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Pedagogy to Overcome Interlanguage Fossilization: Rethinking and Revising Mehmet Demirezen's (2010) Audio-articulation Method

Aicha Rahal
Faculty of letters and Humanities, Sfax, Tunisia

1 Introduction

Since the phenomenon of fossilization has introduced to the field of Second Language Acquisition (SLA), researchers have inclined much attention to the process of fossilization (Selinker, 1972; Han, 2004), types of fossilization (Rahal, 2016; Wei, 2008) and solutions to overcome this linguistic obstacle (Zheng, 2010; Valette, 1991). This linguistic phenomenon is defined as "the permanent cessation of IL learning before the learner has attained target language norms at all levels of linguistic structure and in all discourse domains in spite of the learner's positive ability, opportunity or motivation to learn or acculturate into target society" (Selinker and Lamendella, 1979). Mehmet Demirezen (2010) suggested the audio-articulation method to avoid phonological fossilization which refers to the acquisition of incorrect pronunciation. This method is based on the audio-lingual principles, including drills, repetition, etc. and it leans on the Presentation, Practice, Production (PPP) approach.

This paper is an attempt to rethink and revise the audio-articulation method and include new activities to this method from the principles of the communicative language teaching approach. Theoretically, it starts by presenting the concept of 'interlanguage (IL) fossilization', phonetic fossilization and previous studies on phonetic fossilization and the suggested methods to remedy this linguistic phenomenon. Then, it introduces the audio-articulation method and the new version of this method by including new activities based on the communicative approach. Pedagogically, the insights derived from this study can contribute to the development of the theory of applied linguistics, namely the IL theory and fossilization. It can also give insights into the different pedagogical ways that should be used to avoid stabilized errors in learners' IL.

2 Interlanguage theory

Before discussing the phenomenon of fossilization, it is important to introduce the IL theory. This theory was coined by Larry Selinker (1972), who defines it as "a separate linguistic system based on the observable output which results from a learner's attempted production of a target language (TL) norm". Tarone (1994) provides a similar definition stating that "interlanguage is viewed as a separate linguistic system, clearly different from both the learner's native language (NL) and the TL being learned, but linked to both NL and TL by interlingual identifications in the perception of the learner". IL is, therefore, a linguistics system different from both the first language (L1) and the target language (TL).

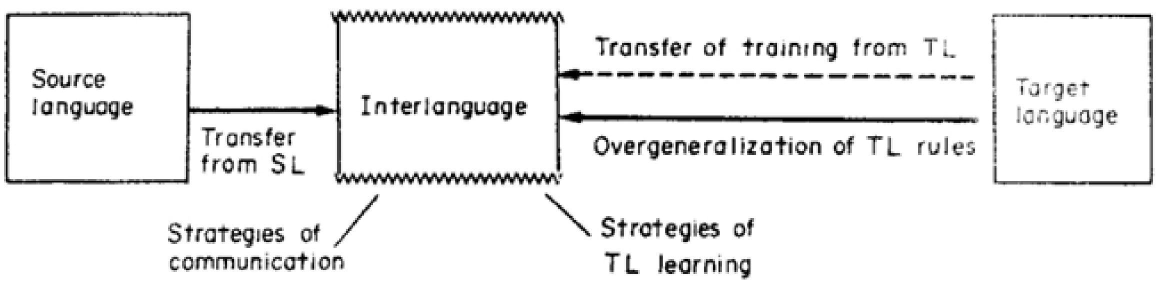

Figure 1. Interlanguage Diagram.

As illustrated in Figure 1, IL is a continuum towards the Target Language (TL). According to Selinker (1972), IL has five processes, including language transfer, the transfer of training, strategies of second language learning,

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strategies of second language communication and overgeneralization of target language linguistic material. Selinker (1972) argues that these processes can hinder the acquisition of the TL.

3 Fossilization

Han (2009) defines fossilization as "an interlanguage-unique phenomenon in which a semi-developed linguistic form or construction shows permanent resistance to environmental influence and thus fails to progress towards the target" (p.133). This indicates that fossilization refers to the cessation and the stagnation of learners' linguistic system at a certain stage. In other words, it refers to the stop of the development of learners' IL overtime. Phonetic fossilization, which is the focus of this study, is one of the types of fossilization referring to the repetition of phonetic errors which result from the incorrect acquisition of L2 pronunciation.

4 The Audio-articulation method

The audio-articulation method was developed by Mehmet Demirezen (2010). It is considered a "fossilized mistake breaker" (Kahraman, 2013, p. 269). It was suggested as a method or a model to overcome phonological fossilization and teach correct pronunciation. According to Demirezen (2010), "in the pronunciation literature, there is no method or model to rehabilitate the fossilized problem-causing segmental phonemes of the target language within a class hour…The audio-articulation model is designed to fill this gap" (p.128).

It is based on the PPP (Presentation, Practice, Production) model, where the teacher presents the target sounds and the corpus, then he/she gives the learners some drills to practice the target sounds. After that, the learners produce the sounds through repetition and imitation. It is also regarded as an analytic linguistic approach using tools such as a phonetic alphabet, articulatory descriptions, carts of the vocal apparatus, contrastive information, and other aids to supplement listening, imitation, and production. This theory is rooted in the behaviorist approach (Brown, 2001). The following are a number of activities used in the audio-articulation method:

- Preparing a corpus: the fossilized problem- causing phoneme
- Singling out minimal pairs from the corpus for practice
- Developing proper tongue twisters, proverbs, idioms, mottoes, or cliché expressions in chunks for classroom practice
- Doing further awareness raising and experiential practices

5 Previous studies on the application of the audio-articulation method

A considerable amount of studies suggested the use of the audio-articulation method to overcome phonological fossilization. Hişmanoğlu (2007), for example, conducted a study on the pronunciation of the/ɔ: / and /ɔ/ sounds in the speech of Turkish learners of English. The results of the research show that the informants tend to pronounce /oʊ/ in place of /ɔ: / and /ɔ/ sounds and this pronunciation becomes in their speech. Hişmanoğlu (2007) proposed the use of the audio-articulation method to remedy fossilization.

Smaoui and Rahal (2015) also investigated the fossilized pronunciation of the /3:/ sound in the speech of 10 intermediate Tunisian English students from the department of English of Kairouan, Tunisia. The result indicates that most of the participants fossilized the /ɔ: / sound in place of the /3:/ sound. The results also show that fossilization is the outcome of the effect of French sounds, limited exposure to the L2 environment and lack of practice. The researcher suggested the audio-articulation method as a way to overcome this linguistic obstacle.

Another study carried out by Kahraman (2012), observed the fossilized pronunciation of the vowel phoneme /æ/ and the ways to overcome fossilization. On the basis of the results, most Turkish learners of English articulated /æ/ sound as /e/. To improve the pronunciation of the learners the audio-articulation method was again proposed. Similarly, Demirezen (2005) studied the fossilized pronunciation of /v/ and /w/ sounds. It was found that Turkish teachers and trainees use the /w/ sound as /v/ sound due to the transfer of their native language.

It seems that there is a common agreement among the cited researchers on the effective role of the audio-articulation method to reduce and overcome phonological fossilization. In the present study, the researcher highlights the importance of this method and she suggested a revised version to include a number of communicative activities.

6 Communicative approach

Communicative language teaching (CLT) is seen as an approach to language teaching and learning (Richards and Rodgers, 2001). It is based on the theory that the core function of language use is communication. Its primary goal is for learners to develop communicative competence. (Hymes, 1972). In other words, its goal is to make use of real-life situations that necessitate communication. On the basis of this approach, the classroom is an opportunity for rehearsal of real-life situations and real communication. Learning language successfully comes through having to communicate real meaning. Wesche and Skehan (2002) describe the principles of the communicative approach, as follows:

• Activities that require frequent interaction among learners or with other interlocutors to exchange information and solve problems.

• Use of authentic (non-pedagogic) texts and communication activities linked to "real-world" contexts, often emphasizing links across written and spoken modes and channels.

• Approaches that are learner centered in that they take into account learners' backgrounds, language needs, and goals and generally allow learners some creativity and role in instructional decisions (p. 208).

It is obvious that this approach emphasizes communication and practice to improve learners' fluency and develop their communicative competence.

The following table presents the different activities used in the audio-articulation method and the suggested activities to revise this method:

Audio-articulation Method	Revised Version
Teacher: prepares the corpus Teacher: prepares the minimal pairs Teacher: prepares the tongue twisters and other drills	-Teacher: introduces the target sounds and asks the students to prepare the corpus in pairs. -Classroom discussion: to prepare the final corpus -Teacher: asks learners to single out the minimal pairs from the corpus -Teacher: asks learner to prepare tongue twisters and other drills
Teacher: asks learners to repeat the target sounds, imitate the recorded pronunciation, practice the minimal pairs, etc.	-Teacher: asks learners to practice the target sounds in communicative situations: dialogues, role plays, etc. -Quiz: Say a word that includes one of the target sounds and see if your partner can identify the minimal pair.

It appears that the audio-articulation method relies on the teacher as a central figure; it is a teacher-centered classroom in which he/she prepares the corpus and the different drills, including the minimal pairs, tongue twisters, etc. However, the suggested model relies more on the role of the learners. The learners are the center of the classroom. They are required to prepare the corpus and the drills in a communicative way, including group work, pair work, classroom discussions, etc. In addition to that, the teacher should motivate the learners to practice the target sounds in a highly interactive way through the use of role plays, dialogues, etc. It is noteworthy that imitation and repetition are important in learning pronunciation but they should be applied in a communicative way.

The researcher adds more communicative activities, such as betting activity and the wrong one out activity which are presented below. These activities are used in group work:

The betting activity

The teacher:

- Divides the students into two groups and gives them cards of money designed for activities.
- Writes words that include one of the target sounds and provides the students with three options to find the pair.
- The students in each group discuss the activity. Each group has to bet a certain amount of money. The teacher gives the correct answer and the group that wins, gets the money.

Wrong one out activity

The teacher:

- writes on the board a number of words that includes the target sounds
- includes some examples that do not include any of the target sounds
- Each student reads an example and tries to find the wrong one. This goes on until all students participate.

7 Conclusion

In this paper, the researcher presents the phenomenon of fossilization which becomes common among learners and teachers. The researcher attempts to rethink and revise the audio-articulation method which was suggested as a model to overcome phonological fossilization. It is important to state that this method has its advantages but it lacks the integration of interactive tasks that can help learners acquire correct pronunciation. It was proposed that the use of communicative activities, such as role plays, discussions, dialogues, etc. are crucial in teaching pronunciation.

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Problematic Areas of Grammar in English-Arabic-English Translation: A Selective Contrastive Study

Millia Solaiman
Jawaharlal Nehru University

1 Introduction

English and Arabic are categorized within two different language families; English belongs to the Indo-European West Germanic family of languages, and Arabic belongs to the Semitic family of languages. This means that the morphology, syntax and style of writing of the two languages vary greatly (Akan et al. 2019: 58). As a result, translating from English into Arabic and vice versa has always been a challenging task for novice translation students, even if they are native speakers of one of these two languages. This task is even more confusing to the students who translate between English and Arabic and they are non-native speakers of neither of them. An example of this unique group of translators is the students who learn Arabic in India. As part of the curriculum, the B.A and M.A students have to study some translation courses in which they translate between English and Arabic. However, English is a second language in India; the second official language, and Arabic is a foreign language. Thus this group of students translates from one non-native language into another non-native language.

The researcher was a teaching assistant, teaching English-Arabic-English translation to the B.A. students of the English Department at Al-Baath University, Syria, from 2011 to 2014. She also attended several translation classes with the B.A. and M.A. students in the Center for Arabic and African Studies at Jawaharlal Nehru University and the Departments of Arabic at the University of Delhi and Jamia Millia Islamia in India in the years 2015, 2016 and 2018. This has given her a clear idea of the most recurrent problematic areas that confront Arab and non-native students while translating between English and Arabic. This has intrigued the motivation for writing this paper. Thus this study is directed generally to the novice Arab translation students and particularly to the students who translate between English and Arabic, and they are non-native speakers of neither of them.

2 Methodological procedures:

The researcher followed two major steps to complete this paper:

1) The researcher provided a general definition of each grammatical component under study, followed by an analysis of its types and rules in English and Arabic to reveal the similarities and differences, along with illustrative examples whenever required.

2) The researcher discussed the areas of each grammatical component that can be the source of problems and errors for the English-Arabic-English translation students, along with illustrative examples whenever required.

3 English and Arabic grammars: A contrastive analysis

The aim of contrastive grammar is to present the grammars of two or more languages in order to reveal their similarities and differences. Aziz (1989: 7) emphasized that ‘‘(F)or practical reasons, only certain areas of two grammars are usually compared and contrasted since dealing with all the details of the languages concerned will be nearly impossible; it will involve tremendous work and require a very long time.’’ Thus in this section, we provided a contrastive analysis of the grammatical components of the two languages that can be the primary source of problems and difficulties while translating from one language into the other. These include tenses and aspects, passive voice sentences, grammatical agreements, grammatical cases, order of words and Arabic nominal sentences.

3.1 *Tense and Aspect*

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Tenses and aspects are grammatical categories found in most languages of the world. 'Tense' is used to indicate when an action happens, i.e. in the past, in the present or in the future. 'Aspect' means the 'manner' of the action, viz. whether the action is perfect or continuous.

In English, there are two types of tenses: simple tenses and complex tenses. The simple tenses are the past simple tense, the present simple tense and the future simple tense. To these three simple tenses, aspects (perfect or continuous) are added to make the complex tenses. These include the past perfect, the present perfect, the future perfect, the past continuous, the present continuous, the future continuous, the past perfect continuous, the present perfect continuous, and the future perfect continuous tenses. English's different tenses and aspects are indicated morphologically by changing the form of the verb. For example, the verb 'eat' has four different forms: 'eat/eats' (the use of one of these two alternative forms of the verb depends on the person and number of the subject), 'ate', 'eating' and 'eaten' (Aziz 1989: 39). The form 'eat/eats' express the present tense, the form 'ate' denotes the past tense, the form 'eating' expresses the continuous aspect and the form 'eaten' represents the perfect aspect.

On the contrary, Arabic has only two tenses; past and present. The past tense (الماضي) indicates a completed action; e.g. نجح الطالب في الإمتحان 'pass-PST DEF-student-NOM in DEF-exam-GEN' (the student passed the exam), and the present tense (المضارع) indicates a non-completed action; e.g. تدرس الطالبة بجد 'PRES-F-study DEF-student-F-NOM hard-GEN' (the student studies/is studying hard). Dickins (2017: 31) indicates that Arabic verbs have only two forms: the perfective form (indicating a completed action; the past tense); e.g. نجح (succeeded), درس (studied), نام (slept); etc., and the imperfective form (indicating a non-completed action; the present tense); e.g. يدرس (studies/is studying), ينجح (succeeds), ينام (sleeps/is sleeping); etc. There is no aspect as such in Arabic. Only some affixes, modal verbs, particles or adverbials are added to Arabic's two verb forms to indicate the aspectual differences (perfect or continuous events or actions). For example, the modal verb 'كان' /kan/ along with the imperfective verb form indicate a continuous or habitual past action and the particles 'قد' /qad/ or 'لقد' /laqad/ and the perfective verb form indicate the perfect aspect. Examples are provided below:

(1) كان يدرسُ عندما رنَّ الهاتف
kan ya-drus ʕndama rann-a al-hatif
AUX PRES-study when rang-PST DEF-phone
'He was studying when the phone rang.'

(2) كانت تذهب إلى النادي باستمرار
kana-t ta-thhab ?la al-nadi b?stmrar
AUX-F PRES-go to DEF-gym always
'She used to go to the gym.'

(3) لقد انتهيت للتو من قراءة هذا الكتاب
laqad intaha-etu li-altaw min qira?at ha-tha al-kitab
PAR finished-I for-now from reading DEM DEF-book
'I have just finished reading this book.'

There is no future tense as such in Arabic, even though it refers to the time of the action (Aziz 1989: 68). The Arabic future time is marked by attaching the prefix (-س) to imperfective verb form or by adding the particle 'سوف' before the imperfective verb form.

3.2 *Passive voice*

Passive voice is a type of sentence structure used when the emphasis has to be placed on the resulted action rather than on the doer of the action (Aziz 1989: 263).

In English, the passive voice sentence is formed of the active sentence by exchanging the positions of the subject and the object. Thus the passive sentence starts with the object and is referred to as 'the patient' and ends with the subject and is referred to as 'the agent'. After the 'patient', a form of 'Be' is introduced (the form of the verb-to-be is determined by the form of the active verb), and the active verb is given in its past participle form. The preposition 'by' is also introduced before the agent. For example, the active sentence 'the boy broke the window' becomes 'the window was broken by the boy', 'the cat spilled the milk' becomes 'the milk was spilled by the cat', 'medical companies are producing effective vaccines' becomes 'effective vaccines are being introduced by medical companies' and 'they will light up the whole city' becomes 'the whole city will be lit up'. In Arabic, the passive voice sentence is formed of the active sentence simply by changing the vowel markers of the verb; e.g. 'كَسَرَ' *kasar* (broke) becomes 'كُسِر' *kusir* (was broken) and 'يَأكُل' *ya?kul* 'eats/is eating' becomes 'يُؤكَل' *yu?kal* (is beaten/is being eaten). Here the change happens only on the level of verb form.

Passive voice sentences are either agentive (when it is crucial to unveil the identity of the doer of the action) or agentless (when the doer of the action is not significant or unidentified). In English, the passive two structures are used frequently, whereas in Arabic the use of the passive voice is restricted to the agentless structure (Deeb 2005: 112). This is because in Arabic it is preferable, stylistically speaking, to use the active rather than the passive voice when the agent is specified and important. For example, 'the window was broken by the boy' is better be translated into Arabic as 'كسر الولد النافذة' (the boy broke the window).

3.3 *Agreement*

'Agreement' is another grammatical category of language which refers to the presence of a relationship between two words. Such relationship allows one word (the controller) to cause certain changes in the form of the other word (the target). Such changes depend on the characteristics of the syntax, also called 'the agreement features' (Igaab & Altai 2017: 288). In English, the types of grammatical agreement are very limited in number. They basically cover two cases. These include the agreement between the verb and its subject in person and number; e.g. 'the student goes to school by bus', 'the students go to school by bus', 'he is a clever student', 'they are clever students'; etc. and the agreement between the pronoun and what it refers to; i.e. its antecedent, in number, person and gender; e.g. 'This book is Dani's. I will give it back to him next week'. On the contrary, in Arabic, agreement covers more complicated cases. The most common cases include the agreement between the verb and its subject in gender; e.g. 'يذهب الطالب إلى المدرسة' /M-go DEF-student to DEF-school/ (the student goes to the school) and 'تذهب الطالبة إلى المدرسة' /F-go DEF-student-F to DEF-school/ (the student goes to school), the agreement between the adjective and the noun it modifies in gender, number, case and definiteness or indefiniteness; e.g. 'طالبٌ ذكيٌّ' /student-NOM/INDEF clever-NOM/INDEF/ (a clever student), 'طالبةً ذكيةً' /student-F-ACC/INDEF clever-F-ACC/INDEF/ (a clever student), 'الطالبين الذكيين' /DEF-student-GEN/DU DEF-clever-GEN/DUAL/ (the two clever students); etc. and the agreement between the pronoun and its antecedent in number and gender; e.g. 'سألت الطالباتِ عن أسمائهن' /ask-PST-I DEF-student-F/PL-GEN about name-F/PL/ (I asked the students what their names are).

3.4 *Case*

Case is a grammatical category of nouns and it usually indicates what the noun's function in the sentence is. English has three grammatical cases; namely, the subjective case, the objective case and the possessive (genitive) case. The first two cases are unmarked and the third one is indicated by the suffix ('s); e.g. 'the student's backpack'. Just like English, Arabic nouns have three cases. Arabic has a subjective case; known as the nominative case, an objective case; known as the accusative case and a genitive case which differs from the genitive case of English.

