the assumption that the external argument is realized in the specifier of functional projection such as TP, AgrP, VoiceP as in (6) then Hiaki data would be a potential counter example to Bobaljik’s generalization stated in (3).

- (6) Structure of a regular intransitive verbs



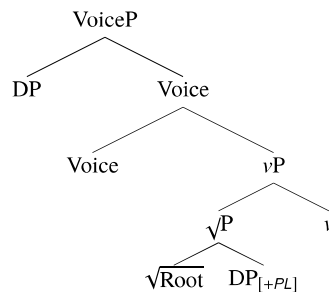
Contrary to the cases above, transitive suppletive verbs like *me’a-sua* ‘kill’ in Hiaki illustrates the pattern expected by Bobaljik’s generalization as shown in (7). Here the suppletion triggering item is not the number of the subject but the number of the object.

¹ Note that Bobaljik and Harley (2013) claim that in Hiaki, there is no independent motivation or support for subject-verb agreement.

- (7) a. Aapo/Vempo uka koowi-ta me'ak
 3SG / 3PL the.SG pig-ACC.SG kill.SG-PRF
 'He/They killed the pig.'
 b. Aapo/Vempo ume kowi-m sua-k
 3SG / 3PL the.PL pig.PL kill.PL-PRF
 'He/They killed the pigs.'

This clearly follows the Bobaljik's stringent locality, since the suppletion conditioning subject DP is in Spec. $\sqrt{Root}P$ as shown in the structure in (8).²

(8) Suppletive transitive verbs



Bobaljik and Harley (2013) argues that the inconsistency between subject-triggering suppletive form in (4) and (5) and object-triggering suppletive form (7) are only apparent by showing that 'run' and 'walk' in Hiaki are unaccusative verbs and the apparent suppletive-triggering subjects are base-generated as a sister of the \sqrt{Root} . They come to this logic in the following manner.

First, in Hiaki, unaccusative verbs cannot combine with APPL(ICATIVE) suffix as in (9).

- (9) a. U'n masso uusi-m yi'i-ria-k
 the deer,dancer children-PL dance-APPL-REF
 'The deer dancer danced for the children.'
 b. *Un tasa Maria-ta hamte-ria-k
 the cup Maria-ACC break.INTR-APPL-REF
 'The cup broke for/on Maria.'

The unavailability of the APPL suffix in (9b) is neither due to a semantic or pragmatic infelicitous nor morphological conflict as the following examples in (10) show. In (10b), the peripheral benefactive argument is introduced by the postposition *vetchi'vo*, which is equivalent to the English benefactive introducing postposition 'for', is available with an intransitive suppletive verb. This shows that the ungrammaticality of the (10a) is not caused by semantic or pragmatic infelicitous in the benefactive context.

² Note that Bobaljik and Harley (2013) follows the assumption that the selected objects are base-generated as a sister to their selecting root (Kratzer 1996, Marantz 1997, Harley 2011). In the cases of transitive verbs, a plural object DP is base-generated as a sister to the verb root.

- (10) a. *Santos Maria-ta San Xavierle-u weye-ria
 Santos Maria-ACC San Xavierle-to go.SG.APPL
 ‘Santos is going/walking to San Xavier for Maria’
 b. Santos Maria-ta vetchi’vo San Xavierle-u weye.
 Santos Maria-ACC for San Xavierle-to go
 ‘Santos is going/walking to San Xavier for Maria.’
 (e.g. carrying out a vow she had made for a pilgrimage)

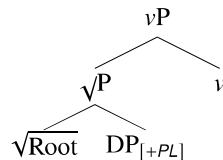
(Bobaljik and Harley 2013)

Secondly, the APPL suffix can co-occur with suppletive verbs as the transitive suppletive verb triggered by object DP_[+PL] as shown in the example in (11).

- (11) Santos Jose-ta koowi-ta /koowi-m mea/sua-ria-k
 Santos Jose-ACC pig-SG.ACC /pig-PL.ACC kill.SG/kill.PL-APPL-REF
 ‘Santos killed a pig/pigs for Jose’

These data above indicate that the subject conditioned suppletive verbs in (4) and (5) are unaccusative verb. Unaccusative nature of the subject conditioned suppletive verbs indicates that the suppletive triggering DP_[+PL] is base-generated as a sister of root as in (12).