Unlike English, Arabic three cases are marked differently. Moreover, the marking system of Arabic grammatical cases is a pit complicated. This is because the choice of the most appropriate case marker depends on whether the noun is singular, plural or dual, whether it is regular or broken plural, whether it is feminine or masculine and whether it is definite or indefinite. Thus the vowel marks 'ُ', 'َ' and 'ِ' are used at the end of singular definite nouns, broken plural definite nouns and regular feminine plural definite nouns to indicate the nominative, accusative and genitive cases respectively; e.g. 'ذهب الطالبُ إلى المدرسةِ' /go-PST DEF-student-NOM to DEF-school-GEN/ (the student went to school), 'رأيت الطلابَ في المدرسةِ' (see-PST-I DEF-student/BK.PL-ACC in DEF-school-GEN) /I saw the students at school/, 'تحدثت مع الطالباتِ' /speak-PST-I with DEF-student-F/PL-ACC/ (I spoke with the students). However, the vowel marks 'ٌ', 'ً' and 'ٍ' are used at the end of the singular, broken plural and regular feminine plural indefinite nouns to express the three Arabic grammatical cases; e.g. 'انضم طالبٌ جديدٌ إلى المدرسةِ' /join-PST student-NOM/INDF new-NOM/INDF to DEF-school-ACC/ (a new student joined the school), 'ساعدت المدرسة طلاباً كثراً' /help-PST-F DEF-school-NOM student/B.K.PL-ACC many-ACC/ (the school helped many students). The marker 'ان' is used at the end of dual nouns to indicate the nominative case; e.g. 'جاء الطالبان' /come-PST DEF-student-DU/NOM/ (two students came), and the marker 'ين' is used at the end of dual nouns to indicate the other two cases; e.g. 'تحدثت مع الطالبتين' /speak-PST-I with DEF-student-F-DU/GEN/ (I spoke with the two students). Finally, the marker 'ون' is added to regular plural masculine nouns to indicate the nominative case; e.g. 'وصل المدرسون' /arrive-PST DEF-teacher-M.PL/NOM/ (the teachers arrived), whereas the marker 'ين' is added at the end of this group of nouns to indicate the accusative and genitive cases; e.g. 'تحدثت مع المدرسين' /speak-PST-I with DEF-teacher-M.PL/GEN/ (I spoke with the teachers). Unlike English, Arabic possessive case is not marked; e.g. 'كتاب الطالب' /book-NOM DEF-student-GEN/ (the student's book or the book of the student) (AlFarkh 2005: 38).

3.5 *Arabic nominal sentences*

English sentences are only verbal sentences, whereas Arabic has verbal as well as non-verbal sentences (Al Ghussain 2003: 84). In other words, while all English sentences must contain at least one main verb, some Arabic sentences may not contain a verb. This type of sentences is referred to as 'nominal sentences'. Arabic nominal sentences are composed of a 'subject' (also called the 'topic') and a 'predicate'. Just like verbal sentences, the subject of the Arabic nominal sentence can be a noun, pronoun or noun phrase. Unlike verbal sentences, the predicate of the nominal sentence is not a verb or verb phrase but a noun, adjective or prepositional phrase (Aziz 1989: 28). For example, 'تسطع النجوم في السماء الليلة' /PRES-shine DEF-stars in DEF-sky tonight/ (the stars are shining in the sky tonight) is a verbal sentence, whereas 'النجوم ساطعة في السماء الليلة' /DEF-stars shining/ADJ in DEF-sky tonight/ (the stars --- shining in the sky tonight) is a nominal sentence. The two examples provided are full sentences in Arabic. However, the second sentence is ungrammatical in English as it requires a main verb as 'the stars <u>are</u> shining in the sky tonight'.

3.6 *Order of words*

English and Arabic vary greatly in their order of words, basically in the order of subjects and verbs and nouns and their adjectives. So while in English, the subject is always positioned before the verb (SVO) (Fromkin et al. 2000: 107), in Arabic the subject can come before the verb (SVO) or after it (VSO) (Baker 2011: 120). However, the use of the SVO structure is very limited in Arabic; basically in embedded clauses that start with the emphatic particle 'أنّ' (that); e.g.

(4) أخبرتهم أنّ هاني سيصل اليوم

akhbar-tu-hu	*anna*	*hani*	*sa-yasil*	*alyawm*
tell-PST-I-them	that	Hani	FUT-arrive	today

'I told them that Hani would arrive today'

Regarding nouns and their adjectives, English adjectives come directly before nouns; e.g. 'smart phone', 'digital currency', 'fatal disease'; etc. On the contrary, Arabic adjectives come after nouns; e.g. 'هاتف ذكي', 'عملة رقمية', 'مرض قاتل'; etc. Moreover, Arabic adjectives can be positioned directly or indirectly after nouns. For example, 'المبادرة الإنسانية للأمم المتحدة' and 'مبادرة الأمم المتحدة الإنسانية' are correct in Arabic; however, these two examples must be rendered in English only as 'the <u>humanitarian</u> <u>initiative</u> of the United Nations'.

4 The problematic areas of grammar in English-Arabic-English translation:

In the previous section, we presented the basic similarities and differences between the tenses, aspects, passive voice structures, grammatical agreement types, syntactic cases and order of words between English and Arabic in addition to the structure of Arabic nominal sentences. This helped to specify the most problematic areas of those grammatical components that are the source of errors while translating between English and Arabic. Specifying these areas helped the researcher suggest appropriate solutions. Moreover, we hope that it will also be a practical step towards making translation students be aware of them.

4.1 *Translating tenses*

As explained before (Section 3.1), English tenses are either simple or complex. Translating English simple tenses into Arabic poses no significant difficulties; however, translating complex tenses does. This is because there is no equivalence for them in Arabic. Moreover, most students do not pay so much attention to the presence of certain aspectual indicators in the English sentence. On the contrary, Arabic has only two simple tenses: past and present. Translating the Arabic past tense into English poses difficulties as it can be equivalent to the English past simple tense, present perfect tense and past perfect tense. Translating the Arabic present tense into English also poses difficulties as it has three equivalences in English; the present simple tense, the present continuous tense and the past continuous tense. This is a case of many-to-one equivalence and one-to-many equivalences.

For example, the sentence 'تمطر السماء بغزارة' may be rendered in English as 'it rains heavily', 'it is raining heavily', or even 'it was raining heavily'. However, the sentence ' تمطر السماء بغزارة في فصل المونسون في الهند' is equivalent only to 'it rains heavily during monsoon in India' as it expresses a general fact, the sentence 'تمطر السماء بغزارة الآن' is equivalent only to 'it is raining heavily now' as the use of the adverb of time 'الآن' (now) indicates that the action is happening at the moment of speaking, and 'كانت السماء تمطر بغزارة' is equivalent only to 'it was raining heavily' because of the presence of the modal verb 'كانت' /kanat/ which indicates a continuous past action. We can notice that the tense of the three Arabic sentences is the same; the present tense 'تمطر'. However, three English tenses; namely the present simple tense, the present progressive tense and the past progressive tense, were possible equivalents for the first sentence because it does not have any aspectual indicators. On the contrary, each of the last three Arabic examples was rendered using only one particular English tense, depending on the indicator.

Many novice students of translation, despite having a good command of the grammar of each language, translate the Arabic present tense into the English present simple even when the sentence ends with words such as 'الآن' (now), 'حالياً' (at present), 'at this moment' (في هذه اللحظة); etc. Other students tend to translate the Arabic present tense into the English present progressive even if the sentence carries the meaning of a repetitive event or habitual action and even if they see such words as 'عادةً' (usually), 'دائماً' (always), 'كل يوم' (everyday); etc. Moreover, many students render the Arabic past tense into the English past tense even if the verb is preceded by 'قد' or 'لقد'.

4.2 *Translating passive voice sentences*

While the formation of the passive voice is indicated only morphologically in Arabic (by changing the vowel marks of the active verb), it requires changes on the level of morphology as well as syntax in English. This is in addition to the introduction of new elements. Therefore, it is not uncommon for the students, especially the non-native speakers, to face difficulties while translating the passive voice sentences between the two languages. For example, many students would translate the agentless passive sentence ' اكتشف البنسلين في عام 1928' unacceptably as 'Penicillin discovered in 1928'; reading the passive verb 'اكتُشِفَ' (was discovered) as an active verb 'اكتَشَفَ' (discovered). Even when the student perceives the Arabic sentence as a passive voice, he/she may still translate it as 'Penicillin discovered in 1928', without introducing a form of 'Be'.

Another problematic area while translating the passive voice between English and Arabic is related to the two passive structures. We have already mentioned that while the use of the agentive passive structure is very common in written English, it is stylistically less frequently used in Arabic. For example, translating 'Penicillin was discovered by Alexander Fleming' as 'اكتشف البنسلين من قبل ألكسندر فليمينغ' is unacceptable. It has to be rendered in Arabic as 'اكتشف ألكسندر فليمينغ البنسلين' (Alexander Fleming discovered Penicillin).

4.3 *Maintaining grammatical agreement*

We have already indicated that compared to English, the types of Arabic grammatical agreement are more complicated. It is true that the agreement of the subject and verb and pronoun and antecedent are present in the two languages. However, while the English verb must agree with its subject in person and number, the Arabic verb must agree with its subject in gender. While the English pronoun must agree with its antecedent in person, number and gender, the Arabic pronoun must agree with its antecedent in case, number and gender.

Moreover, while the English adjective does not need to agree with the noun it modifies, the Arabic adjective does. This causes so many errors while rendering an English text into Arabic.

4.4 *Indicating grammatical cases*

Since no possessive marker is used in Arabic, many students may forget to add the ('s) when they are translating from Arabic into English. For example, they would translate 'احتفالات العام الحالي' unacceptably as 'the current year celebrations' instead of 'the current year's celebrations. Moreover, a lot of students make several mistakes in translating English texts into Arabic when they have to indicate Arabic three syntactic cases. This is because English subjective and objective cases are unmarked, but in Arabic they are.

4.5 *Reversing words order*

The fact that English and Arabic have opposite word order system, especially of verbs and subjects and nouns and adjectives, makes translating between these two languages a tough job, especially for the non-native translators. Although most students know the differences of the order of words of English and Arabic, they still make mistakes. For example, they preserve the VSO order of the Arabic sentences when they translate them into English which is a major mistake. They may also keep the adjective before the noun when they translate from English into Arabic, or they may keep the noun before the adjective when they translate from Arabic into English which is totally unacceptable.

4.6 *Translating Arabic nominal sentences*

For most students, translating Arabic nominal sentences into English does not pose a major difficulty. However, many students still make mistakes while translating them. For example, they translate such type of sentences into English without using a form of 'Be' which results in ungrammatical sentences. Thus ' السماء زرقاء' is translated into English by many students unacceptably as 'the sky blue' instead of 'the sky is blue'. Moreover, many students may translate the English sentence 'the weather is nice' into Arabic adding the verb-to-be 'يكون' as 'يكون الطقسُ جميلاً'. This is grammatically acceptable but stylistically speaking it should be rendered as 'الطقسٌ جميلٌ'.

5 Conclusion and suggestions

Translating between English and Arabic is a challenging task especially to the novice students of translation. This task is even more challenging to the students who translate between these two languages and they are non-natives of neither of them. This is basically due to the variant linguistic systems, cultural backgrounds and stylistic features the two languages have.

Many areas of grammar can be a source of problems while translating between English and Arabic. However, we tried to limit this study to the most noticeably recurrent ones; viz. the translation of tenses, passive voice, grammatical agreement, case, words order and Arabic nominal sentences. Although the areas discussed above may seem to be simple and pose no difficulties for professional translators; especially if they are native speakers of Arabic or English. However, these areas can be truly and discouragingly problematic to the novice students of translation and particularly if they are non-natives of English and Arabic.

While translating tenses between English and Arabic, translation students have to read the whole sentence to understand the time and mood of the action and to look for affixes, modal verbs, particles or temporal adverbials. Reading the whole sentence will also help the students determine whether it is an active or passive sentence. Translation students need to be particularly careful while translating Arabic passive sentences into English. They need to keep in mind that while the passive voice is indicated only morphologically in Arabic, the English passive voice requires changes on two levels; namely verb form (morphology) and words order (syntax), in addition to the introduction of new elements. Moreover, the agentive passive English structure is equivalent to the active structure in Arabic. The fact that Arabic grammatical agreement and syntactic cases are more complicated than what English has makes translating such grammatical categories between the two languages a tough job. Therefore, students must be cautious, especially when they are moving in the English-Arabic direction. These students need also to keep in mind that while translating Arabic nominal sentences into English, a form of be should be used. They are also advised to avoid word-by-word translation as it results in so many mistakes especially in the order of words.

Finally, any optimum translation requires good reading skills, good command of the grammatical components, stylistic features and cultural backgrounds of each language. This is in addition to a great reservoir of vocabulary. The semantic comprehension of the S.T. is not enough to properly transfer it into the T.L. If the grammar of the translated text is incorrect it may result in poor quality translation or even in distorting the meaning of the original text. Translation students are advised to fully read the S.T. and analyze its grammatical structures. This would help understand its semantic indications and implications and thus render it properly in the T.L., in accordance with the grammatical and stylistic rules of the two languages. Pre-translation reading of the S.T. and proof reading of the translated text are essential steps that can help detect the grammatical errors of all categories. Moreover, learning some aspects of comparative, contrastive and error analysis would be of tremendous help to translation students.

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Adjunction without Pair-Merge

Manabu Mizuguchi
Kokugakuin University

1 Introduction

Structure building is one of the main topics in the study of generative grammar. It has been argued in the literature that there are two types of structure in language: substitution and adjunction. In substitution, as shown in (1), the structural properties change when the object Y is added to the object XP; the newly derived object in (1b) has the properties of Y, not X.[1]

(1) a. [$_{XP}$ X Z] b. [$_{YP}$ Y [$_{XP}$ X Z]]

On the other hand, in adjunction, the structural properties do not change at all even after an object is added to another object. Y does not affect the structural properties when adjoined to XP, with the derived object retaining the properties of X. Hence, we get (2b), instead of (1b).

(2) a. [$_{XP}$ X Z] b. [$_{XP}$ Y [$_{XP}$ X Z]]

To see this with concrete examples, consider the following examples. As illustrated, even when adjuncts such as PP and AdvP are added to VP, the resulting structure remains VP, not changing into PP or AdvP.

(3) a. I [$_{VP}$ [$_{VP}$ read the book] [$_{PP}$ during the concert]].
b. Anna [$_{VP}$ [$_{AdvP}$ rarely] [$_{VP}$ [$_{VP}$ drives her car] [$_{AdvP}$ around her house]]].

As Chomsky (2004) puts it, in adjunction, it is as if an adjoined element Y and its host X were put on separate planes, with Y not affecting X. To use Bode's (2020) metaphor, adjunction is $X + Y = X$.

In this paper, I consider adjunction in the Minimalist Program and discuss how it is explained in the theoretical framework where Merge is the simplest computational operation. I claim that with labeling and Determinacy in place, both of which are independently motivated assumptions, the properties of adjunction are deducible from Merge, with no need to extend Merge to capture adjunction.

The organization of this paper is as follows. In section 2, I first discuss structure building in Minimalism, spelling out the issue with adjunction. Then in section 3, I propose a minimalist analysis of adjunction, showing that adjunction falls under simplest Merge. In section 4, I discuss two related implications of the proposed analysis. Finally, I conclude the paper in section 5.

2 Substitution and adjunction in Minimalism

In this section, I consider how substitution and adjunction are treated in the Minimalist Program. It has been argued that the structure-building operation in the Faculty of Language or Universal Grammar (UG) is Merge (Chomsky 1995 et seq.). Chomsky (2004) claims that this operation subsumes two types: set-Merge and pair-Merge, noting that they are descendants of substitution and adjunction in earlier theories. As shown

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[1] Notations such as "XP" and "YP" are misnomers in that they are not real in the sense of earlier theoretical frameworks and are used only for convenience in the paper. As will be noted below, XP is simply a set identified by minimal search (labeling) as having the label X, hence the properties of X.

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in (4), given syntactic objects, set-Merge (substitution) generates a set-theoretic object out of any two objects while pair-Merge (adjunction) produces an ordered pair.

(4) a. set-Merge
X, Y → {X, Y}
b. pair-Merge
X, Y → <X, Y>

In {X, Y}, the two objects merged are on a par in the sense that the order in which they appear is not significant: that is, the set {X, Y} is no different from the set {Y, X} ({X, Y} = {Y, X}). On the other hand, as for the ordered pair, <X, Y> is different from <Y, X> (<X, Y> ≠ <Y, X>). As we have observed, substitution and adjunction have to be distinguished. The distinction between the two structures is captured by two different types of pair (i.e., an "unordered" pair or set and an "ordered" pair) generated by two types of Merge.

This approach to substitution and adjunction, however, has problems. First, it is unclear why substitution is a set (unordered pair) while adjunction is an ordered pair. It might be true that if there are two kinds of structure in language, there will be two different types of syntactic objects corresponding to substitution and adjunction. However, it is a sheer stipulation to say that substitution is a set-theoretic object while adjunction is an ordered pair, unless there is independent evidence for the assumption. Why isn't substitution an ordered pair? Likewise, why isn't adjunction a set-theoretic object?

Second, it is unclear how an ordered pair explains the property of adjunction we have discussed in section 1. Recall that the structural properties do not change when an object is adjoined to another object. How does an ordered pair account for this or the fact that it is as if an adjoined element and its host were put on separate planes?

Finally, there is a theoretical problem with the relevant approach. In recent years, Merge has been reconsidered. Merge is now considered an operation on the workspace. The workspace, which consists of a set of accessible syntactic objects, is where syntactic computation takes place and represents the stage of the derivation at any given point. Merge in this definition, often called capital Merge (MERGE), maps the workspace (WS) into a new workspace (WS′) by pairing two objects in the workspace into a set and reducing the workspace.[2]

(5) Merge: WS = [X, Y] → WS′ = [{X, Y}]

Chomsky (2019) and Chomsky, Gallego and Ott (2019) argue that Merge reconsidered this way is simplest Merge (i.e., the Merge that satisfies the Strong Minimalist Thesis (SMT)[3]) and that the simplest object constructed is a set consisting of two objects. To put it simply, the Merge that is allowed is the one that generates a two-membered set in the workspace.

Given this reformulation of Merge, pair-Merge will fall outside and will not be an instance of simplest Merge, being an extension of Merge. As discussed, it generates an ordered pair, not a set. In fact, pair-Merge has been called into question. Chomsky, Gallego and Ott (2019) argue that it is a formally distinct operation. Likewise, Chomsky (2017) mentions in passing that it is a second operation. These statements suggest that pair-Merge is deviant from the simplest application of Merge.

With this discussion in mind, the question is whether the extension of Merge is reasonable. Empirically, the answer is "Yes": adjunction is ubiquitous in language and there must be some mechanism in UG to capture adjunction. Theoretically, on the other hand, the answer is "No." Linguistics, the Minimalist Program in particular, is a branch of normal science, and taking language as an optimal system that satisfies SMT, tries to achieve an explanatory theory through maximizing minimization (Epstein, Kitahara and Seely 2015). In any scientific inquiry, less is better than more, and the simplest explanation should be sought. Pair-Merge

[2] By convention, square brackets are used for the workspace and curly brackets are employed for derived syntactic objects in the workspace.
[3] SMT is a hypothesis that language is optimally designed: UG reduces to the simplest computational operations, which operate in accord with language-independent conditions of computational efficiency or 3rd factor principles. For SMT, see, e.g., Chomsky (2000, 2010, 2017, 2019).

will be an addition and will lead to less simple theory. Moreover, UG is an evolutionary product. Biologically, simplification of UG will make it easier to solve the problem of evolvability and eventually attain an explanation of the origin of language. All these considerations suggest that Merge should not be extended and that adjunction should be made possible based on simplest Merge.

In the rest of the paper, I will explore this direction and argue that adjunction does fall under simplest Merge.

3 Adjunction under simplest Merge

In set theory, the ordered pair <X, Y> is mathematically equivalent to the set {X, {X, Y}}, where X is self-embedded in a set containing X (Kuratowski 1921, Tourlakis 2003; see also Fukui 2017, Omune 2020). Building on this insight, I argue that simplest Merge (from now on, simply "Merge"), in conjunction with independently motivated assumptions, deduces adjunction.

To see this, suppose that we have the workspace (6).

(6) WS = [X, Y, Z]

To the extent that Merge satisfies SMT, it is unconstrained and applies freely, able to generate the following two workspaces (7a) and (7b) as outputs.

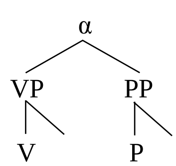
(7) a. {Z, {X, Y}}
b. {X, {X, Y}}

In (7a), X and Y in the workspace are merged and they form a set, with which Z, a distinct object in the workspace, is merged to form a larger set. In (7b), Merge forms another set by taking X and recursively merging it with {X, Y}, which contains X. Notice that given that <X, Y> is on a par with {X, {X, Y}}, (7b) amounts to the ordered pair. Now that we have seen that Merge can produce (7b), I show how self-embedding by Merge explains adjunction.[4]

Take (3a) as an example and consider its derivations under Merge. In (3a), the PP is a VP adjunct. Given that adjuncts modify objects they are merged with (i.e., modification is captured by a sister relation), suppose that the VP and the PP are merged to form a set, which is marked as α below for convenience.

(8) a. {$_{\alpha}$ VP, PP}

However, the set, as it is, incurs a labeling problem and will not be labeled, since it is a symmetric set. Though labels are not necessary for computation in syntax as suggested by Collins (2002) and Seely (2006), they are required for interpretation: it matters for the Conceptual-Intentional (CI) and Sensorimotor (SM) systems what kind of object a certain syntactic object is. Chomsky (2013) argues that the label of a set is determined by minimal search (i.e., the search operation abiding by SMT), which locates the closest head as the label, identifying the set. In the case of a symmetric set like (8a), as illustrated in an informal tree structure in (9), the two heads are equally embedded and hence are equally close to minimal search when the operation applies to the set.