- (12) Suppletive intransitive verb



Hence, Bobaljik’s (2012) claim in (3) can be retained and, furthermore, it is further refined as in (13).

- (13) Locality: β may condition α in (a), not (b):
 a. $\alpha \dots]x^0 \dots \beta$
 b. $\alpha \dots]x^n \dots \beta$, where $n > 0$.

(Bobaljik and Harley 2013)

2.3 Ainu: Against Bobaljik and Harley’s stringent locality This section reviews Oseki’s (2016) argument which argues against stringent locality in (13) with Ainu language (Shibatani 1990) by showing (i) existence of subject-conditioned suppletive transitive verbs. (ii) applicative-triggered suppletive intransitive verbs and (iii) morphologically-complex suppletive transitive verbs. This section reviews the cases of (i) and (ii).

According to Oseki (2016), Ainu also has a number-conditioned verbal root suppletion and the behavior of suppletion data in this language looks parallel to the ones in Hiaki as examples in (14) and (15) show. In (14), the verb alters between *oman~paye* ‘go’ and it is conditioned by the number of the subject.

- (14) a. Nea kur oman.
 the man go.SG
 ‘The man goes.’
 b. Nea utar paye.
 the men go.PL
 ‘The men go.’

(Oseki 2016)

In (15), the verb alters between *rayke~ronmu* ‘kill’ and this alternation is conditioned by the number of the

object.

- (15) a. Nea kur kamiyasi rayke.
 the man monster kill.SG
 ‘The man killed the monster.’
 b. Nea kur kamiyasi ronmu.
 the man monster kill.PL
 ‘The man killed the monsters.’

(Oseki 2016)

The data in Ainu presented in (14) and (15) are similar to Hiaki data and apparently follow the Bobaljik and Harley’s generalization in the previous subsection.

However, Ainu has cases where the Bobaljik and Harley’s prediction cannot be born out. Those are the examples shown in (16), where the number of a subject of transitive verbs can trigger verbal root suppletion. In the example (16a), the subject is 2nd person plural as marked by the affix *eci=* and the object is overtly realized as 3rd person singular DP *okkaypo nispa* ‘the young headman.’ In (16b), the subject is 3rd person plural *sisak rometok utaroke* ‘unusually brave people’, where the object is realized as a verbal prefix and marked as *e=* 2nd person singular.

- (16) a. Okkaypo nisa eci=rommu
 boy headman 2.PL.SU=kill.PL
 ‘You killed the young headman (of village).’
 b. Sisak rometok utaroke e=ronmu.
 unusual brave people 2.SG.OB=kill.PL
 ‘Unusually brave people killed you.’

(Oseki 2016)

More importantly, Oseki provides data which show the cases that even an applied argument, which presumably occurs the higher position than vP domain triggers suppletion of verbal \sqrt{Root} . In the example sentences shown in (17a) locative applicative morphology *e-* introduces ‘*Nupurasr kotan*’ and it appears to trigger verbal root suppletion. In (17b), commutative applicative morphology *ko-* introduces *usa imikinkay nuwe* ‘plenty of various clothes’, which triggers suppletive form *okay*.

- (17) a. Nupurar kotan petekok kasi e-rok kamuy.
 Nupurasr village.PL source TOP APPL-sit.PL god
 ‘God that lives in the source of Nupurasr villages.’
 b. Utar usa imikinkay nuwe ko-okay
 people various clothes.PL plenty APPL-be.PL
 ‘People are with plenty of various clothes.’

(Oseki 2016)

Utilizing the data presented above, Oseki generalize the locality of suppletion as the following manner.

- (18) The domain of verbal root suppletion must be sufficiently broad to include external argument in Spec Voice (Kratzer 1996).

3 Numeral classifier systems in Japanese

As the previous sections, we review two proposals for the number conditioned suppletive form. This section looks at the lexical-stratum-conditioned suppletive forms observed within DP and claims that Bobaljik and Harley’s stringent locality for suppletive form does not work with this type of DPs.

3.1 Japanese numeral quantifier system This section begins with a quick review of Japanese classifier system. First, Japanese is an instance of numeral classifier language and it cannot directly count the number

of nouns (cf. Matsumoto 1991, Downing 1996, Aikenvald 2000, Mizuguchi 2004, Yoda (to appear) *among others*) unlike English. Also this language has numerous types of classifiers and the classifier varies depending on the characteristics of host nominal. For instance, as in (19), classifier used to count human has to be *nin*, classifier used to non-human animate *biki*, and things *tsu*.