(9)


In a symmetric set, the label cannot be uniquely determined. Labeling of a symmetric set, according to

[4] For a different approach to adjunction based on (7b), see Omune (2020), who, stipulating that (7b) is an adjunct relation, argues that the stipulation is conceptually better than adopting pair-Merge. As for invisibility of an adjoined element, which I discuss below, he argues that it follows from the notion of occurrence.

Chomsky, will be possible either when the two heads agree or when one of the two elements is moved to be a copy. The assumptions behind the solutions are that the features shared via agreement can be the label and that copies, which are constituent parts of a single object, are transparent to minimal search; the operation sees copies as a whole. The transparency of copies to minimal search is endorsed by the absence of intervention effects in agreement, which also involves minimal search.

Going back to (8a), the two heads do not agree with one another for lack of agreeing features, and the other solution is employed in this case. Suppose that the VP moves out of α and turns into a copy. The derived syntactic object in the workspace is (8b).[5]

(8) b. {$_\beta$ VP, {$_\alpha$ VP, PP}}

Thanks to the movement, VP is transparent to minimal search, which thus locates P as the label of α and the set is labeled (hence, α is "PP"). The labeling problem is solved by movement.

Notice that the derived object (8b) is a self-embedding structure and it follows from labeling that it is generated by recursively merging X (here, VP) with the set containing X via Internal Merge, instead of External Merge: the other X is not a distinct object in the workspace.

However, movement to solve a labeling problem raises another problem. (8b) is now faced with the problem of indeterminacy. Chomsky (2019) proposes seven desiderata that any computational operations for language should meet, claiming that Determinacy is one of such desiderata. It requires that no ambiguous situation be allowed for subsequent rule application. For instance, if Merge applies and the derivation generates workspaces such as (10) as outputs, Determinacy will be violated.

(10) a. WS = [X, Y, {X, Y}]
b. WS = [{X, Y}, {Z, Y}]

In (10a), the derived workspace contains two X's and two Y's, which are accessible to any rule applying to X and/or Y in the subsequent derivation. Likewise, in (10b), the workspace contains two accessible Y's. In other words, Determinacy requires that accessible terms appear only once in the workspace.

With Determinacy in place, now go back to (8b). Notice that the workspace contains two VP's, both of which are accessible to rule application in the subsequent derivation. A Determinacy violation will occur and (8b) will be ruled out.

I argue that the problem of indeterminacy can be solved. To see how the problem is fixed, first consider the example (11), where the *wh*-phrase moves from within the embedded clause to the matrix Spec,CP.

(11) Which book do you think the professor will recommend?

It has been argued that *wh*-movement is successive cyclic by way of phase edges. This means that as illustrated in (12), copies are created in phase edges and that accessible terms will appear more than once in the workspace.

(12) {Wh {C … {Wh {*v* … {Wh {C … {Wh {*v* {V Wh}}}}}}}}

However, no Determinacy violation occurs in (11). The reason is that Transfer applies in the course of the derivation, making lower copies inaccessible to computation in the subsequent derivation. In (12), as illustrated in (13), Transfer applies at the phase level and cyclically ships off phase-head complements out of narrow syntax.[6]

(13) a. {Wh {*v* {V Wh }}}
b. {Wh {C … {Wh {*v* {V Wh }}}}}
c. {Wh {*v* … {Wh {C … {Wh {*v* {V Wh }}}}}}}
d. {Wh {C … {Wh {*v* … {Wh {C … {Wh {*v* {V Wh }}}}}}}}}

[5] For expository convenience, copies are marked with underlines in this paper.
[6] In this paper, those elements that are marked in grey show that they have been transferred.

Thanks to Transfer, the derived workspaces contain only one accessible *wh*-phrase and no indeterminate situation will arise for subsequent rule application.

Transfer is one of the syntactic operations. Given that UG is based on the simplest computational operations, it will follow that Transfer, like Merge, is unconstrained and applies freely, not only at the phase level but also anywhere in the course of the derivation (see also Chomsky 1998:121-122). When Transfer applies to a syntactic object, it will ship off the object in full or only part of it; otherwise, the derivation cannot continue. Hence, given the object (14), when Transfer applies to it, (15a) and (15b) will be possible outcomes.

(14) {X, {Y, Z}}

(15) a. {X, {Y, Z}}
b. {X, {Y, Z}}

If the outcome happens to be (15a), the derivation halts while in (15b), it is allowed to continue.

With in mind the assumptions I have introduced (Transfer applying freely and the domains of Transfer), both of which are independently motivated, the problem of indeterminacy in (8b) can be solved. In (8b), suppose that Transfer applies and that only part of it, that is, α, is transferred, which allows the derivation to go on. The finally generated object is (8c).

(8) c. {$_\beta$ VP, {$_\alpha$ <u>VP</u>, PP}}

We can see that in (8c), thanks to Transfer, Determinacy is respected as the derived workspace contains only one accessible VP for the subsequent derivation.

To recap, the derivations of VP adjunction in (3a) are, first, Merge the host and the adjunct; then, Move or Internally Merge VP to solve the labeling problem; finally, Apply Transfer to solve indeterminacy.

In the discussion so far, I have argued that Transfer applies freely and sends to the interfaces the object in full or only part of it so that the derivation can continue. It has been argued that Transfer, when applied at the phase level, ships off a phase-head complement. So given (16), where Y is a phase head and (16a) is a phase, when Transfer applies to the phase, only Z will be transferred, with Spec X and the head Y left in narrow syntax (=(16b)).

(16) a. {X, {Y, Z}}
b. {X, {Y, Z}}

I assume that one of the roles of phase heads is to specify which part of the syntactic object is transferred: that is, phases constrain Transfer to apply only to phase-head complements, excluding Specs and heads.

Let us now consider how the proposed derivations deduce the adjunct status of the PP in (3a). Recall Bode's (2020) metaphor, which says that in adjunction, $X + Y = X$: it is as if X and Y were on different syntactic planes. In adjunction, the host retains all the properties and it is as if the adjunct were not there. This property follows straightforwardly from the derivations. Notice that in (8c), minimal search, when applied to β, locates V as the closest head and that the set is given the label V; the whole structure is thus interpreted as a set with the properties of V; in other words, it is "VP."

The proposed analysis can also capture another property of adjunction: the Adjunct Condition, one side of Huang's (1982) Condition on Extraction Domains (CED), which says that the adjunct is an island for extraction. As illustrated in (17), extraction is not possible out of the adjunct.

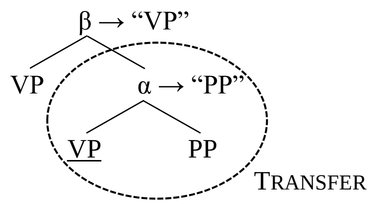
(17) a. *Which concert did you read the book [during t]?
b. *Who did Mary cry [after John hit t]?

(17) shows, as Chomsky (2004) says, that the adjunct is put on a separate plane. This property is also straightforwardly explained. In (8c), the adjunct is in α. This set, as I have discussed, has been transferred so that Determinacy can be respected, getting inaccessible by the time extraction takes place. The adjunct has

got out of the derivation or "primary" plane and is put on a separate plane (that is, on the interfaces).

Summarizing the discussion, with labeling and Determinacy in place, the properties of adjunction (retention of structural properties and inaccessibility of adjuncts) follow from Merge. Structural properties do not change since it is the host, not the adjunct, that determines the label of the adjoined structure or (7b); the adjunct is inaccessible because the object containing it has been transferred. (18) illustrates adjunction under Merge.

(18)



Though extraction may not be possible out of the adjunct, the adjunct as a whole can move. Consider (19).

(19) a. In which city did you meet Susan?
b. Where did you buy the book?

Take (19a) and see how adjunct movement is explained under the proposed derivations. As in (3), suppose that the adjunct is adjoined to VP and that the VP and the PP are merged, which yields (20a).

(20) a. {$_{\alpha}$ VP, PP}

Recall that if nothing happens to (20a), then the derivation will be ruled out at the interfaces since α is left unlabeled. As discussed, the way to solve the labeling problem is by moving either the VP or the PP. I argue that in (19), the adjunct, instead of its host VP, is moved and that the movement is to Spec,*v*P, the phase edge, at the *v*P phase level, since it is a *wh*-phrase undergoing movement to Spec,CP. Consider (20b,c).

(20) b. {*v*, {$_{\alpha}$ VP, PP}}
c. {PP, {*v*, {$_{\alpha}$ VP, PP}}}

Notice that at the derivational point when *v* is merged with α, both the VP and the PP are accessible to computation and can be subject to Merge, since neither of the two phrases has not moved out and α has not been transferred for Determinacy. Thanks to the relevant movement, which renders PP a constituent part and hence makes it transparent to minimal search, V is located as the label of α, which is given the label V. Also, Determinacy is respected: α, a phase-head complement, is cyclically transferred at the phase level, thanks to which the derived workspace contains only one accessible PP (i.e., the PP at the edge of *v*P). The adjunct PP can move from Spec,*v*P to Spec,CP (=(20d)), and the finally derived output is (19a).

(20) d. {PP, {C, … {PP, {*v*, {$_{\alpha}$ VP, PP}}}}}

Unlike the object in the adjunct, the adjunct as a whole can move without any problems. Under the proposed analysis of adjunction, both the Adjunct Condition (ungrammaticality of extraction out of the adjunct) and adjunct movement (a grammatical instance of movement) are explained.

In the discussion of (3), I have argued that the host VP, instead of the adjunct PP, moves out to be merged with α, which yields a self-embedding structure. Provided that Merge applies freely, suppose that movement applies to PP, instead of VP, which also creates a self-embedding structure (7b), generating (21) instead of (8c):

(21) {$_{\beta}$ PP, {$_{\alpha}$ VP, PP}}

Recall that the PP can move at the stage (20a). In (21), α can be labeled thanks to the invisibility of PP (which has turned into a constituent part due to movement) and Determinacy is warranted thanks to the transfer of α. In (21), minimal search, when applied to α and β, locates V and P, respectively, with the result that α is given the label V and β is given the label P. Unlike β in (8), β in (21), with the label P, bears the properties of P. Notice, however, that when the set is merged with *v* in the next step, the selection of *v* will be violated since the head, which is a categorizer, selects root R, which is to be categorized and realized as V. Given that selectional restrictions are reducible to the properties of CI (Pesetsky 1982, Fortuny 2008 among others for relevant discussion), the derived outcome (22) will be ruled out at CI in violation of selection, not satisfying Full Interpretation.

(22) *{*v*, {$_{\beta}$ PP, {$_{\alpha}$ VP, PP}}} (β = P)

To summarize this section, building on the assumption that the ordered pair <X, Y> is mathematically on a par with the set {X, {X, Y}}, I have argued that Merge can generate {X, {X, Y}} and have shown how adjunction follows from self-embedding by Merge. As discussed, Merge, in conjunction with labeling and Determinacy, deduces the properties of adjunction.

4 Implications

In this section, I discuss two related implications of the proposed analysis of adjunction. The first implication is that movement of an object does not freeze it and that extraction out of a moved object is possible. Recall that in VP adjunction, VP moves out, which solves a labeling problem. Given this, in examples such as (23), the *wh*-phrase, as illustrated in (24), is extracted out of the VP that has moved.

(23) a. Which book did you read during the concert?
b. Which student did the teacher punish after John hit Susan?

(24) {Wh {C … {$_{\beta}$ {$_{VP}$ … Wh … }, {$_{\alpha}$ VP, PP}}}}

This suggests that a moved object is not frozen for extraction. This implication is independently backed up by Collins (2005a,b) and Bošković (2021) among others, who discuss "smuggling" in movement, where preceding movement makes otherwise impossible movement possible. When movement out of a moved object X turns out to be ungrammatical, it is not due to movement of X (Bošković 2018).

Notice that in (23), the *wh*-phrase cannot move out of VP before VP moves to merge with α. If it moved out of VP in {$_{\alpha}$ VP, PP}, it would merge with α. However, this has the effect that α will be transferred; otherwise, a Determinacy violation will result since there are two accessible *wh*-phrases contained in the derived output: {$_{\gamma}$ Wh, {$_{\alpha}$ {$_{VP}$ … Wh …}, PP}}. The output will thus be {$_{\gamma}$ Wh, {$_{\alpha}$ VP, PP}}. The syntactic object γ will be labeled N because minimal search locates N in Wh. This violates selection since *v** does not select N but R. The movement of VP must precede the movement of the *wh*-phrase in (23).[7]

The second implication, which is related to the first one, is that the Subject Condition, the other side of CED, is not due to movement of the subject. It has been argued that the subject is an island for extraction and that movement of the subject freezes it to block extraction. Consider (25).

(25) a. *Which professor [a picture of t] hit George?
b. *Which candidate were [posters of t] all over the town?

As I have argued, however, movement does not lead to freezing.

I claim, following Goto and Ishii (2019), that the Subject Condition is ruled out by Determinacy. At the stage of the derivation when the subject has moved to Spec,TP, two accessible copies of the subject are produced in the workspace (marked in bold in (26)).

[7] It goes without saying that counter-cyclic movement of VP is not allowed under Merge (Chomsky 2019).

(26) {$_{TP}$ **{$_{NP}$ a picture of which professor}** {T {$_{vP}$ **<u>{$_{NP}$ a picture of which professor}</u>** {*v** … }}}}

This yields an ambiguous situation for rule application in the subsequent derivation. Recall that Determinacy requires that accessible terms appear only once in the workspace. (26) violates Determinacy and extraction out of the subject is ruled out.[8]

I have argued that the Subject Condition is not explained by movement but by Determinacy. This argument predicts that if the violation is not incurred, movement out of the moved subject will be possible. This prediction is in fact borne out. Consider (27) from Fiengo et al. (1988).

(27) $^{?}$Who$_j$ do you wonder {$_{CP}$ {which pictures of t$_j$}$_i$ C {are t$_i$ on sale}}?

In (27), just as in (25), the subject *{which pictures of who}* undergoes movement and the *wh*-phrase is extracted out of the moved subject. The extraction is well-formed in (27) because the embedded TP, which is a phase-head complement, is cyclically transferred at the embedded CP phase level and only one copy of the subject is accessible in the workspace. Consider (28) and compare it with (26).

(28) {$_{CP}$ {which pictures of who} C {are <u>{which pictures of who}</u> on sale}}?

In (28), Determinacy is respected. Thanks to Transfer, subject movement to the phasal Spec will conform to Determinacy and extraction out of the subject will thus be possible in the following derivation. (28) argues for the claim that a Determinacy violation explains the Subject Condition.

Some may wonder if a Determinacy violation can be circumvented in (25). Recall that Transfer, like Merge, applies freely in the course of the derivation. Given this, if Transfer applies when (26) is generated and part of (26) or *{T {$_{vP}$ {$_{NP}$ a picture of which professor} {*v* … *}}}* is transferred, the derived workspace will contain only one accessible NP, with the result that Determinacy is respected. Consider (29).

(29) {$_{\alpha}$ {$_{NP}$ a picture of which professor} {T {$_{vP}$ <u>{$_{NP}$ a picture of which professor}</u> {*v** … }}}}

Though Determinacy is not violated in (29), notice that α will be given the label N and hence will be "NP," since minimal search for labeling, when applied to α, locates N. In the next step, (29) is merged with C, which produces (30).

(30) {C {$_{\alpha}$ {$_{NP}$ a picture of which professor} {T {$_{vP}$ <u>{$_{NP}$ a picture of which professor}</u> {*v** … }}}}}

The derived object, however, will lead to a violation of selection: C does not select NP but TP. As discussed above, provided that selection is reducible to the properties of the CI system, (30) will be ruled out in violation of selection when transferred and accessed by the CI system. The Subject Condition cannot be circumvented even when Transfer applies freely.

5 Conclusion

In this paper, I have discussed adjunction in the Minimalist Program and proposed an analysis that captures its properties (that is, retention of structural properties and invisibility of an adjoined element). I have argued that with labeling and Determinacy in place, the properties of adjunction follow from Merge without any stipulation. I have thus shown that to explain adjunction in natural language, we do not have to rely on pair-Merge, which is considered an unwanted extension of Merge. The discussion in the paper suggests as a broad conclusion that Merge has no variants and that other syntactic phenomena which have been argued to support extensions of Merge will also fall under Merge (Chomsky, Gallego and Ott 2019).

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[8] For relevant discussion, see Narita (2015), who also argues that the Subject Condition is not due to the opacity of the moved subject; he proposes that labeling failure of "TP" is the cause of the Subject Condition.

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Word-Final Devoicing in Brazilian Portuguese and L2 English

Wellington Araujo Mendes Junior
Federal Center for Technological Education of Minas Gerais, Federal University of Minas Gerais

1 Introduction

This study examines word-final devoicing in Brazilian Portuguese (e.g. *sedes* ['sɛ.ts] ~ ['sɛ.dʒis] 'headquarters') and in English as a Second Language (e.g. *sides* [saɪts] ~ [saɪdz]). The goal was to assess whether different phonological environments and task types influence the voicing property of the final sibilant. As it is known, word-final English sibilants are prone to progressive assimilation, rather than regressive assimilation – as it occurs in Brazilian Portuguese. The underlying English representation for regular plural and 3rd person singular present is assumed to be /z/ (HAYES, 2011). A progressive assimilation rule predicts that if a vowel or a voiced consonant precedes /z/, the output is [z], as in *dogs* [dɒgz], *trees* [triːz] and *pies* [paɪz]. On the other hand, if a voiceless consonant precedes /z/, it surfaces as [s], as in *cups* [kʌps], *cats* [kæts] and *ducks* [dʌks]. Finally, if an alveolar fricative or an affricate precede the sibilant, the outcome is [ɪz], as in *buses* [bʌsɪz], *quizzes* [kwɪzɪz] and *watches* [wɒtʃɪz].

As for Brazilian Portuguese, the underlying representation for regular plural forms is assumed to be /s/. A regressive assimilation rule predicts that if a word-final sibilant is followed by a vowel or a voiced consonant, then /s/ will be voiced: *mês* [mes] 'month', *mês bonito* [mez ˈbo.ni.tu] 'beautiful month', *mês anterior* [mez ɐ̃.te.ɾi.ˈoɾ] 'previous month'. However, as a consequence of an ongoing sound change, word-final unvoiced clusters are becoming very productive in some Brazilian Portuguese plural forms (SOARES, 2016). These forms were traditionally pronounced with a vowel between a stop consonant and word-final sibilant, but such vowel has been undergoing gradual deletion: *crepes* ['kɾɛ.pis] ~ [kɾɛps], *potes* ['pɔ.tʃis] ~ [pɔts], *cheques* ['ʃɛ.kis] ~ [ʃɛks]. Thus, the production of word-final unvoiced clusters in BP follows from the reduction and eventual loss of unstressed high front vowels when flanked between a consonant and a word-final sibilant. It seems that such alternation also applies to plural forms produced by Brazilian speakers of L2 English, as in cakes [keɪks] ~ ['keɪ.kis] (CRISTÓFARO-SILVA; MENDES-JR., 2022).

Considering that both BP and L2 English involve the production of word-final stop + sibilant consonant clusters, our aim was to investigate whether word-final devoicing would take place in both languages and whether it could be influenced by phonological environments and task types. Thus, an experiment was designed to test the production of stop + sibilant clusters in English spoken by Brazilian speakers. Harmonics-to-noise ratio (HNR) was used to measure the degree of sibilant voicing. This paper is organized as follows: the second section describes the methodology adopted in this study, the third section discusses our findings and it is followed by the conclusions.

2 Methodology

A set of 36 plural nouns ending in a stop + sibilant cluster were considered in BP. These words present a single orthographic pattern: <Ces>, as in *cheques* [ʃɛks] ~ ['ʃɛ.kis] 'cheques'. For the L2 English case study, a set of 36 words were selected, where 15 words display the orthographic pattern <Ces>, as in *grapes* [greɪps], and the other 21 words display the orthographic pattern <Cs>, as in *maps* [mæps].

The experiment comprised two tasks. The first one consisted of a picture-counting task in which participants were asked to count and name the items shown in the pictures. Short carrier sentences that did not include orthographic stimuli of the target words were given. The second trial consisted of a reading task. Initially, participants were asked to read 72 BP sentences aloud. Alike the picture-counting task, BP nouns in the reading task were followed by either a vowel or a voiceless consonant. On the other hand, L2 English nouns were followed by either a vowel or a pause. The overall number of syllables in the sentences was controlled for both languages: 4 in English and 12 in BP. Sentence-level intonation and the morphological class of each word were also controlled.

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A group of six Brazilians studying at the Federal Center for Technological Education of Minas Gerais, in the city of Araxá, participated in this study[1]. All participants were high school students who had been taking English classes as part of the school's curriculum for about one year. The group consisted of 3 males and 3 females and their ages ranged from 15 to 17. All participants displayed either B1 or B2 proficiency levels (intermediate learners) of the Common European Framework of Reference for Languages.

Due to the recent COVID-19 pandemic, all interactions were performed remotely. Experiments were recorded with the *Open Broadcaster Software Studio* at 48 kHz sampling rate. The obtained recordings were converted into WAVEform audio format by the software *Adobe Premiere 2020*, which was able to maintain the same sampling rate as the original files. The average time to complete the experiment was 45 minutes. A total of 648 tokens were collected for the L2 English study. For the BP study, 432 tokens were collected. Samples were edited and manually annotated using Praat TextGrids (BOERSMA; WEENINK, 2020).

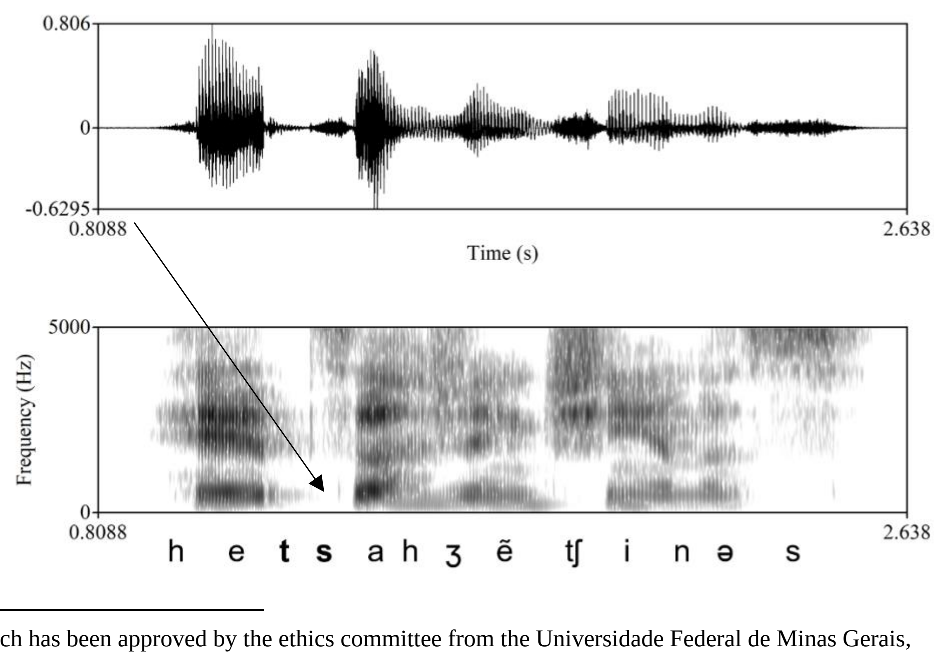
Besides assessing the presence or absence of a vowel between [Cs] clusters, this research also considered the voice quality of word-final sibilants. In BP, only voiceless sibilants occur word-finally, unless a vowel follows it, to which a voiced sibilant occurs. In English, voiced and voiceless sibilants occur word-finally. When a vowel follows the sibilant, the voice quality remains as it formerly was (rather that changing as it occurs in BP). We posited that word-final voiceless sibilants would be favored in L2 English, as it is the more robust pattern in L1. We also posited that a voiced sibilant occurs at higher rates in an intervocalic position: [Cis] followed by a word-initial vowel.

Voicing was measured under Harmonics-to-noise ratio. Each token was extracted to a separate sound object and a harmonicity object was created, from which the mean harmonicity was calculated, hereafter the HNR. The details of its calculation can be found in Boersma (1993). Harmonicity would seem to be a good measurement of voicing since vocal cord vibration produces "a complex periodic wave" (JOHNSON, 1997, p. 63). Based on the discussion from Praat's manual, higher values of HNR should correspond with higher voicing rates.

3 Results

Results showed that Brazilian Portuguese speakers tend to preserve a voiceless sibilant even in contexts where it hadn't been previously expected, and this occurs regardless of the visual presentation of the words. No statistically significant differences were found between the picture-counting task and the reading task ($\chi2 = 0.66$, df = 1, p-value = 0.41). Consider Figure 1.

Figure 1. Spectrogram and waveform of the phrase *redes argentinas* in BP.



[1] This research has been approved by the ethics committee from the Universidade Federal de Minas Gerais, reference number: CAAE: 15116119.9.0000.5149.

Figure 1 shows the spectrogram of the phrase *redes argentinas* ‘argentine hammocks’ produced by one of the subjects during the BP study, where a word-final voiced sibilant is traditionally expected. As mentioned earlier, BP only presents voiceless sibilants word-finally. However, across word-boundaries, BP sibilants are voiced when followed by a voiced consonant or a vowel: *mês* [mes] ‘month’, *mês bonito* [mez ˈbo.ni.tu] ‘beautiful month’, *mês anterior* [mez ɐ̃.te.ɾi.ˈoɾ] ‘previous month’. In Figure 1, the arrow indicates the absence of the voicing bar during the production of the of stop + sibilant cluster in the target word *redes*. If there was voicing, the region indicated in the acoustic signal would be black, not white. This indicates that not only did the sibilant remain voiceless, but the preceding stop also retained the devoiced property. In other words, there was the production of the form [he**ts** ah.ʒẽ.'tʃi.nəs] instead of [he**dz** ah.ʒẽ.'tʃi.nəs]. We should point out that word-final devoicing occurred with all cluster types investigated in the BP study: [ps, ts, ks, bs, ds, gs], even in cases where the sibilant was followed by a vowel. Consequently, we can suggest that the devoicing of stop + sibilant sequences is an emerging phenomenon in BP, following a trend that takes place in other Indo-European languages, such as Dutch (SIMON, 2010), German (BROCKHAUS, 2012) and French (JATTEAU et al., 2019). Now consider Figure 2.

Figure 2. Figure 1. Spectrogram and waveform of the phrase *two bags* in L2 English.

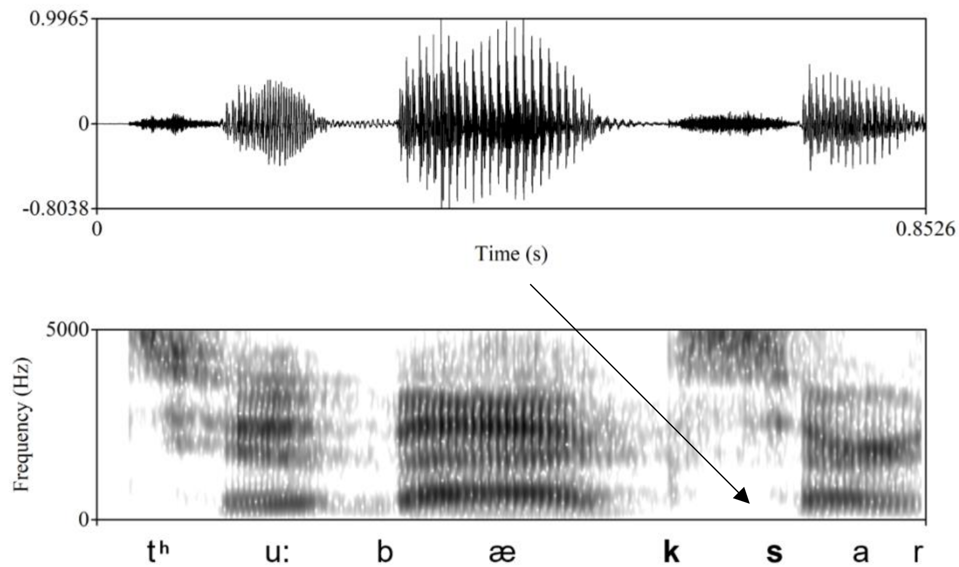
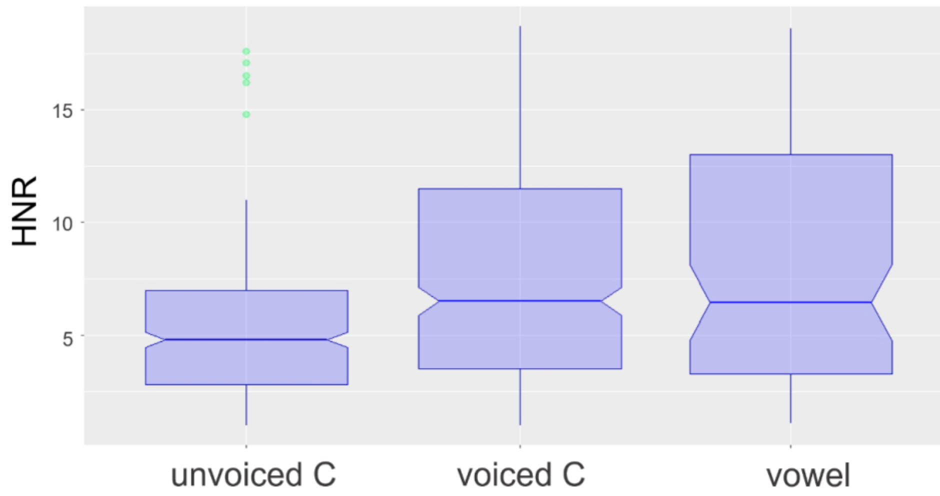


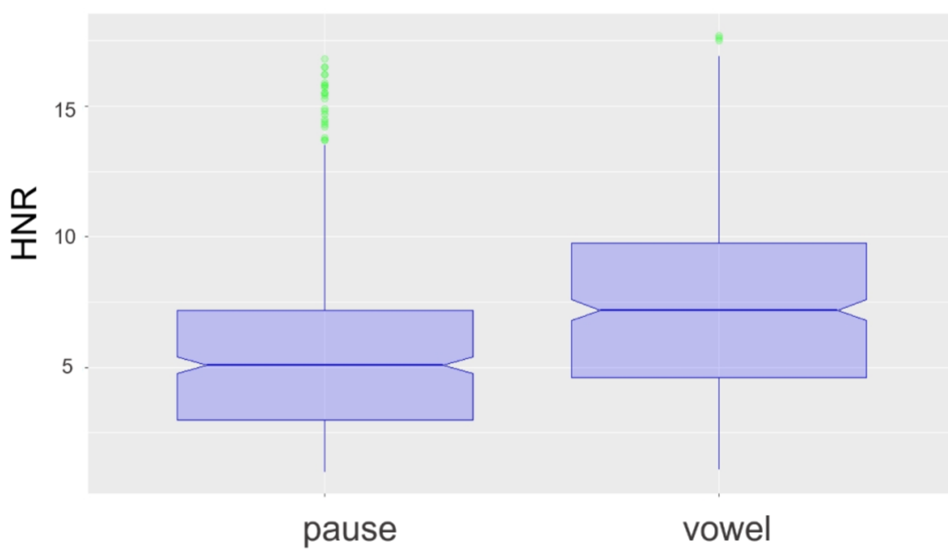
Figure 2 shows the spectrogram of the sentence “two bags are seen”, produced by one of the subjects during the L2 English study. The arrow indicates the absence of voicing in the final consonant cluster. That is, there was the production of [bæ**ks**ɑːr] instead of [bæ**gz**ɑːr], in which both the stop and the final sibilant remained voiceless. We emphasize that the devoicing of the word-final cluster occurred with all the voiced English cluster types evaluated in this research (i.e. [bz, dz, gz]), both in cases where the final sibilant was followed by a pause (e.g. *two lab*s [tuː læps]) and in cases where the final sibilant was followed by a vowel (e.g. *two labs are* [tuː læps ɑːr]). As mentioned in the previous paragraph, the devoicing of word-final sequences was significantly attested in BP (e.g. [hets ahʒẽtʃˈinəs]). This suggests that not only segments but also the fine phonetic detail - expressed by a still-emerging voicing property in the L1 - is apparently transferred to the L2. Now consider Figure 3.

Figure 3. Harmonics-to-noise ratio of the word-final sibilant per preceding phonetic environment.



The boxplots in Figure 3 show harmonics-to-noise ratio per preceding phonetic environment in L2 English. Data is comprised of sibilants preceded either by an unvoiced consonant, a voiced consonant or an epenthetic vowel. At first sight, we can see that HNR rates are somewhat lower when the sibilant is preceded by an unvoiced consonant, and higher rates are manifested when the sibilant is followed by voiced consonants and epenthetic vowels. An analysis of variance (ANOVA) on these scores yielded significant variation among conditions: $F(2,858)=59.99$, $p < 0.001$. A post hoc Tukey test showed that the group comprised of unvoiced consonants differed significantly at $p < 0.05$; the voiced consonants group was not significantly different from the epenthetic vowels group. This result suggests that epenthetic vowels contribute to higher rates of voicing as much as other voiced segments in L2 English. Now consider Figure 4.

Figure 4. Harmonics-to-noise ratio of the word-final sibilant per preceding phonetic environment.



The boxplots in Figure 4 show harmonics-to-noise ratio per following phonetic environment in L2 English. We can see that when the sibilant is followed by a pause, it tends to be unvoiced, with HNR rates at around 5 decibels. Conversely, when the sibilant is followed by a vowel, voicing rates are higher. T-test results show that there is a significant difference in HNR between both following phonetic environments ($t = -8.8153$, $df = 821.37$, p-value $< 0,01$). Finally, an interaction between both preceding and following phonetic environments was attested [F(2,858)=7.797, $p < 0.001$]. However, it is worth mentioning that even though such environments seem to influence voicing rates of the final sibilant, these rates are still lower when compared to L1 English target forms. To put it another way, nouns that should be pronounced with a word-final voiced sibilant present more unexpected voiceless sibilants than voiced ones. This can be accounted by the fact that only voiceless sibilants occur word-finally in BP. Learners are likely unaware of the fact the [z] should be voiced in accordance with the voice property of the preceding segment.

4 Conclusions

Results showed that Brazilian Portuguese speakers tend to preserve a voiceless sibilant even in contexts where it hadn't been previously expected, and this occurs regardless of the visual presentation of the words. Moreover, L2 English HNR rates showed that fully voiced sibilants are strongly influenced by the phonological environment, including preceding epenthetic vowels. It is noteworthy that, in BP, the sibilant is neutralized at the end of words; thus, Brazilian speakers takes the absence of such contrast to L2. In summary, the results reported in this study suggest that the different voicing rates of the final sibilant in L2 English can be accounted for two phenomena of BP as L1: sometimes it is influenced by the phonological environment – both preceding and following vowels - and sometimes it is influenced by word-final devoicing. A clash of both phenomena seems to be currently taking place in the learners' interlanguage.

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Wh-Questions and Resumption in Mende

Jason D. Smith
Michigan State University

1. Introduction

Question formation in Mende (ISO 639-2 *men*), an understudied SOV Mande language spoken in West Africa, provides novel insight into partial movement and resumptive pronouns. This paper is the first analysis of question formation in the Mande language family, as to this point there are only limited descriptions of wh-questions in Mande languages (Jalkunan: Heath 2017: 272-277, Mandinka: Creissels 2011: 30, Vai: Welmers 1976: 118-123, Lorma: Dwyer 1981: 100-102). I illustrate the three strategies that Mende uses in question formation and discuss their implications on partial movement and resumptive pronouns.

Questions in Mende can be either in-situ (1b), focus-fronted (1c), or partially moved (1d).

(1) a. Peter mahe-i lɔ-nga — Declarative
Peter chief-DEF.SG see-PRF
'Peter has seen the chief.'

b. Peter **yɔ-ɔ** (=ye lɔ) lɔ-nga — In-situ Question
Peter who-FOC see-PRF
'Who has Peter seen?'

c. **ye mia** Peter *ngi* lɔ-nga — Focus-fronted Question
who FOC Peter 3SG see-PRF
'Who is it that Peter has seen?'

d. Mary mɔli-nga [$_{CP}$ **ye mia** Peter *ngi* lɔ-nga] — Partially-moved Question
Mary ask-PRF who FOC Peter 3SG see-PRF
'Mary asked who is it that Peter has seen?'
(= which x [Mary asked whether Peter had seen X])

In (1a) the direct object *mahei* 'the chief' is found in its canonical pre-verbal position, while (1b) is a question that targets the direct object position. The wh-word *ye* remains in-situ and is focus-marked by Mende's in-situ focus marker *lɔ*. In (1c) the wh-word is moved to the left periphery where it is marked by *mia*, with the third person singular resumptive pronoun *ngi* surfacing in the canonical direct object surface position. (1d) shows partial movement of the wh-word *ye* 'who' to the left periphery of the embedded CP.

The remainder of this paper is structured as follows. Section 2 is a brief background on Mende, while Section 3 sketches the morphology of its wh-words. Section 4 introduces wh-question strategies, and Section 5 highlights a subject-object asymmetry with regard to resumptives pronouns. Section 6 is a conclusion.

2. Background

Mende is a Western Mande language, with the Mande languages being part of the Niger-Congo language family (Williamson and Blench 2000). There are roughly two millions Mende speakers, located primarily in Sierra Leone with additional speakers in Liberia (Eberhard, Simons, and Fennig 2020). There are four major

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dialects, with most previous research focusing on the Kɔɔ dialect (c.f. Innes 1967). My research focuses on the Sewama dialect which is spoken in and around Bo, the largest city in the Mende-speaking area. The data was collected in Bo starting in 2019 through structured elicitation with two native speakers, with on-going follow up via WhatsApp and Zoom.

Most previous research on Mende has focused on tone (c.f. Dwyer 1971, 1978, Leben 1973, Goldsmith 1978) or consonant mutation (c.f. Dwyer 1969, Conteh, Cowper, and Rice 1986, Tateishi 1990). There has been very little syntactic analysis to this point. Within the broader Mande language family Koopman's (1992) analysis of Bambara case chains is well known. Nikitina (2009, 2011, 2012, 2019) has developed an extensive analysis of Wan using an LFG framework.

Canonically, Mende has a rigid SOVX word order. It has head-initial relative clauses and has postpositions (2), though the preposition *a* is used frequently and in a variety of contexts, including instrumental constructions (3).

(2) kenɛ-i [mbe-i yeya-ni] i ji-ni **nya wɛlɛ bu**
man-SG.DEF rice-SG.DEF buy-PST he sleep-PST my house in
'the man who bought the rice slept in my house'

(3) kenɛ-i yenge-i-lɔ kpaa hun **a kali-i**
man-DEF.SG work-PST-ASP farm on with hoe-DEF.SG
'The man worked on the farm with the hoe.'

3. Morphology / Form of wh-items

Mende utilizes a full array of wh-words, as seen in *Table 1*. Plural marking is possible on *ye* 'who', *gbɛ* 'what', *mindo* 'where', and *migbe* 'when.' Interestingly, the plural marker for 'who' is *-ni*, which differs from both the definite and indefinite plural markers for nouns, *-nga* and *-sia* respectively. The plural marker for *gbɛ* 'what' is the indefinite plural marker for nouns *-nga*. The word for both 'who' and 'how' is *ye*, which is also used in the constructions for 'whose' and 'which.' This morphological complexity can also be seen in the use of *gbɛ* in the words translated as 'what' (*gbɛ*), 'when' (*migbɛ*), 'why' (*gbɛva*), and 'which' (*yegbɛ* following the targeted noun).

Table 1 – Wh Expressions

Mende Interrogative	English Translation
ye (-ni)	'who (PL)'
gbɛ (-nga)	'what (PL)'
mi-ndo (-nga)	'where (PL)'
mi-gbe (-nga)	'when (PL)'
gbɛva	'why'
ye	'how'
ye (nda) X_{indef}	'whose'
X_{def} *ye-gbɛ*	'which'
$X_{def/indef}$ *lolɛ*	'how much / many'

4. Wh-Question-formation strategies

4.1 *In-situ Questions* Questions in Mende can be asked with the wh-word either remaining in-situ or moving to the left-periphery. In this section I look first at in-situ questions. The wh-words for 'who,' 'what,' 'when,' 'where,' and 'why' can all surface in-situ, as seen in (4).

(4) a. Peter ndupu-i-sia gbafa-nga kpaa hun gboi ti hawei va
Peter child-DEF-PL insult-PRF farm on yesterday 3PL laziness for
'Peter has arrogantly insulted the children on the farm yesterday for their laziness.'

b. Peter {**ye-ni-lɔ**} gbafa-nga {**mindo lɔ**} {**migbe lɔ**} {**gbɛ-va lɔ**}
Peter who-PL-FOC insult-PRF where-FOC.I when-FOC.I why-FOC.I
'{who} {where} {when} {why} has Peter insulted?'

(4a) is a canonical sentence with SOVX order. The DP subject and object precede the verb with a series of adjuncts following it. Note that (4b) is meant to demonstrate the possible in-situ locations for the wh-words, as only one use of *lɔ* is sanctioned in a clause. This example shows that an in-situ question can target any of the arguments or adjuncts in the clause, and the targeted constituent is marked with the in-situ focus marker *lɔ*.[2]

It is not possible for *mia*, a second focus marker, to mark in-situ questions (5).

(5) *Peter **ye-ni** **mia** gbafa-nga
Peter who-PL FOC insult-PRF
Intended: 'Who (PL) has Peter insulted?'

The focus marker *lɔ* triggers vowel-harmony in various contexts, one of which is in the formation of in-situ singular 'who/what' questions. In (6b), the surface form *yɔɔ* 'who' is a derived form. The wh-word *ye* 'who' is focus-marked by *lɔ*, forming a phonological word, as a domain in which vowel harmony can occur, yielding *ye-lɔ*. Regressive vowel harmony yields *yɔ-lɔ*, before elision of the intervocalic *l*, a process that occurs frequently in Mende, yields *yɔ-ɔ*. A similar process occurs with in-situ focus of *gbɛ* in (6c), yielding *gbɔ-ɔ* 'what.'