- (19) a. Gakusei san- $\{nin/*biki/tsu\}$
 student three-CL
 ‘three students’
 b. inu san- $\{*nin/biki/*tsu\}$
 dog three-CL
 ‘three dogs’
 c. hako mi- $\{*nin/*biki/tsu\}$
 box three-CL
 ‘three box’

Second, Japanese has several lexical stratum, such as Native Japanese vocabularies, which is originally exists in Japanese, Sino-Japanese vocabularies, which is originated to Chinese, and so on (cf Tsujimura 1994)³. Furthermore, each number in Japanese has two types of vocabularies. One is Native Japanese number like *hito, futa, mi, yo..* ‘1,2,3,4...’ and Sino Japanese numbers *ichi, ni, san, si...* ‘1,2,3,4...’ (cf. Kubozono 2011). This paper uses subscripts to distinguish two as in (20).

- (20) a. $1 = \{hito_{NJ}/ichi_{SJ}\}$ b. $2 = \{futa_{NJ}/ni_{SJ}\}$ c. $3 = \{mi_{NJ}/san_{SJ}\}$

Third, some classifiers have suppletive forms as shown in (21), which is conditioned by lexical stratum of the numeral.

- (21) a. Classifier to count people: 人 = $\{ri / nin_{SJ}\}$
 b. Classifier to count days: 日 = $\{ka_{NJ} / nichis_{SJ}\}$
 c. Classifier to count lines: 行 = gyo_{SJ}
 d. Classifier to count chests: 笥 = sao_{NJ}

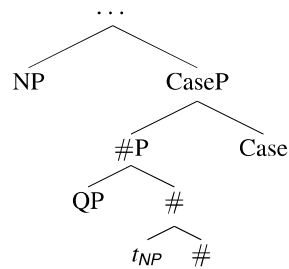
3.2 Structure of Japanese nominal In this paper, I assume [_{CaseP} [_{#P} QP [_# NP #]]] for the structure of DP and the surface form of Japanese nominal is yielded by massive remnant movements following Wantanabe (2006)⁵. Furthermore, Watanabe claims that the surface word order #-CL in *Gakusei-san- nin* ‘students-3-CL’ is derived by NP movement to Spec.CaseP. Following Watanabe, CL is located on #⁰ as shown in (22).

³ Armin Mester (p.c.) comments that cross-linguistically suppletion is generated language contacts. Japanese is also the case.

⁴ Note that, pronunciation of 4 in Sino vocabulary is accidental homophone with *shi* ‘dead’. This pronunciation is thought to be taboo, and hence avoided in many cases (cf. Kubozono 2011).

⁵ Masao Ochi (p.c.) pointed another possibility of position/structure of nominal and classifier, yet this paper assumes the structure proposed by Watanabe’s seminal work.

(22) The structure of Japanese Nominal (cf. Watanabe 2006)



3.3 Suppletion in classifiers in Japanese For instance, Japanese classifier to count people has suppletive form and it alters between “*ri~nin*” as in (21a). Here, *nin* is a suppletive form conditioned by Sino numbers, and *ri* is otherwise as in (23). The classifier for days also has suppletive form and it alters between *ka~nichi*. Among these, *ka* is conditioned by Native numbers and *nichi* is by Sino numbers as in (24). The reason this paper claims that the examples in (23) and (24) are instances of suppletive form is that some classifiers have only one form. Those are illustrated in (25) and (26). *Gyo*, the classifier for “line” is realized as only Sino vocabulary and *sao*, the classifier for “chests” is realized as Native as (25) and (26), respectively. Note that, these classifiers still require stratum matching with its host numerals.