(6) a. Peter ndupu-i maaba-i-lɔ
Peter child-DEF.SG avoid-PST-ASP
'Peter avoided the child'

b. Peter **yɔ-ɔ** maaba-ni
Peter who-FOC avoid-PST-ASP
'Who did Peter avoid?'

c. Peter **gbɔ-ɔ** maaba-ni
Peter what-FOC avoid-PST-ASP
'What did Peter avoid?'

4.2 *Focus-fronted questions* In addition to in-situ focus marking, Mende also employs a focus-fronting strategy, to which I now turn. In this construction, the wh-word moves to the left-periphery and is focused by *mia*. Consider first *ye* 'who,' which moves to the left periphery and is focused by *mia* (7). The 3rd person singular pronoun *ngi* is the resumptive pronoun for singular 'who' questions (7b), while the 3rd person plural pronoun *ti* is the resumptive for plurals (7c).

(7) a. Peter nyapu-i / nyapu-i-sia gɔkɔ-i-lɔ
Peter girl-DEF.SG / girl-DEF-PL find-PST-ASP
'Peter found the girl / girls.'

b. **ye** **mia** Peter *ngi* gɔkɔ-ni
who FOC Peter 3SG.HUM find-PST
'Who is it that Peter has found?'

c. **ye-ni** **mia** Peter *ti* gɔkɔ-ni
who-PL FOC Peter 3PL find-PST
'Who (PL) is it that Peter has found?'

[2] *gbɛ* 'what' operates the same way as *ye* 'who' in this example.

Gbɛ 'what' operates somewhat similarly, except that the singular resumptive pronoun is null. A DP direct object typically triggers word-initial consonant mutation on the following verb (e.g.(8a)), but a null pronoun does not trigger mutation (8b). For plural questions, the 3rd person plural pronoun *ti* is found in argument/adjunct position (8c).

(8) a. Peter mangu-i / mangu-i-sia gɔkɔ-i-lɔ
Peter mango-DEF.SG / mango-DEF-PL find-PST-ASP
'Peter found the mango / mangoes.'

b. **gbɛ mia** Peter ø kɔkɔ-ni
what FOC Peter 3SG.NONHUM find-PST
'What is it that Peter has found?'

c. **gbɛ-nga mia** Peter *ti* gɔkɔ-ni
who-PL FOC Peter 3PL find-PST
'What (PL) is it that Peter has found?'

Mindo 'where' can also move to the left peripheral focus position. In this instance, the resumptive pronoun is *na,* which can also mean 'there' or 'that.'

(9) a. Peter Mary lɔ-nga kpaa hun
Peter Mary see-PRF farm on
'Peter has seen Mary on the farm.'

b. **mindo mia** Peter Mary lɔ-nga *na*
where FOC Peter Mary see-PRF LOC
'Where is it that Peter has seen Mary?'

In (9a) the locative phrase *kpaa hun* 'on the farm' follows the verb. When the wh-word raises into the left-peripheral focus position in (9b), the resumptive pronoun *na* remains in its pre-movement position.

While *mindo* 'when,' and *gbeva* 'why' can move into a focus-fronted position, they do not use an overt resumptive pronoun (10a-b). Focus-fronted wh-words cannot be marked with *lɔ* (10c).

(10) a. **migbe mia** Peter Mary gbafa-nga
when FOC Peter Mary insult-PRF
'When is it that Peter has insulted Mary?'

b. **gbeva mia** Peter Mary gbafa-nga
why FOC Peter Mary insult-PRF
'Why is it that Peter has insulted Mary?'

c. ***gbeva / migbe lɔ** Peter Mary gbafa-nga
why / when FOC Peter Mary insult-PRF
'Why / when is it that Peter has insulted Mary?'

In summary, *ye* 'who', *gbɛ* 'what', *mindo* 'where', *migbe* 'when', and gbeva 'why' can all raise into the left periphery in question formation, where they are marked by *mia. Ye* 'who,' *gbɛ* 'what,' and *mindo* 'where' each co-occur with resumptive pronouns, though the third person singular resumptive pronoun for *gbɛ* 'what' is ø.

4.3 *How questions* The wh-word *ye* 'how' operates quite distinctly from other wh-words. Example (11) shows that *ye* 'how' occurs immediately following the subject, and that it cannot appear in either an in-situ or focus-fronted position.

(11) a. Peter yenge-i-lɔ kpaa hun **a** **kali-i**
Peter work-PST-ASP farm on with hoe-DEF.SG
'Peter worked on the farm with the hoe.'

b. *Peter yenge-ni kpaa hun **ye** **lɔ**
Peter work-PST farm on how FOC
'How did Peter work on the farm?'

c. ***ye** **mia** Peter yenge-ni kpaa hun
how FOC Peter work-PST farm on
'How did Peter work on the farm?'

d. Peter **ye-(*lɔ)** yenge-ni kpaa hun
Peter how FOC work-PST farm on
'How did Peter work on the farm?'

In (11a) the instrumental phrase *a kalii* 'with the hoe' occurs in a post-verbal position. (11b-c) show that the wh-word *ye* 'how' cannot appear in the same position as the instrumental phrase that it targets, nor can it appear in a focus fronted position. (11d) shows that it appears following the subject, and that it cannot be focus marked.

4.4 *Partial Movement* Thus far we have considered in-situ and full wh-movement, and I turn now to partial movement. Fanselow (2006) identifies four types of partial movement, two of which occur in Mende. In *Simple Partial Movement* (SPM) only the wh-phrase moves, while in *Particle-marked Partial Movement* (PPM) the scope of the wh-phrase is marked by a question particle and the wh-phrase can partially move. Consider first the data in (12) which shows Simple Partial Movement.

(12) a. Mary kɔ-nga [kɛ Peter mangu-i-sia mɛ-i-lɔ] Declarative
Mary learn-PRF C Peter mango-PL-DEF eat-PST-ASP
'Mary has learned that Peter ate the mangoes.'

b. Mary kɔ-nga [kɛ Peter **gbɛ-nga-a** mɛ-ni] In-situ
Mary learn-PRF C Peter what-PL-FOC eat-PST
'What has Mary learned that Peter ate?'

c. Mary kɔ-nga [kɛ **gbɛ-nga mia** Peter *ti* mɛ-ni] Partial
Mary learn-PRF C what-PL FOC Peter 3Pl eat-PST
'What has Mary learned that Peter ate?'

d. **gbɛ-nga mia** Mary kɔ-nga [kɛ Peter *ti* mɛ-i-lɔ] Full movement
what-PL FOC Mary learn-PRF C Peter 3PL eat-PST-ASP
'What is it that Mary has learned that Peter ate?'

(12a) consists of an embedded CP in a matrix clause, while (12b) shows an in-situ question in the embedded clause with *gbɛnga* 'what (PL)' in the direct object position. (12c) shows SPM with only the wh-word moving into the left-periphery of the embedded clause. In (12d) the wh-phrase moves into the left-periphery of the matrix clause. In both movement contexts, the third person plural resumptive pronoun *ti* remains in the pre-movement position.

Particle-marked Partial Movement can be seen in embedded questions, which in Mende are indicated by the question maker *ina*, which can also be translated as 'if' or 'whether.' (13a) is an embedded yes/no question with *ina* in the left most position of the embedded CP. When the direct object of the embedded questions is transformed into an in-situ wh-word, *ina* remains in the left periphery of the embedded CP question (13b). In (13c) the wh-word *gbɛnga* ‘what (PL)’ moves to the left periphery of the embedded clause, to the right of *ina*, which marks the limit of its scope.

(13) a. John mɔli-nga [ina Peter mangu-isia yeya-nga]
John ask-PRF Q Peter mango-DEF-PL buy-PRF
‘John had asked whether Peter had bought the mangoes.’

b. John mɔli-nga [ina Peter **gbɛ-nga-a** yeya-nga]
John ask-PRF Q Peter what-INDEF.PL-FOC buy-PRF
‘John had asked what (PL) Peter had bought.’
(= which X [John had asked whether Peter had bought X])

c. John mɔli-nga [ina **gbɛ-nga** **mia** Peter *ti* yeya-nga]
John ask-PRF Q what-INDEF.PL FOC Peter 3PL buy-PRF
‘John had asked what (PL) it is that Peter had bought.’
(=which X [John had asked whether Peter had bought X])

It is also possible for both the question marker and the wh-word to co-occur in the left-periphery of the matrix clause, as in (14a), in which the matrix-fronted question marker *ina* marks the scope of *gbɛnga* ‘what (PL).’ Interestingly, it also possible for the wh-word *gbɛnga* ‘what (PL)’ to move into the matrix scope position, while the question word *ina* remains in the embedded clause, as in (14b). In this instance, the data does not fit Fanselow’s typology, and it is unclear what *ina* does with regard to the wh-word’s scope.

(14) a. ina **gbɛ-nga** **mia** ngi mɔli-nga [Peter *ti* yeya-nga]
Q what-INDEF.PL FOC 1SG ask-PRF Peter 3PL buy-PRF
‘What (PL) is it I had asked that Peter had bought (them)?’

b. **gbɛ-nga** **mia** ngi mɔli-nga [ina Peter *ti* yeya-nga]
what-INDEF.PL FOC 1SG ask-PRF Q Peter 3PL buy-PRF
‘What (PL) is it I had asked that Peter had bought (them)?’

5. Resumptive Pronouns

While resumptive pronouns are common in Mende, they are not obligatorily used. In this section I highlight a subject-object asymmetry. As noted previously a resumptive pronoun remains in the pre-movement position of a wh-moved object. There is a distinction between [+human] and [-human] singular object resumptive pronouns that parallels the use of non-resumptive object pronouns. (15) shows the relevant constructions for a non-human singular object.

(15) a. Peter nike-i gɔkɔ-nga
Peter cow-DEF.SG find-PRF
‘Peter has found the cow’

b. Peter **ø** kɔkɔ-nga
Peter 3SG.NONHUM find-PRF
‘Peter has found it’

c. gbɛ mia Peter **ø** kɔkɔ-nga
what FOC Peter 3SG.NONHUM find-PRF
‘What has Peter found?’

(15a) is a canonical SOV sentence. In (15b) the singular object *nikei* ‘the cow’ is pronominalized. The pronoun is null, and the subsequent verb does not undergo word-initial consonant mutation, remaining *kɔkɔnga* ‘has found’, instead of the mutated *gɔkɔnga* found in (15a) . A similar process occurs with resumptive pronouns, as seen in (15c), where the fronted wh-question utilizes the same null pronoun that is used in the non-focus pronominal construction in (15b). This aligns with McCloskey’s (2006) argument that resumptive pronouns are simply ordinary pronouns.

When a [+human] object is used, the pronoun is phonologically expressed, as seen in (16). Instead of having a null pronoun in (16b), the 3rd person singular object pronoun *ngi* is used. Similarly, *ngi* is used as the resumptive pronoun in (16c) in the object position from which the fronted wh-word *ye* ‘who’ moved.

(16) a. Peter ndupu-i gɔkɔ-nga
Peter child-DEF.SG find-PRF
‘Peter has found the child.’

b. Peter **ngi** gɔkɔ-nga
Peter 3SG.HUM find-PRF
‘Peter has found him.’

c. ye mia Peter **ngi** gɔkɔ-nga
who FOC Peter 3SG find-PRF
‘Who has Peter found?’

Plural objects use the same resumptive pronoun, regardless of whether the object is [+human] or [-human].

(17) a. Peter nike-i-sia / ndupu-i-sia gɔkɔ-nga
Peter cow-DEF-PL / child-DEF-PL find-PRF
‘Peter has found the cows / children.’

b. Peter **ti** gɔkɔ-nga
Peter 3PL find-PRF
‘Peter has found them (the cows / the children).’

c. gbɛ-nga / ye-ni mia Peter **ti** gɔkɔ-nga
what-PL / who-PL FOC Peter 3PL find-PRF
‘What / who has Peter found?’

(17a) is a canonical sentence with alternative [-human] nikeisia ‘the cows’ and [+human] ndupuisia ‘the children’ direct objects. In both cases the same pronoun *ti* is used, whether as an object pronoun (17b) or a resumptive pronoun (17c).

While object resumptive pronouns are used consistently, wh-movement of subjects does not result in resumptive pronouns being used, contrary to how it might appear. Consider the data in (18). (18a-b) show that while plural subjects have an obligatory subject pronoun, that singular subjects cannot have one.

(18) a. ndupu-i-sia *(ti) Peter lato-nga
child-DEF-PL 3PL Peter praise-PRF
‘The children praised Peter.’

b. ndupu-i (*ngi) Peter lato-nga
child-DEF.SG 3SG Peter praise-PRF
‘The child praised Peter.’

In (18a) it is obligatory for the 3rd person plural subject pronoun *ti* to be used after the plural subject *ndupuisia* ‘the children’. (18b) has a singular subject *ndupui* ‘the child’ and it is ungrammatical to have a subject pronoun.

Having established that a subject pronoun is obligatory after a plural subject, the following example shows what happens in contexts in which a resumptive pronoun might occur, namely a focus-fronted subject (19a) and a plural fronted wh-phrase subject (19b).

(19) a. ndupu-i-sia (*ti) mia *(ti) Peter lato-nga
child-DEF-PL 3PL FOC 3PL Peter praise-PRF
'It is the children that praised Peter.'

b. **ye-ni** **mia** *(ti) (*ti) Peter lato-nga
who-PL FOC 3PL 3PL Peter praise-PRF
'Who (PL) is it that praised Peter?'

In (19a) the plural subject *ndupuisia* 'the children' moves into the left periphery where it is focused by *mia*. Crucially, the subject pronoun does not move with it, as seen by the ungrammatical marking on *ti* in the pre-*mia* position. The *ti* that follows *mia* is the un-moved subject third person plural pronoun and is obligatory. In (19b) the wh-word *yeni* 'who (PL)' moves into the left periphery. If a resumptive pronoun were required, there would be two pronouns immediately following the focus marker *mia*, however only one is permitted, the obligatory subject pronoun *ti*. At this point I am unable to offer a thorough a description of why this subject-object asymmetry exists, and as such I leave it for future research.

6. Conclusions

In this paper I have outlined the question-formation process in Mende, showing that in-situ, partial movement, and full-movement strategies are all utilized. Resumptive pronouns are used in non-subject wh-movement constructions, with a null pronoun being used for [-human] pronouns.

This is the first description of question formation in Mende. As such more work is necessary to better understand the subject-object asymmetry in regards to resumptive pronouns and the movement of wh-words beyond the scope of their question markers. Research into question-formation in the broader Mande language family is also warranted.

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On the Absence of Superiority and Weak Crossover Effects in Eton

Daniel Aremu & Haniel Enoka
Goethe University, Frankfurt

1 Introduction

The phenomena of superiority and weak crossover (WCO, henceforth)[1] have received extensive attention in the linguistic literature. Sentences like (1b) and (2b) show superiority and WCO respectively.

(1) a. Who_i t_i ate what?
b. *$What_i$ did who eat t_i?

(2) a. His_i mother saw $John_i$.
b. *Who_i did his_i mother see t_i?

While (1a) is grammatical because in such clause-mate wh-phrases, it is the higher wh-phrase that moves into the Spec,CP position (3a), (1b) is ungrammatical because it is the lower wh-phrase that undergoes movement into the Spec,CP position (3b).

(3) a. [CP Who_i [C [TP t_i ate what]]]?
b. *[CP $What_i$ [C [TP Who ate t_i]]]?

The ungrammaticality of (1b) is traditionally due to the Minimal Link Condition (MLC, henceforth) which prefers shorter movements to longer ones (Chomsky 1995).[2]

The sentence in (2b) is ungrammatical because, in English, the moved *wh*-phrase cannot be co-referenced with the possessive pronoun on a bound reading. This is technically called a weak crossover. Although, similar accounts have been shown across languages, there are languages where superiority and WCO effects are absent. The aim of this paper, therefore, is to present data and a proposed analysis for the absence of superiority and WCO effects in Eton (an understudied Bantu language spoken in Cameroon).

The paper is organized as follows. Section 2 of this paper discusses a brief background to Eton; highlighting the basic morphophonological and syntactic properties of the language. Section 3 begins with an overview of what has been proposed for superiority and WCO in the literature and few languages where either both are present or absent. The section also presents the core of the paper by describing data from Eton, and arguing for the absence of superiority and WCO in Eton. In section 4, we present Hornstein's (2001) unified analysis for superiority and WCO, and show that even though this analysis is interesting, it does not hold for Eton. We go further to propose a superficial analysis for superiority and WCO in Eton. The paper is concluded in section 5, with some discussions open for future research.

2 Background to Eton

Eton is an understudied Bantu Language spoken predominantly in Cameroon.The speakers inhabit the

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[1] Lasnik & Stowell (1991, p.689) say that WCO is "so named by Wasow (1972) because the judgments concerning the unavailability of the bound construal of the pronoun are less robust than in the case of strong crossover."

[2] Pesetsky (1987) argues that *which*-phrase (D-linking) do not occasion superiority because they are linked to a discoursed which is believed to be shared by the participants. See Hornstein and Weinberg (1990) for a rebuttal of Pesetsky's D-linking argument (Ishii 2000).

Lekie department of the Central region of Cameroon. The total number of Eton speakers is currently unknown, but according to Delpech (1985), the language has over 250,000 speakers. The Language has a noun class system which comprises of twelve classes and the classes.(Van de valde 2008).

Morphophonologically, Eton is a tonal language with three level tones assigned to each syllable. Therefore, the tone bearing unit (TBU) in the language is the syllable. According to Van de Velde (2008, p.51), the three tones that are attested in the language are: High (H); Low (L); Dissimilating high tone (D).

Syntactically speaking, Eton is an SVO language. In the literature, a question like (4a) require an all new information, and the answer usually show the basic word order in a given language. Thus, in (4b), the subject is followed by the verb, and then the object.

(4) a. Dje lot-ge?
what happen-PST
'What happened?'

b. Alima a we kapri.
A. SM kill goat
'Alima killed a goat.'

3 Superiority and WCO in Eton

3.1 *Brief Overview of Superiority and WCO* Technically speaking, superiority effects has been argued to be as a result of the preference for shortest movement over longer movement (MLC). Chomsky's notion of economy of derivation allows movement only when it is highly necessary (procrastinate), and must be triggered by a need to check certain features (Chomsky 1995, 1998, 1999). In view of this, *wh*-movement is therefore premised upon the need to check a feature, in this case, a [*wh*-feature]. This is the result of Chomsky's (1995) **Attract-F** operation.

(5) *Attract-F*:
K attracts F if F is the closest feature that can enter into a checking relation with a sub-label of K.
(Chomsky 1995, p.297)

Assuming K to be an XP, this operation requires that the sub-label of K (the X head of the XP) operates as a probe that searches downward for the closest goal (G1), with the necessary feature that it requires, and attracts G1 for feature checking. A c-commanding relation is assumed here, where K dominates and c-commands G1. G1 is closest to K if there is no other G2 intervening between K and G1, where K dominates both G1 and G2, and G1 asymmetrically c-commands G2.

Applying this knowledge to the structure in (3) above, repeated below as (6), the [*u*wh-feature] on C attracts the closest compatible goal in (6a) to its Spec position. The same thing cannot be said for (6b) because the attracted goal is not the closest. Such movement is disallowed because there is an intervener that asymmetrically c-commands the goal. This is what is known as the ***superiority effect***.

(6) a. [CP Who_i [C [TP t_i ate what]]]?
b. *[CP $what_i$ [C [TP Who ate t_i]]]?

Apart from English, another language with superiority effect is Bulgarian (7) (Bošković 2002, p.354).

(7) a. Koj kogo običa ?
who whom loves
'Who loves whom?'

b. *Kogo koj običa ?
whom who loves
Lit. 'Whom does who love?

In Bulgarian, (7a) is acceptable, and it is in line with the MLC. On the other hand, (7b) is ungrammatical because of the reason given for the English example above.

WCO effect, on the other hand, bans the movement of an R(eferantial)-expression across a non-commanding co-indexed pronoun (Crystal 2008). This type of crossover movement is banned because the co-indexation between the displaced R-expression (*wh*-phrase) and the possessive pronoun is interpreted on a bound reading. This leads to the ***WCO condition*** by Chomsky (1977).[3]

(8) *Weak Crossover Condition*:
"A variable cannot be the antecedent of a pronoun to its left."[4]
(Adesola 2006 citing Chomsky 1977, p.201)

Therefore, in example (2) above, repeated below as (9), (9a) is grammatical because it does not violate the WCO condition. In contrast, example (9b) is ungrammatical because it violates the WCO condition. The variable (*wh*-trace) cannot be co-indexed with a pronoun to its left.

(9) a. His_i mother saw $John_i$.
b. *Who_i did his_i mother see t_i?

Cross-linguistic studies have shown the presence of WCO effect in other languages such as German, Palauan, Malayalam, Korean and Kiswahili (see among others, Bresnan 1998, Baker 1995, Georgopoulos 1991, and the references therein).

However, there exist in the literature also, languages where WCO is absent. One of such languages is Yoruba. According to Adesola (2006), a sentence like (10) is acceptable in Yoruba.[5]

(10) Ta_i ni ìyá rẹ̀$_i$ fẹ́ràn t_i?
who be mother his like
'Who_i did his_i mother like t_i?'

Similar to Yoruba, Eton shows no sign of superiority nor WCO. This is the focus of the next two sub-sections.

3.2 *Superiority in Eton* The following *wh*-questions in Eton are simple (matrix) *wh*-questions. Going by the MLC, (11a) is grammatical because we assume that the subject *wh*-phrase occupies the Spec,CP in the left periphery of the clause.[6] In contrast, (11b) is supposed to be ungrammatical due to superiority. However, in Eton the sentence is perfectly fine. Instead of the closest *wh*-phrase being attracted, it is the object *wh*-phrase that moves from its base position into the left periphery.

(11) a. Zá$_i$ t_i á-kus-gè jé?
who 3SG-buy-PST what
'Who bought what?'

b. Jé$_i$ zá á-kus-gè t_i?
what who 3SG-buy-PST
Lit. 'What did who buy?'

Such absence of superiority is not limited to simple *wh*-qhestions. Long distance or embedded *wh*-questions also show absence of superiority effect. (12a) is a typical embedded wh-question where superiority effect is not anticipated. The sentences in (12b & c) are equally grammatical despite the fact that the object *wh*-phrases in both, move across another *wh*-phrase, into the left periphery of the entire clause.

[3] This has also been called the *Leftness Condition* (LC) (Koopman & Sportiche, 1982, Haegeman 1994).
[4] This condition will be modified below under Hornstein's (2001) unified analysis for superiority and WCO.
[5] Also See Adesola (2006) for a discussion on the absence of superiority in Yoruba.

[6] Whether there is subject *wh* movement in Eton or not is to be seen. In other to see this, we will have to carry out movement tests such as island tests. This has not been done, however.

(12) a. John a-kat-ge zá na a-di-ge jé?
J. 3SG-tell-PST who COMP 3SG-eat-PST what
'John told who that he ate what?'

b. Jé John a-kat-ge za na a-di?
what J. 3SG-tell-PST who COMP 3SG-eat
Lit. 'What did John tell whom that he ate?'

c. Jé John a-kat-ge Haniel na za a-di?
what J. 3SG-tell-PST H. COMP who 3SG-eat
Lit. 'What did John tell Haniel that who ate?'

What this tells us is that in Eton, superiority is absent.[7] This gives support to what Adesola (2006) observed for Yoruba, and to the fact that superiority is not a universal effect after all.

3.3 *Weak Crossover in Eton* We also noticed that structures that result in WCO effect in other languages, is perfect in Eton. Using (13a) as our baseline sentence, the object of the verb *gé* can be co-referenced with the possessive pronoun *nyé*, that is both can refer to the same person. More technically, we can say that Binding Principle C is not violated since the possessive in this case does not c-command the R-expression. If WCO is present in Eton, we expect a sentence like (13b) to be ungrammatical on a bound reading. This is not the case however. The dislocated wh-phrase and the possessive can still refer to one and the same person. This is unexpected if a language has the WCO effect.

(13) a. Nyéklè $nyé_i$ à-lót-gé $John_i$
teacher his 3SG-call-PST him
'His teacher called him.'

b. $Zá_i$ [nyéklè $nyé_i$ a-lót-gé t_i]?
who teacher his 3SG-call-PST
'Who did his teacher call?' (* in English on a bound reading)

Whether the structure is a simple or an embedded clause does not matter. In (14b), we have an embedded clause where even though the *wh*-phrase is moved to the left periphery of the matrix clause, it can still share the same reference with the possessive within the subject DP of the embedded clause.

(14) a. Mary a-kat-ge na nyéklè $nyé_i$ a-lot-ge $nyé_i$
M. 3SG-say-PST COMP teacher his 3SG-call-PST him
'Mary said that his_i teacher called him_i.'

b. Za_i Mary a-kat-ge na nyéklè $nyé_i$ a-lot-ge t_i?
who M. 3SG-say-PST COMP teacher his 3SG-call-PST
'Whoi did Mary say that hisi teacher called?' (* in English on a bound reading)

So far, we have shown that while superiority and WCO effects are present in many languages, they are absent in Eton. Next, we turn to Hornstein's proposal that unifies both superiority and WCO effects. We further show that, although this analysis captures languages with superiority and WCO well, it does not hold for Eton.

4 Hornstein's (1995, 2001) Unified Analysis and the Proposal for Eton

4.1 *Hornstein's Unified Analysis* Hornstein (1995, 2001) believes that it is possible to assimilate both superiority and the WCO effects into each other. He did this by assuming that "a *wh*-in-situ is interpreted functionally, and that the idea is to treat functionally interpreted *wh*-phrases as similar to bound

[7] The claim that superiority is absent in Eton entirely is not yet founded, as there might be contexts, which are yet to be seen, where superiority effect holds. Nevertheless, so far, we have at least seen the absence of superiority in some contexts.

pronouns within complex DPs." (Hornstein 2001, p.140). To make this clearer, consider the sentence in (15). If everyone is paired with the possessive his in the complex DP, it is seen as a bounding relation. Therefore, Hornstein says that "the sentence is true just in case there is a pairing of every relevant person in the domain with another individual, namely that person's mother, and the relevant individual loves the person he is paired with."

(15) Everyone loves his mother

Extending this to multiple *wh*-questions, we can assume that the in-situ object *wh*-phrase in (16) is analogous to the possessive DP in (15). For simplification, we can therefore disintegrate the object *wh*-word into what Hornstein called a *bound pronominal part* and a *nominal restrictor*. This means that both parts can correspond to the complex DP *his mother* respectively.

(16) Who loves what?

Thus, we can have (17) as a disintegration of ***who*** and ***what*** respectively. This is capable of accounting for superiority and WCO effects.

(17) a. *pro* + person = who
b. *pro* + thing = what

Given (17), the structure of a sentence like (16) will look like (18).

(18) [CP Who$_i$ [IP t$_i$ saw [pro$_i$ thing](=what)]]?

In order to account for structures that violate superiority and WCO, Hornstein (2001, p.140) proposes a (revised) Weak Cross Over Condition stated as follows:

(19) A pronoun cannot be linked to a WH-t/variable to its right.

Going by the WCO condition in (19), (20a) is fine because the pronoun is not linked to a variable to its right, but to its left. In contrast, (20b) is ungrammatical because it violates the WCO condition. The pronoun is linked to a variable to its right.

(20) a. Who ate what?
[CP Who$_i$ [IP t$_i$ ate [pro$_i$ thing](= what)]?

b. *What did who see?
*[CP what$_i$ [IP [pro$_i$ person] (=who) eat t$_i$]]?

Similar result is gotten in WCO as exemplified in (21) below. (21b) is ungrammatical because it violates the WCO condition.

(21) a. Who$_i$ t$_i$ saw his$_i$ mother.

b. *Who$_i$ did his$_i$ mother see t$_i$.

Extending this analysis to Eton does not change the status of superiority and WCO in the language. The structure in (22a) does not violate the WCO condition. Therefore, it is grammatical. However, (22a) violates the WCO condition, and yet it is not ungrammatical in Eton.

(22) a. Zá á-kus-gè jé? [CP Zá [IP t_i á kus-gè [pro$_i$ thing] (=jé)]]
who 3SG-buy-PST what
'Who bought what?'

b. Jé$_i$ zá á-kus-gè t_i? [CP Jé$_i$ [IP [pro$_i$ person] (=zá) á kus-gè t_i]]
what who 3SG-buy-PST
Lit. 'What who buy?'

The same result holds for WCO in Eton. The pronoun *nyé* in (23b) is linked to a variable to its right. Although this violates the WCO condition, it is nevertheless grammatical in Eton.

(23) a. Zá$_i$ [nyéklè nyé$_i$ a-lót-gé t_i]?
who teacher his 3SG-call-PST
'Who did his teacher call?' (* in English on a bound reading)

b. [CP Zá$_i$ [nyéklè nyé$_i$ a ló-gì t_i]]

How then do we account for the absence of superiority and WCO in Eton?

4.2 *Towards a Theoretical Analysis* We begin by saying that not all kinds of operator-like movement induces WCO effects. For instance, according to Lasnik & Stowell (1991, p.695), "WCO effects fail to appear in tough-movement constructions." For example, consider the tough construction in English below (Lasnik & Stowell 1991, p.695):

(24) John$_i$ was hard [NO$_i$ [PRO to persuade his$_i$ boss [PRO to vouch for e_i]]]

The structure in (24) assumes a somewhat base-generation of *John*, and it is the Null Operator (NO) that undergoes movement from the object of the lower PP (that is deeply embedded within an infinitival clause itself) to the left periphery of the entire non-finite clause. The NO therefore binds both the possessive and its trace. This causes no WCO effect.
The question that readily comes to mind is that what if we assume a bi-clausal and a null operator movement for Eton too? Thus an object *wh*-question like (25a) will have a structure like (25b).

(25) a. Jé$_i$ Haniel á-kus-gè t_i?
what H. 3SG-buy-PST
'What did Haniel buy?'

b. [PredP Jé$_i$ [Pred' [Pred Ø] [CP OP$_i$ [C' [C Ø] [TP Haniel á-kus-gè t_i]]]]]?

If our assumption is right, then the absence of superiority and WCO effects in Eton is (perhaps) solved. This also means that *wh*-questions in Eton do not involve simple *wh*-movement like the *wh*-questions in English. To further support this, Safir (2004) notes that "WCO effects do not arise whenever a pronoun in the scope of a null operator has an external antecedent" (cf. Adesola 2005). Therefore, (26) will be the structure for (22b), where the bound pronominal in the scope of the NO has an external antecedent instead. In other words, the trace in the object position is the result of a NO movement, and not the *wh*-phrase. The *wh*-phrase *Jé* occupies a higher projection above the CP where it c-commands the pronoun and does not violate the WCO condition.

(26) [Jé$_i$ [CP OPi Ø [IP [pro$_i$ person] (=zá) á kus-gè t_i]]

Thus, adopting this analysis allows for an explanation for the the absence of superiority and WCO effects in Eton.

5 Conclusion

This paper discusses the absence of superiority and WCO effects in an understudied Bantu language: Eton. Despite the common view in the literature that most languages of the world attest superiority and WCO effects, we have seen that there are languages where these effects are absent. An example of such languages are Yoruba (Adesola 2005, 2006) and Eton, as proposed in this paper. Although the data from Eton show promising evidence for the absence of superiority and WCO effects, the analysis proposed is still very much in a cradle state. For the proposed analysis to be well-founded, further research needs to be carried out to prove whether wh-queations in Eton indeed bi-clausal and involves null operator movement. Therefore, this paper is just a modest contribution to these aspects of the language, and not in any way the whole.

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The Interaction of Music Accent and Mandarin Prosodic Structures

Wang-Chen Ling
Taipei Medical University

1 Introduction

This paper investigates the interaction of music accent and language at different levels of Mandarin prosodic structure. The reconciliation of language and music is observed through melody composing in Mandarin children's songs. The melody composers interpret the lyrics and output the prosodic structure according to the syntactic structure of the lyrics. They then map the prosodic structure to music beats and finally output the song we hear.

The prosody of Mandarin shows its language rhythm. Scholars including Selkirk (1980), Nespor and Vogel (1986), and Inkelas (1989) propose the prosodic hierarchy in (1), which universally exists.

(1)
Utterance (U)
|
Intonational Phrase (IP)
|
Phonological Phrase (PhP)
|
Prosodic Word (PrWd)
|
Foot (Ft)
|
Syllable (Syl)

The higher levels of the prosodic structure dominate the lower levels. The importance of each prosodic structure differs in different languages. This paper focuses on syllable, foot and intonational phrase, which are essential in Mandarin and examines how they interact with music accent.

Before we discuss the interaction of language prosody and music accent, some music basics will be introduced first. Musical beat is the fundamental element that characterizes music rhythm. Beats are organized by patterns of strong and weak beats and divided into measures. Please consider (2).

(2) 

In the *four-four* time signature in (2), the upper *4* indicates that there are four beats in a measure and the *lower 4* shows that a quarter note is regarded as one beat. The first beat in each measure is the strongest beat. Both the first and the third beats have natural accents, whereas the second and the fourth beats naturally do not have accents and thus are weak beats.

Please consider (3) for the *three-four* time signature.

(3) 

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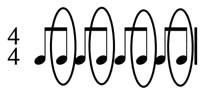
In the *three-four* time signature, the number, *3*, indicates that there are three beats in a measure while the number, *4*, shows that a quarter note is regarded as one beat. The first beat has accent whereas the rest of the beats are relatively weak.

The notes that are not *on the beat* are also weak beats. Take the *four-four time* signature for example.

(4) 

As illustrated in (4), we can subdivide the four beats into eight eighth notes. The circled notes are not *on the beat* and thus are weak.

Previous studies (Fang & Su 2005; Li 2009) have found that children's songs value the rhythmic correspondence of language and music, which facilitate Mandarin learning of children. Therefore, in order to examine the language-to-music mapping, I establish a database and collect 39 Mandarin children's songs, which are suitable for children from zero to eight years old. In the database, the lyrics are written first and the melody composers interpret the lyric and compose melody according to the rhythmic correspondence between language and music. The interaction of music accent and Mandarin syllable, foot and intonational phrase (IP) is presented in the following sections.

2 Music accent and Mandarin syllable

The Mandarin neutral-toned syllables are unstressed and they are mapped to unaccented music beats.

(5) 

da ***le*** *yi-* *zuo* *xiao* *diao-* *qiao*
build ASP one CL little drawbridge
'Built a drawbridge.'

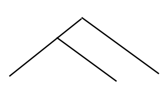
As shown in (5), *le*, the aspect marker, is a neutral-toned syllable, which is unstressed. The unstressed *le* is mapped to the weak beat, which is not *on the beat*.

3 Music accent and Mandarin Foot

The interaction of music accent and Mandarin prosody is also shown in foot. The strongest beat in a measure is mapped to the Mandarin foot initial syllable. I will briefly introduce how music composers interpret the existing lyrics and form the Mandarin foot.

Along the lines of Shih (1986) and Hsiao (1991), this study considers that Mandarin foot is formed according to the following conditions. First, a pair of syllables that are immediate constituents form a binary foot, called the *immediate constituent foot* (ICF).

(6)

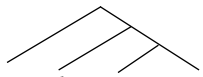


zhou *mu* *niao*
peck wood bird 'woodpecker'
ICF

As shown in (6), *zhou-mu*, 'peck wood' are a pair of immediate constituents, which form an ICF.

Second, scanning from left to right, adjacent syllables are paired into a disyllabic *adjacent beat foot* (ABF) after ICF is formed.

(7)



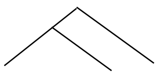
wo *shi* *tu-* *zi*
1SG COP rabbit 'I am a rabbit.'

ABF ICF

In (7), the pair of ICs, t*u-zi*, 'rabbit,' form an ICF. Then the adjacent syllables, *wo shi*, 'I am' form an ABF.

Third, unparsed monosyllable joins its adjacent foot to form a Jumbo Foot (JF), which contains more than two syllables.

(8)



zhuo *mu* *niao*
peck wood bird 'woodpecker'

ICF

As shown in (8), *zhuo-mu*, 'peck wood,' forms an ICF first. The unparsed *niao*, 'bird,' then forms a jumbo foot (JF) with the ICF, *zhou-mu*, 'peck wood'.

The way Mandarin foot domain interacts with music accent is introduced below. As mentioned in section one, the first beat in each measure has the strongest beat. Please consider (9).

(9)

(*zhuo-* *mu* *niao*) JF
peck wood bird
'woodpecker'

In (9), the first beat in the measure, which is the strongest beat, is mapped to the foot initial syllable, *zhuo*. In other words, the strongest beat signals the foot initial position.

4 Music accent and Mandarin intonational phrase

The fact that Mandarin IP-final syllables tend to have longer musical duration influences the assignment of music beats. I will define the domain of an intonational phrase first.

The domain of an intonational phrase can be syntactically or semantically defined (Halliday, 1967; Downing, 1970; Selkirk, 1984). Among the researchers, the definition provide by Selkirk (1984) is widely used. Selkirk (1984:291) proposes that an intonation phrase has to be a Sense Unit. The Sense Unit condition is shown in (10).

(10) Sense Unit Condition (Selkirk 1984:291)

Two constituents C_i, C_j form a sense unit if (a) or (b) is true of the semantic interpretation of the sentence:
(a) C_i modifies C_j (a head),
(b) C_i an argument of C_j (a head).

For example, *little* modifies *rabbit* so *little rabbit* conforms to (10a) and forms a sense unit. In *the monkey jumps*, *the monkey* is the argument of *jumps*, which conforms to (10b). Adjacent Sense Units can be combined to form a bigger intonational phrase.

In this study, the punctuations such as commas and periods denote IP final positions.

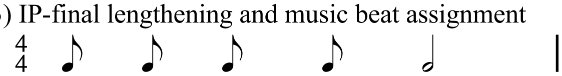
(11) **(**(*yi* *zhi*)$_{\text{ABF}}$ (*xiao* (*hou-zi*)$_{\text{ICF}}$)$_{\text{JF}}$**)**$_{\textbf{IP}}$ 。
one CL little monkey
'One little monkey.'

(12) **(**(*wo* *shi*)$_{\text{ABF}}$ (*xiao* *tu-zi*)$_{\text{JF}}$**)**$_{\textbf{IP}}$ 。
1SG COP little rabbit
'I am a bunny.'

The periods in (11) and (12) mark the domains of the intonational phrases. These intonational phrases also conform to the Sense Unit Condition.

After defining the domain of a Mandarin intonational phrase, this study examines how music accent interacts with Mandarin within the intonational phrase domain.

(13) IP-final lengthening and music beat assignment



((*yi* *zhi*)$_{\text{ABF}}$ (*xiao* (*hou-* *zi*)$_{\text{ICF}}$)$_{\text{JF}}$**)**$_{\textbf{IP}}$
one CL little monkey
'one little monkey'

Mandarin IP-final syllables tend to have longer musical duration. As illustrated in (13), in order to make the IP-final syllable, *zi*, longer, it is forced to show earlier and thus is mapped into a stronger beat. The IP-final *zi* is thus mapped to two beats, which is longer than the preceding half beat. However, *zi* is a Mandarin neutral-toned suffix, which is unstressed. This shows the conflict between the two constraints in (14).

(14)
a. IP-final syllable has longer musical duration.
b. Mandarin unstressed syllables are mapped to weak musical beats.

(14a) wins since *zi* is forced to be mapped to a stronger note to require longer musical duration even though *zi* is a unstressed syllable.

As proposed in section three, the strongest beat in a measure is mapped to the Mandarin foot initial syllable. However, this constraint can be dominated due to the fact that IP-final syllable tends to have longer musical duration.

(15) IP-final lengthening and music beat assignment

((*wo* *shi*)$_{\text{ABF}}$ (*xiao* *tu-* *zi*)$_{\text{JF}}$
1SG COP little rabbit

As shown in (15), in order to make the IP-final syllable have longer musical duration, the unstressed *zi* is assigned to the second measure and has four beats whereas its preceding syllable, *tu* only has one beat. By doing so, the strongest beat is not mapped to the foot initial syllable.

The constraint conflicts can be analyzed within the framework of Optimality Theory (Prince and Smolensky 2004) as shown in section five below.

5 An Optimality Theory analysis

The interaction of music accent and different Mandarin prosodic levels shows the competition between different constraints. The higher ranked constraints are satisfied at the sacrifice of the lower-ranked constraints. This paper analyzes the language-to-music interaction within the framework of Optimality Theory (Prince and Smolensky 2004). The relevant constraints are provided in (16-18).

(16) *$\sigma_{n-1} \geq \sigma_n]_{IP}$:
Assign one violation mark for every IP-final syllable whose musical duration is equal to or shorter than its preceding syllable.

(17) Align-L(Primary accent, Ft)
Assign one violation mark for the strongest beat in a measure that is not left-aligned with the foot initial syllable.

(18) *Accented Neu-T-σ
Assign one violation mark for every neutral-toned syllable (unstressed syllables) that are mapped into accented beats (strong beats).

Constraint (16) demands that IP-final syllables must have longer musical duration. Constraint (17) requires that the strongest beat in a measure should be left-aligned with the foot initial syllable. Constraint (18) forbids Neutral-toned syllables (or unstressed syllables) to be mapped into strong beats. The constraints compete with each other and *$\sigma_{n-1} \geq \sigma_n]_{IP}$ conquers the other constraints. The constraint ranking is proposed in (19) and tableaux (20-21) illustrate the constraint competition.