- (23) a. {hito / *ichi} -ri
 one.NJ / one.SJ -CL.human
 ‘one person’
 b. {futa / *ni} -ri
 two.NJ / two.SJ -CL.human
 ‘two people’
 c. {*mi / san} -nin
 three.NJ / three.SJ -CL.human.SJ
 ‘three people’

- (24) a. {*hito / ichi} -niti
 one.NJ / one.SJ -CL.day.SJ
 ‘one day’
 b. {*futa / futu} -ka
 two.NJ two.SJ -CL.day.NJ
 ‘two days’
 c. {mi(k) / *san} -ka
 three.NJ / three.SJ -CL.day.NJ
 ‘three days’

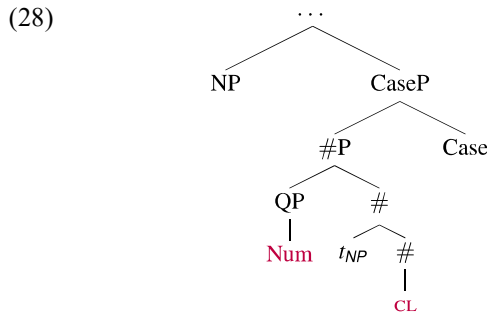
- (25) a. {*hito / ichi} -gyo
 one.NJ / one.SJ -CL.line.SJ
 ‘one line’
 b. {*fut / ni} -gyo
 two.NJ /two.SJ -CL.line.SJ
 ‘two lines’
 c. {*mi / san} -gyo
 three.NJ / three.SJ -CL.line.SJ
 ‘three lines’

- (26) a. {hito / *ichi} -sao
 one.NJ / one.SJ -CL.chest.NJ
 ‘one chest’
 b. {futa / *ni} -sao
 one.NJ / two.SJ -CL.chest.NJ
 ‘two chests’

Note that, “three + *sao*” combination is unattested as a literal meaning “three chests”. However, combination of “three chests” still remains as a name. In this case, “three chests” is pronounced as *mi-sao* as in (27a). Furthermore, *kan* can be used to count bamboo stick. In this case, if the number is Sino Japanese, then the classifier must be Sino as well.

- (27) a. {mi / *san} -sao
 three.NJ / three.SJ -CL.chest.NJ
 ‘three chests’
 b. {*mi / san} -kan
 three.NJ / three.SJ -CL.bamboo.stick.SJ
 ‘three bamboo sticks’

The examples illustrated from (23) to (27) show that the suppletion of classifiers is conditioned by the lexical stratum of numerals. In my current analysis, both numeral and classifier are in the same #P domain but not in a sister relation. This suppletion mechanism does not support Bobaljik and Harley’s (2013) stringent locality, but supports Oseki’s version of locality as in (28).



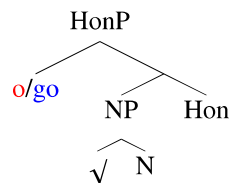
4 Suppletion in Japanese polite expressions

There is another case where suppletive form is triggered by lexical stratum of host. That is polite prefix used in honorification and beautification. The honorific prefix alters between *go*-*o* and they are conditioned by the lexical stratum of its host nominal as in (29).

- (29) a. *o*-prefixes before the Native Japanese NP
 b. *go*-prefixes before the Sino Japanese NP.

The structure of Honorification is independently proposed by Volpe (2009) and this paper follows his structure as in (30).

- (30) Structure of Honorification (cf. Volpe 2009)



I assume the same structure for beautification like (31) and (32). In (31), the host nominal *kaban* ‘bag’ that is Native vocabulary conditions suppletion of prefix. As a result, the honorific prefix is realized as *o*, which is Native vocabulary version of the prefix. In (32), the host nominal is *tyosho* ‘book’ and the prefix is conditioned as *go*, contrary to the case of example in (31).

- (31) a. Taro-no kaban
Taro-GEN bag
‘Taro’s bag’
b. Sensei-no {_{ONJ}/_{*go_{SJ}}}-kaban
Prof-GEN HON-bag
‘Prof’s bag’
- (32) a. Taro-no tyosho
Taro-GEN book
‘Book written by Taro’
b. Sensei-no {_{*ONJ}/_{go_{SJ}}}-tyosho
Prof-GEN HON-book

This is also the case that, the suppletion in the specifier of HonP is conditioned by host nominal in the complement. In other words, the suppletion of *o~go* in this case is triggered by Spec-head relation and this also shows the counter example of Bobaljik and Harley’s generalization.

5 Conclusion

This paper examined the locality of suppletion from the relation between Japanese numerals and classifiers and claims that the suppletion-conditioning item may not be in the stringent locality as proposed by Bobaljik and Harley (2013). The current data supports Oseki’s (2016) account for the locality.

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