(19) *$\sigma_{n-1} \geq \sigma_n]_{IP}$ >> Align-L (Primary accent, Ft), *Accented Neu-T-σ

Tableau (20) examines the competition between *$\sigma_{n-1} \geq \sigma_n]_{IP}$ and Align-L(Primary accent, Ft).

(20) Input:
((*wo* *shi*)$_{ABF}$ (*xiao* *tu-* *zi*)$_{JF}$)$_{IP}$
1SG COP little rabbit
'I am a bunny.'

Candidates:

a. 
((*wo* *shi*)$_{ABF}$ (*xiao* (*tu-* *zi*)$_{ICF}$)$_{JF}$)$_{IP}$
1SG COP little rabbit

b. 
((*wo* *shi*)$_{ABF}$ (*xiao* *tu-* *zi*)$_{JF}$)$_{IP}$
1SG COP little rabbit

*$\sigma_{n-1} \geq \sigma_n]_{IP}$ >> Align-L (Primary accent, Ft),

	*$\sigma_{n-1} \geq \sigma_n]_{IP}$	Align-L (Primary accent, Ft)
☞candidate a		*
candidate b	*!	

In (20), the input is the composer's interpretation of the lyric prosodic structure. The candidates refer to how the composer may map the lyric to music melody. Candidate (a) satisfies*$\sigma_{n-1} \geq \sigma_n]_{IP}$ since the IP-final syllable, *zi*, is mapped to four beats, which is longer than its preceding syllable, *tu*, which only has one beat. However, the lower-ranked constraint, Align-L (Primary accent, Ft), is sacrificed because the strongest beat in the second measure is mapped to *zi*, which is not a foot initial syllable. On the other hand, candidate (b) violates the higher ranked constraint because the IP-final syllable, *zi*, is linked to a half note, which is not longer than its preceding note. Therefore, candidate (b) is fatally ruled out whereas candidate (a) is selected as the optimal output.

Tableau (21) illustrates the competition between the longer musical duration of the IP-final syllables and the language-to-music mapping of unstressed syllables.

(21) Input:

((*yi* *zhi*)$_{ABF}$ (*xiao* (*hou-* *zi*)$_{ICF}$)$_{JF}$)$_{IP}$
one CL little monkey
'one little monkey'

Candidates:

a. 4/4 ♪ ♪ ♪ ♪ 𝅗𝅥 |
((*yi* *zhi*)$_{ABF}$ (*xiao* (*hou- zi*)$_{ICF}$)$_{JF}$)
one CL little monkey

b. 4/4 ♪ ♪ ♩ ♩. ♪ |
((*yi* *zhi*)$_{ABF}$ (*xiao* (*hou-* *zi*)$_{ICF}$)$_{JF}$)
one CL little monkey

$*\sigma_{n-1} \geq \sigma_n]_{IP}$ >> *Accented Neu-T-σ

	$*\sigma_{n-1} \geq \sigma_n]_{IP}$	*Accented Neu-T-σ
☞candidate a		*
candidate b	*!	

In candidate (a), the IP-final, *zi*, satisfies$*\sigma_{n-1} \geq \sigma_n]_{IP}$ because *zi* is mapped to two beats and has longer musical duration than its preceding syllable, which is linked to a half beat. In order to satisfy $*\sigma_{n-1} \geq \sigma_n]_{IP}$, candidate (a) violates *Accented Neu-T-σ since the unstressed *zi* is mapped to a strong beat. Nevertheless, Candidate (a) is still chosen as the optimal output because *Accented Neu-T-σ ranks low. As for candidate (b), even though *zi* is mapped to an unaccented beat, it is still fatally ruled out. Since Candidate (b) violates the top-ranked $*\sigma_{n-1} \geq \sigma_n]_{IP}$ because the IP-final *zi* is not mapped to a beat with longer musical duration than its preceding beat. As a result, candidate (a) emerges as the optimal output.

6 Conclusion

In this cross-disciplinary study, I examine how language and music interact and reconcile with each other at different Mandarin prosodic levels. Mandarin unstressed syllables are mapped to musical weak beats. The strongest beat in each music measure is left-aligned with Mandarin foot initial syllable. However, in order to satisfy the constraint that syllable at Mandarin intonational phrase final position tends to have longer musical duration, the aforementioned language-to-music mappings can be sacrificed. This paper then analyzes the constraint competition within the framework of Optimality Theory (Prince and Smolensky 2004) and provides the ranking that $*\sigma_{n-1} \geq \sigma_n]_{IP}$ outranks both Align-L (Primary accent, Ft) and *Accented Neu-T-σ.

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Prosodized Floating Tone in Triplications of Three Taiwan Hakka Dialects

Yuchau E. Hsiao
National Chengchi University

1 Introduction

This paper addresses the tone patterns of the triplications in three Hakka dialects spoken in Taiwan, i.e., Sixian, Hailu and Dongshi. Sixian is the largest Hakka dialect in Taiwan, which is most popularly used in the County of Miaoli, located in northwestern Taiwan. Hailu is the second largest Hakka dialect in Taiwan, mainly used in two other counties, Sinchu and Taoyuan, of northwestern Taiwan. Dongshi is a Hakka dialect spoken in the Town of Dongshi, located in central Taiwan. Hakka dialects in China display no triplications as those in Southern Min dialects, but in Taiwan the Hakka dialects are under the influences of Taiwanese[1], after their interactions with the latter for over 70 years. These three dialects in Taiwan have then developed some similar triplicated forms like Southern Min, particularly Taiwanese, though the Hakka triplications are not very popularly used. The rest of this paper is organized as follows. Section 2 introduces the emphatic suffix in Southern Min, which is the origin of the floating tone in triplication. Sections 3-5 discusses the triplications in Sixian, Hailu and Dongshi respectively. Section 5 offers an OT analysis of the floating tones in the triplications, followed by the conclusion in section 7.

2 Southern Min Triplication

The triplication in some Southern Min dialects may be affixed with an emphatic morpheme *a*, and surfaces in form of A*a*AA, as observed in Chen (1984). The -*a* is an emphatic suffix, and its base tone is mostly a high-falling tone, HM, such as Longyan,[2] and Taiwanese, etc. I would like to argue here that when the -*a* suffix is deleted, the HM tone is preserved as a floating tone, ⒽⓂ.

The segment of the -*a* suffix in Taiwanese is absent, but the Ⓗ-element of the floating ⒽⓂ is associated with the leftmost syllable of the triplication, while the Ⓜ-element of it is deleted. The leftmost syllable of the triplication surfaces with two tone roots (a regular sandhi tone or base tone plus the floating Ⓗ-element); namely, the derived form is not a single tone but a tonal cluster. The addition of this emphatic floating tone results in a super-stress on the leftmost syllable of the triplication, which is the prosodic head of the triplication and thus prefers a high register tone or tone cluster.

Like Taiwanese, only the Ⓗ-element of the floating ⒽⓂ is left-adjoined in Sixian. In Hailu, it appears to show a case of tonal metathesis. Dongshi allows the floating ⒽⓂ to split and be shared by the leftmost and medial syllables. These patterns will be examined closely in the following sections.

3 Sixian Triplication

There are six base tones in Sixian, including four smooth tones and two checked tones. A smooth syllable is an open syllable or a syllable that ends in a sonorant. A tone carried by a smooth syllable is usually referred to as a smooth tone, or a long tone. A checked syllable ends in a glottal or unreleased voiceless stop, such as [ʔ], [p], [t] and [k]. A tone carried by a checked syllable is usually referred to as a checked tone, or a short tone. Only one of the six tones in Sixian is subject to tone sandhi; namely, MH maps to L before another MH, as formalized in (1).

[1] Taiwanese refers to the Southern Min dialect used in Taiwan.
[2] Longyan is a Southern Min dialect located in the Southwest area of Hokkian Province.

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(1) MH ⟶ L / ____ MH

For example, the monosyllable in (2a) carries its base tone, MH. In the disyllabic reduplication of (2b), the left syllable undergoes tone sandhi and carries a sandhi tone, L. In the triplication of (2c), only the Ⓗ-element of the floating (HM) is adjoined to the leftmost syllable and combined with the sandhi L. The register of L is raised here in this super-stressed position, as illustrated in (3), where the floating tone is circled. and an MH cluster is eventually derived.

(2) a. son 'sour'
MH
b. son son 'a little sour'
L MH
c. son son son 'very sour'
MH L MH

(3) L (HM) ⟶ L Ⓗ~~Ⓜ~~ ⟶ M H

In (4), tone sandhi is not applicable. In (4c), the ML base tone is combined with the floating Ⓗ-element.

(4) a. pjen 'flat'
ML
b. pjen pjen 'a little flat'
ML ML
c. pjen pjen pjen 'very flat'
MH ML ML

ML is simplified as M, as illustrated in (5), in order to avoid concave clusters like *[ML H] or *[HM H].

(5) ML (HM) ⟶ M Ⓗ~~Ⓜ~~ ⟶ M H

4 Hailu Triplication

There are seven base tones in Hailu, including five smooth tones and two checked tones. Two of the seven tones are subject to tone sandhi; in nonfinal position, LM maps to L, and <u>H</u> maps to <u>M</u>, as formalized in (6), where the checked tones are underlined.

(6) a. LM ⟶ L
b. <u>H</u> ⟶ <u>M</u>

Consider first the triplication in (7).

(7) a. lo 'old'
LM
b. lo lo 'a little old'
L LM
c. lo lo lo 'very old'
MH L LM

The monosyllable in (7a) carries its LM base tone. In the disyllabic reduplication of (7b), the left syllable undergoes tone sandhi and carries a sandhi tone, L. In the triplication of (7c), only the Ⓗ-element of the floating (HM) is adjoined to the leftmost syllable and combined with the sandhi L. The register of L is raised in this super-stressed position, as illustrated in (8), where the Ⓜ-element is deleted and then an MH cluster is derived.

(8) L Ⓗⓜ ⟶ L Ⓗ~~Ⓜ~~ ⟶ M H

There is also a checked tone sandhi, namely, $\underline{\text{H}}$ maps to $\underline{\text{M}}$. Consider now the triplication in (9), where the checked tones are underlined.

(9)
a. sip — ‘wet’
$\underline{\text{H}}$
b. sip sip — ‘a little wet’
$\underline{\text{M}}$ $\underline{\text{H}}$
c. sip sip sip — ‘very wet’
MH $\underline{\text{M}}$ $\underline{\text{H}}$

The monosyllable in (9a) carries its H base tone. In the disyllabic reduplication of (9b), the left syllable undergoes tone sandhi and carries a sandhi tone, M. In the triplication of (9c), only the Ⓗ-element of the floating (HM) is adjoined to the leftmost syllable and combined with the M base tone, as illustrated in (10), where the Ⓜ-element is deleted and then an MH cluster is derived.

(10) M (HM) ⟶ M Ⓗ~~Ⓜ~~ ⟶ M H

Finally, let us look at (11), where the tone sandhi rules are not applicable.

(11)
a. vu — ‘black’
$\underline{\text{HM}}$
b. vu vu — ‘a little black’
$\underline{\text{HM}}$ $\underline{\text{HM}}$
c. vu vu vu — ‘very black’
MH H$\underline{\text{M}}$ $\underline{\text{HM}}$

In (11c), the HM base tone is combined with the floating Ⓗ-element, as illustrated in (12).

(12) HM (HM) ⟶ HM Ⓗ~~Ⓜ~~ ⟶ M H

With the adjunction of the floating Ⓗ-element, there is a need to avoid a high-level tone sequence (*H H) and a concave contour (*HM H), and thus the sandhi H is lowered as M, whereby an MH cluster is still derived.

5 Dongshi Triplication

There are six base tones in Dongshi, including four smooth tones and two checked tones. Three of the six tones are subject to tone sandhi. First, M maps to MH before L or ML. Second, L maps to M before another L. Third, HM maps to H before another HM. The rules are formalized in (13).

(13)
a. M ⟶ MH / ___ Lr
b. L ⟶ M / ___ L
c. HM ⟶ H / ___ Hr

In spite of the rule in (13a), M is always followed by another M in reduplication, as in (14b), and thus no tone sandhi occurs here. In the triplication of (14c), only the Ⓗ-element of the floating (HM) is adjoined to the leftmost syllable and combined with the M base tone, and finally an MH cluster is derived. Particularly, all the floating tone melodies in Dongshi are required to surface. Consequently, the Ⓛ melody of the floating (HM) is linked to the second syllable, as illustrated in (15), where T stands for any tone.

(14) a. kong 'light'
<u>M</u>
b. kong kong 'a little light'
<u>M</u> <u>M</u>
c. kong kong kong 'very light'
MH L <u>M</u>

(15) (M Ⓗ)$_\sigma$ (Ⓜ T)$_\sigma$ ⟶ (M Ⓗ)$_\sigma$ (Ⓜ Ŧ)$_\sigma$ ⟶ (M H)$_\sigma$ (L)$_\sigma$

Liberman (1975), and Liberman & Prince (1977) argue for a designated terminal element, which is associated with a prosodic head, the most prominent element in a prosodic structure. Goldsmith (1987) suggests that it is easier for a prominent position to attract a high tone. Prince & Smolensky (1993) posit a prominence scale to evaluate tone, and considers a high tone more prominent than a low tone. de Lacy (1999) combines these ideas and posits the pair of schemas in (16). The triangle symbol, Δ, represents a prosodic head, and the minus triangle symbol, -Δ, represents a prosodic nonhead; α then refers to a prosodic structure.

(16) a. $*\Delta_\alpha/L \gg *\Delta_\alpha/M \gg *\Delta_\alpha/H$
b. $*\text{-}\Delta_\alpha/H \gg *\text{-}\Delta_\alpha/M \gg *\text{-}\Delta_\alpha/L$

In this spirit, the medial syllable of the triplication is the weakest prosodic nonhead, which thus prefer L tone. As illustrated in (15), the Ⓜ-element of the floating ⒽⓂ, namely, the floating Ⓛ melody, is associated to the weakest syllable without its high register. Since the weakest syllable in the triplication of Dongshi requires a low register, the association of the floating Ⓛ melody to the low register yields an L.

The second tone sandhi rule is that L maps to M before another L. Again, in the triplication of (17c), the Ⓗ-element of the floating ⒽⓂ is adjoined to the leftmost syllable and derives an MH cluster; whereas the Ⓜ-element of the floating tone, that is, the Ⓛ melody, is associated to the second syllable, which is the weakest nonhead and thus prefers an L tone. This pattern can be illustrated by (15) as well.

(17) a. thiam 'sweet'
L
b. thiam thiam 'a little sweet'
M L
c. thiam thiam thiam 'very sweet'
MH L L

The third tone sandhi rule is that HM maps to H before another HM. Again, in the triplication of (18c), the Ⓗ-element of the floating ⒽⓂ is adjoined to the leftmost syllable and derives an MH cluster; whereas the Ⓜ-element of the floating tone, that is, the Ⓛ melody, is associated to the second syllable, which is the weakest nonhead and thus prefers an L tone, as illustrated in (19).

(18) a. tsheu 'thin'
HM
b. tsheu tsheu 'a little thin'
H HM
c. tsheu tsheu tsheu 'very thin'
MH L HM

(19) (H Ⓗ)$_\sigma$ (Ⓜ T)$_\sigma$ ⟶ (H Ⓗ)$_\sigma$ (Ⓜ Ŧ)$_\sigma$ ⟶ (M H)$_\sigma$ (L)$_\sigma$
*H H

It should be noted that the adjunction of the floating Ⓗ-element would create an adjacent H sequence, which is banned in this Hakka dialect. To avoid the *[H H] pattern, the sandhi H is lowered to M, whereby an MH cluster emerges.

6 Constraints and Tableaux

In terms of Optimality Theory (OT, Prince & Smolensky 1993/2004), universal grammar consists of unranked constraints, which are specifically ranked in different languages. A specific constraint ranking serves as a specific grammar, which evaluates candidate outputs. The candidate that incurs minimal violation under the relevant constraint ranking is selected as the optimal output. In (20-30), I posit a series of constraints to govern the grammars of the triplications in the three Taiwan Hakka dialects.

(20) Align-R-Ⓗ
Assign one violation mark for every prosodic head, Δ, whose right edge does not coincide with the right edge of the floating Ⓗ-element.

(21) *Ⓣ
Assign one violation mark for every tonal element that is not linked to a syllable in the output.

(22) Δ/Hr
Assign one violation mark for every tone in the prosodic head, Δ, that is not of high register.

(23) $-\Delta_w$/Lr
Assign one violation mark for every tone in the weakest prosodic nonhead, $-\Delta_w$, that is not of low register.

(24) Max-Ⓗ
Assign one violation mark for every floating Ⓗ tonal element in the input that does not have a correspondent in the output.

(25) Max-Ⓛ
Assign one violation mark for every floating Ⓛ contour melody in the input that does not have a correspondent in the output.

(26) Align-E-Ⓛ
Assign one violation mark for every weakest prosodic nonhead, $-\Delta_w$, whose edges do not coincide with the edges of the floating Ⓛ-melody.

(27) OCP-H_σ
Assign one violation mark for every pair of adjacent high-level tones, H H, linked to a single syllable, σ.

(28) *$Concave_\sigma$
Assign one violation mark for every concave contour linked to a single syllable, σ.

(29) Ident-T
Assign one violation mark for every input tone that is not identical with its output correspondent.

(30) TS (cover constraint for tone sandhi)

In (20), the right edges of the prosodic head and the floating H tone element are required to coincide. The notion of generalized alignment requires designated edges of two types of constituents to coincide (McCarthy and Prince 1993). In the case of the triplication in question, alignment is observed between the floating tone and the leftmost syllable. In (21), no floating tone is allowed in the output. In (22), the prosodic head prefers a high register tone. In (23), the weakest prosodic nonhead prefers a low tone. In (24), the floating Ⓗ tone must be preserved. In (25), the floating Ⓛ tonal melody must be preserved. In (26), the floating Ⓛ melody must replace the tone of the weakest prosodic nonhead. In (27), no adjacent H tone sequence is allowed within a syllable. In (28), no concave contour is allowed within a syllable. In (29), tone identity is required. In (30), TS represents a cover constraint for tone sandhi. In (31), I propose a constraint ranking for Sixian and Hailu Hakka. The constraints in the rectangle are bottom-ranked, which will be omitted in the tableaux due to limited space.

(31) Align-R-Ⓗ, Δ/Hr, OCP-H_σ, *$Concave_\sigma$, *Ⓣ >> Max-Ⓗ >> TS >> Ident-T
>> Max-Ⓛ, -Δ_w/Lr, Align-E-Ⓛ (Sixian & Hailu)

The following tableaux show how these constraints work. In tableau (32), candidates (b-f) are ruled out by the top-ranked constraints; the parentheses indicate that either violation is fatal. Consequently, candidate (a) is selected as the optimal output.

(32) Sixian

$(L)_\sigma$ ⒽⓂ	Align-R-Ⓗ	Δ/Hr	OCP-H_σ	*$Concave_\sigma$	*Ⓣ	Max-Ⓗ	TS	Ident-T
☞a.$(M\ H)_\sigma$						*		
b.$(M\ HM)_\sigma$	*(!)					*		*
c.$(M\ M)_\sigma$	*(!)		*(!)			*		*
d.$(L\ HM)_\sigma$	*(!)	*(!)				*		*
e.(L ⒽⓂ$)_\sigma$	*(!)	*(!)			*(!)			*
f.$(L)_\sigma$	*(!)	*(!)						*

In tableau (33), Hailu Hakka has the same constraint ranking. The optimal output is (33e). I have mentioned earlier that there seemed to be tone metathesis, namely, HM maps to MH. However, this tableau shows that the M H cluster results from the avoidance of OCP-H and *Concave.

(33) Hailu

$(L)_\sigma$ ⒽⓂ	Align-R-Ⓗ	Δ/Hr	OCP-H_σ	*$Concave_\sigma$	*Ⓣ	Max-Ⓗ	TS	Ident-T
a.$(HM\ H)_\sigma$				*!				
b.$(HM\ HM)_\sigma$	*(!)			*(!)				
c.$(H\ M)_\sigma$	*!					*		
d.(HM Ⓗ$)_\sigma$					*!			
☞e.$(M\ H)_\sigma$								*
f.$(H\ H)_\sigma$			*!					*
g.$(M\ HM)_\sigma$	*!							*

In Dongshi Hakka, the floating Ⓗ-element is also adjoined to the leftmost syllable, but the Ⓜ-element, that is, the Ⓛ melody of the floating ⒽⓂ, is linked to the second syllable and replaces its tone. In (34), I propose a different constraint ranking for Dongshi, where the constraints in the rectangle are promoted to the top.

(34) Align-R-Ⓗ, Δ/Hr, OCP-H_σ, *$Concave_\sigma$, *Ⓣ, Max-Ⓛ, -Δ_w/Lr, Align-E-Ⓛ
>> Max-Ⓗ >> TS >> Ident-T (Dongshi)

Tableau (35) shows how the second syllable selects its tone, where candidate (e) emerges as an L tone.

(35) Dongshi

$(L)_\sigma$ ⒽⓂ	*Ⓣ	Max-Ⓛ	-Δ_w/Lr	Align-E-Ⓛ	Max-Ⓗ	TS	Ident-T
a.(Ⓛ$_{Hr}$ H$)_\sigma$	*(!)		*(!)		*		*
b.$(M)_\sigma$		*(!)		*(!)	*		*
c.(Ⓛ M$)_\sigma$				*!	*		*
d.$(L\ M)_\sigma$				*!	*		*
☞e.(L ⒽⓂ$)_\sigma$						*	*

In summary, I have posited two constraint rankings for the three Taiwan Hakka dialects. The constraints in the rectangle are bottom-ranked in Sixian and Hailu Hakka, but these constraints are promoted to the top in Dongshi Hakka, in order to derive a low tone in the second syllable of the triplication.

7 Conclusion

I have proposed a set of constraints, which constitutes a grammar for the floating tone adjunction in Sixian and Hailu, and one for Dongshi. This paper has shown that the floating tone adjunction in the triplication is keyed to tonal alignment, prosodic prominence, sequential tonal markedness, and tonal faithfulness.

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Online Modality Influencing Acceptability Judgements in Spanish Passives

Walther Glodstaf
University of Illinois at Urbana-Champaign

1. Introduction

Research pushing for more formal experimental methods in syntax argues online platforms such as Amazon Mechanical Turk (MTurk) offer an easy way to conduct experimental research (Sprouse et al., 2013). Indeed, comparisons between formal and informal syntactic experiments show little difference in online results (Sprouse, 2011; Sprouse et al., 2013). However, it is unclear if the online replications' results are specific to syntactic phenomena, since only those were compared. Particularly interface phenomena such as those involving the syntax-semantics interface might show different results, as these phenomena are more costly to process due to requiring simultaneous use of two modules. Current evidence for this is suggestive (see Pylkkänen & McElree (2006) for an overview). But it might affect results in an online setting such as MTurk, since 25% of workers on MTurk use it as their main source of income (Smith, 2016). Completing tasks efficiently is thus vital, and sloppy processing might ensue accordingly.

I present results of a partial online replication of Valenzuela et al.'s (2015) offline study, investigating the acceptability judgements of passives with a *by-phrase* in heritage speakers of Spanish, because acceptability of the *by-phrase* in Spanish passives is a syntax-semantics phenomenon. Specifically, the acceptability of the *by-phrase* involves event kind modification to explain the differences between verbal passives that can take a *by-phrase* and adjectival passives that generally cannot (Gehrke, 2015). Thus, the ability of the syntactic position for the *by-phrase* (*little v*P) to host the *by-phrase* is mediated by semantics. As such, the acceptability of the *by-phrase* is a syntax-semantics phenomena in Spanish passives. Replicating the offline results of Valenzuela et al. (2015) online, thus offers a good opportunity to test whether the results of acceptability judgement tasks (AJTs) targeting syntax-semantics phenomena are affected by being done online. The online study replicated Valenzuela et al.'s (2015) results that indicated that US heritage speakers of Spanish over-accepted adjectival passives with a *by-phrase*. But the online study's results also indicated that native speaker controls living in Spain and Spanish-speaking Latin America also over-accepted adjectival passives with a *by-phrase*. I argue that these results could be accounted for by the study having been run on an online platform and targeting an area of syntax-semantics. I will base this argument on the fact that the time difference between the original study and the replication study is short enough (5 years) that language change would not be expected. Further, statistical analysis indicates that despite over-accepting adjectival passives with a *by-phrase*, native speakers still rate the grammatical adjectival passives without a *by-phrase* as significantly more acceptable than the ungrammatical one with a *by-phrase*. This indicates that the predicted difference between the two conditions is made by the native speakers. However, the distinction fails to translate into the expected ratings in the experiment. This analysis suggests investigating syntax-semantics phenomena on online platforms results in significantly different results compared to traditional pen and paper methodologies. This is interesting, as previous research suggests no such difference exists for AJTs investigating purely syntactic phenomena (Sprouse, 2011).

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2. Adjectival and Verbal Passives in Spanish

Descriptively, adjectival and verbal passives have three key differences in Spanish. First, their choice of copula. Second, whether they can host a *by-phrase* or not. Third, their preference for the imperfect or preterit tense in the past. The distinction in copula choice is as follows: An adjectival passive is formed with the verb *estar*, while a verbal passive is formed with the verb *ser* (Gehrke & Marco, 2014; Bosque, 1990; 1999; Marín, 2004). Thus, the copula identifies (1a) as a verbal and (1b) as an adjectival passive.

(1) a. Todos los cuadros fueron pintados. (verbal passive)
all the paintings is.SER.PRET.3P painted
'All the paintings were painted.'

b. Todos los cuadros estaban pintados (no imprimidos). (adjectival passive)
all the paintings is.ESTAR.IMPERF.3P painted (not printed)
'All the paintings were painted (not printed).'

The examples below in (2) illustrate the second point: Only verbal passives can host a *by-phrase*. As shown in (2) the inclusion of the optional *by-phrase* is grammatical in the verbal passive (2a). A *by-phrase* in the minimally different adjectival passive (2b) however, renders the sentence ungrammatical.

(2) a. Todos los cuadros fueron pintados por el niño rubio.
all the paintings is.SER.PRET.3P painted by the boy blond
'All the paintings were painted by the blond boy.'

b. *Todos los cuadros estaban pintados por el niño rubio.
all the paintings is.ESTAR.IMPERF.3P painted by the boy blond
'All the paintings were painted by the (blond) boy.'

Banning adjectival passives hosting *by-phrases* is potentially too strict though. Gehrke and Marco (2014) and Gehrke (2015) have found some *by-phrases* occurring with adjectival passives. These are however limited to *by-phrases* that have a weak or generic noun (3a), or an indefinite (3b). *By-phrases* with a pronoun (3c), or an agent modified by a demonstrative pronoun (3d) are not possible though.

(3) a. Todos los cuadros estaban pintados por niños.
all the paintings is.ESTAR.IMPERF.3P painted by boys
'All the paintings were painted by boys.'

b. Todos los cuadros estaban pintados por un niño.
all the paintings is.ESTAR.IMPERF.3P painted by a boy
'All the paintings were painted by a boy.'

c. *Todos los cuadros estaban pintados por él.
all the paintings is.ESTAR.IMPERF.3P painted by him
'All the paintings were painted by him.'

d. *Todos los cuadros estaban pintados por este niño.
all the paintings is.ESTAR.IMPERF.3P painted by this boy
'All the paintings were painted by this boy.'

In contrast, all of these subjects are possible in a *by-phrase* of a verbal passive as shown in (4).

(4) a. Todos los cuadros fueron pintados por niños.
all the paintings is.SER.PRET.3P painted by boys
'All the paintings were painted by boys.'

b. Todos los cuadros fueron pintados por un niño.
all the paintings is.SER.PRET.3P painted by a boy
'All the paintings were painted by a boy.'

c. Todos los cuadros fueron pintados por él.
all the paintings is.SER.PRET.3P painted by him
'All the paintings were painted by him.'

d. Todos los cuadros fueron pintados por este niño.
all the paintings is.SER.PRET.3P painted by this boy
'All the paintings were painted by this boy.'

Lastly, the adjectival passive strongly prefers the imperfect, while the verbal passive strongly prefers the preterit (Valenzuela et al., 2015; Bruhn de Garavito & Valenzuela, 2008). Thus, in general, studies find that use of *estar* with the preterit and use of *ser* with the imperfect are rated lower in AJTs than use of *estar* with imperfect and *ser* with preterit, as shown in (5).

(5) a. La pizza #estuvo/estaba preparada.
The pizza #is.ESTAR.PRET/IMPERF prepared
'The pizza was done/ready.'

b. La pizza fue/#era preparada
The pizza is.SER.PRET/#IMPERF prepared
'The pizza was made.'

Adjectival and verbal passives have differing copula due to differing featural compositions in the copulas. I follow Valenzuela et al. (2015) in assuming that *estar* has certain inherent aspectual features (such as [+perfective] (Schmitt, 1992), or [+bounded/telic] (Zagona, 2013; Valenzuela et al., 2015)) that must be checked with the participle and subsequently deleted. *Ser* has no such aspectual features. This results in the participles that go with *estar* denoting an end point and upon being adjectivised. This end point becomes an inchoation of a state (Valenzuela et al., 2015; Camacho, 2013). Thus, participles going together with *estar* are adjectival (Zagona, 2013), leading to the predicate (the participle) to be headed by an AP with an embedded *v*P, but no functional structure containing AspP and TP (Alexiadou et al., 2014; Gehrke, 2015).[2] In contrast, the verbal passive is analysed to have a verbal (vP) layer (including TP and AspP). Below is a brief structure for both the participle in a verbal (6a) and adjectival passive (6b).

(6) a. $_{AP}$[… $_{vP}$[$_{v}$[[verbal-√]]]]]

b. $_{TP}$[… $_{AspP}$[… $_{vP}$[$_{v}$[[verbal-√]]]]]

A piece of evidence for the smaller structure of adjectival passives is that verbal passives allow temporal and spatial modification while adjectival passives do not. This is shown in (7) where the passive with the copula *ser* but not *estar* can take the temporal modification 'since three days'.

(7) La pizza fue/*estaba preparada por un cocinero hace tres días.
the pizza is.SER.PRET/*ESTAR.IMPERF prepared by a cook since three days
'The pizza was made by a chef three days ago.'

Similarly, in (8) the passive formed with the copula *ser* allows for spatial modification of the verb in the form of 'in an oven'. The passive formed with the copula *estar* however does not.

[2] This goes against Valenzuela et al. (2015)'s assumption that adjectival passives lack a *v*P (Kratzer, 1994; 2000). I adopt the Gehrke's analysis since it covers more empirical ground; and is not ruled out by Valenzuela et al. (2015)'s materials.

(8) La pizza fue/ *estaba hecha en un horno.
the pizza is.SER.PRET/*ESTAR.IMPERF made in an oven
'The pizza was made in an oven.'

The second difference between the passives: the grammaticality or ungrammaticality of the *by-phrase* is explained as syntax-semantics process targeting *v*P. Following Gehrke (2015), the participle in an adjectival passive denotes an event-kind. It thus lacks an event token, and any modification of the event must be kind-type modification. Kind-type modification is a sub-kind specification rather than addition of extra-information that would modify the actual underlying event. For example, in (9a), 'in China' adds the extra-information of where an event takes place. The information is extraneous since the making of cars can – and does – take place in many different countries and the location does not specify a sub-kind of making of cars. As a result, (9a) is ungrammatical since it lacks an event token to be modified through the specification of a location. (9b) however is acceptable since it does not specify a location but a manner of preparation, which specify sub-kinds of events (Gehrke, 2015; Gehrke & Marco, 2014).

(9) a. *El coche estaba hecho en China.
*The car is.ESTAR.IMPERF made in China
'The car was made/produced in China.'

b. La pizza estaba hecha en un horno
The pizza is.ESTAR.IMPERF made in an oven
'The pizza was made in an oven.' *Meant:* 'The pizza was made using an oven.'

This semantic restriction on modification affects the selection of agents in *by-phrases* in the following way: Since only event-kind modification is allowed, there is a ban on explicitly modifying the event if this requires an event token. Since event tokens represent instruments and agents among other things, the only way to express these in a kind-type-modification is to express an event sub-kind that implies the instruments or agents via manner or cause. Syntactically it means that adjectival passives do have a *v*P in them. (Gehrke, 2015; Gehrke & Marco, 2014).

Lastly, the aspectual preference between verbal and adjectival passives is analysed by Valenzuela et al. (2015) to be due to the participle being a state after adjectivization, while the verbal one is an event. Since states are generally not bounded aspectually, the prefer the unbounded imperfect, while events tend to be bounded, so prefer the preterit. Consequently, distinguishing between whether *by-phrases* are allowed in adjectival and verbal passives uses both the syntactic and semantic module. The syntax processes the structure of the participle from which the passive is built. It is however also linked to the semantic module, since the feature valuation of the [perfective] feature on the copula influences the event semantics of the participle, which influences the type of modification the participle allows.

3. The Present Study

This study was a partial replication of Valenzuela et al. (2015) with some key-modifications. This study consulted only US heritage speakers and native speakers. The 5-point acceptability scale in this study did not include a separate 'I don't know option', and every point on the scale was labelled to ensure more homogenous usage of the scale, since Schütze and Sprouse (2014) point out that participants might differ in how they judge the difference between a sentence with a rating of 1 and another of 2. The labels were translated into English as: *1 – unacceptable*, *2 – not as unacceptable as 1*, *3 – strange but acceptable*, *4 – not as acceptable as 5*, *5 – acceptable*. Further, the middle point was labeled as still acceptable to avoid it being used as an unofficial 'I don't know'-option. Lastly, the study was run online on the MTurk platform.

Participants were first completed the Spanish version (Rojas & Iglesias, 2008) of the LEAP-Q (Marian, Bloomfield & Kaushanskaya, 2007) language background questionnaire. To shorten the length of the experiment, all language-specific questions were focused on either English or Spanish. All participants answered all questions for both languages. Then, participants did the AJT-task, which was comprised of 60 questions. 30 of these were target items split into 10 target items for the present, 10 for the preterit, and 10 for the imperfect. The remaining 30 items were control items of which 15 tested copula selection with adjectives that only take *ser* or *estar*. The other 15 items tested the distinction between the imperfect and preterit where only one of the tenses was possible. Fillers and targets were counterbalanced for a total 50/50 ratio of acceptable/unacceptable stimuli. As such, fillers had more unacceptable items than acceptable ones, since 3 out of 4 targets were expected to be acceptable. Lastly, the participants also did a subpart of the DELE proficiency test. The proficiency test consisted of two parts: a multiple-choice vocabulary selection tasks with 4 options; and a multiple-choice CLOZE test with three answer options.

4. Materials

The target stimuli for this study were provided to this study by Valenzuela to match the Valenzuela et al. (2015) experimental materials. However, the study of Valenzuela et al. (2015) only contained minimal pairs for each sentence based on whether or not the sentence contained a *by-phrase*. Thus, there were minimal pairs within verbal and adjectival passives that differed in the presence or absence of a *by-phrase*, but there were no minimal pairs across the category verbal and adjectival passives. Neither were the different tenses constructed to be minimal pairs. As a result, in order to have each tense and passive type be minimal pairs, this study took the couplets of adjectival and verbal passives that were minimal pairs in the present tense and created minimal pairs for them as necessary in either verbal or adjectival passives. This was done by taking for example a minimally different verbal passive couplet from the original study. This couplet only differed in whether the passive had a *by-phrase* or lacked it and instead had another continuation of the sentence of roughly the same length. The minimally different adjectival passive conditions for these verbal passives were then created by changing the *ser* copula into the *estar* copula. The exact same was done in the opposite scenario when creating minimally different verbal passives. From these minimally different present tense sentences, minimal pairs for the imperfect and preterit were created. This was done by changing the tense of each copula from the present to the imperfect and preterit. Table 1 shows an example of a target token set in the present study. Bolded sentences indicate that these sentences are acceptable according to Valenzuela et al. (2015). Cursive sentences indicate original sentences from Valenzuela et al. (2015). Underlined sentences indicate that these sentences were created as a minimal pair.

Table 1: Sample Target Stimuli Set

Copula	Verbal (SER)	Adjectival (ESTAR)
+SUBJ	<u>**La cena es preparada por un cocinero profesional**</u>	*La cena ya está preparada por un cocinero profesional*
-SUBJ	<u>**La cena es preparada para la fiesta**</u>	***La cena ya está preparada para la fiesta***

5. Participants

Participant recruitment and participation was done on MTurk. Participants had to be native speakers of Spanish and resided in a Spanish speaking country or be US heritage speaker of Spanish. Participants were further excluded if: they did not indicate that they knew Spanish since birth in the language background questionnaire; their average time to answer each question was less than a second; they did not answer all the questions. Native speakers were excluded if, they indicated that they had not spent most of their life (defined as 75%) in a Spanish-dominant linguistic environment; they did not indicate that Spanish was their dominant language; their accuracy on the proficiency test was 10% or more worse than the expected 90% or higher accuracy rating. Heritage speakers were excluded if, they had spent more than a decade longer in a Spanish-dominant linguistic environment than an English one; they started learning English in their teens. Participants were also excluded if, they used a predictable answer pattern for more than 90% of the vocabulary selection questions in the proficiency test; their accuracy in the proficiency test was below chance level; there were inconsistencies in the language background questionnaire; they completed the survey in less than 15 minutes (over twice as fast as the native speaker average).

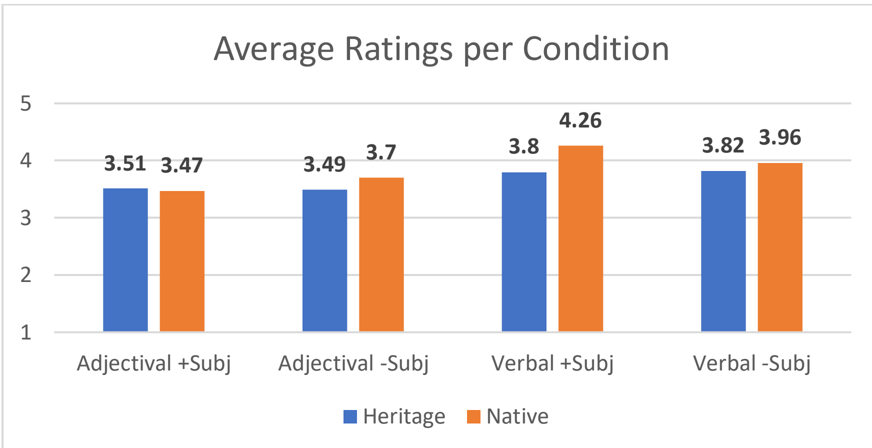
28 native speakers from Spanish-speaking Latin America and Spain and 21 US heritage speakers took part in the study. Roughly half of both groups' participants were between 20 – 29 years old. The remaining

native speakers were equally split between 30 – 39, and 40 – 49. The remaining heritage speakers were in the age groups 30 – 39 (14%); 40 – 49 (19%), 50 – 59 (10%), and 18 – 19 (5%). About half of the participants in both groups had a bachelor's degree and 30% of native and 39% of heritage speakers had a post-graduate degree or some post-graduate education. Only 10% of heritage speakers had less than high school education and 7% of native speakers had vocational training. 57% of the heritage speakers had low proficiency in Spanish. 28% had intermediate proficiency. The rest were high proficiency speakers.

6. The Results

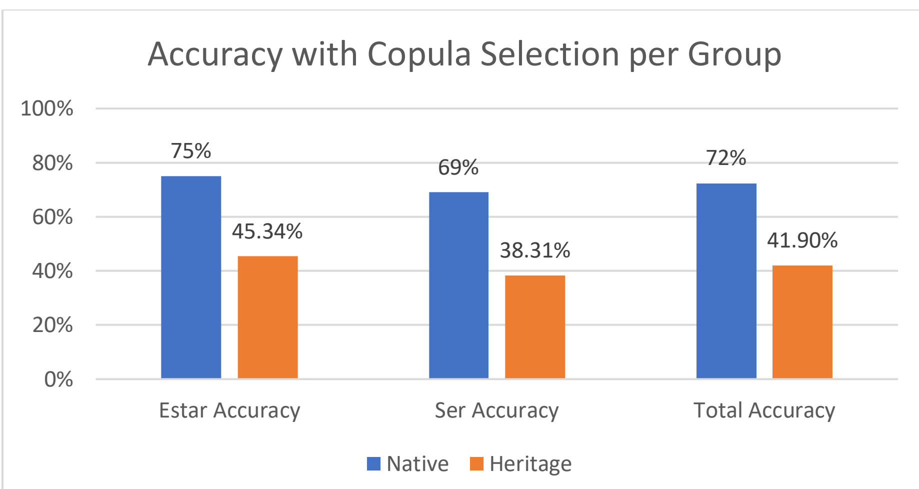
The results were somewhat unexpected, since both groups found all passives conditions with or without a *by-phrase* acceptable. This included the unacceptable adjectival passives with a *by-phrase*.

Figure 1: Average Score per Condition for Heritage Speakers and Native Speakers



Only in the copula control conditions did the groups perform differently. Native speakers had a roughly 70% accuracy chance on copula selection, while the heritage speakers were below chance levels for both copulas. Native speakers probably did not perform at ceiling due to dialectal differences.

Figure 2: Accuracy scores for the Copula selection Fillers per Group



These results for each condition were further analysed with a generalised liner mixed model. In it, acceptability was a dependent variable where ratings 1-2 were coded as unacceptable and ratings 3-5 as acceptable. The fixed independent variables in the model were group (heritage or native speaker), tense, proficiency, and whether the participant had attended postgraduate studies. The cut-off was put at graduate school level since at that level of education it is more certain that students will have been exposed to academic texts, which is also where the passive is most often found in Spanish (Tolchinsky & Rosado, 2005). Participant was included as a random effect in the model.

For the verbal passive with a *by-phrase*, the results of this analysis were that none of the predictor variables were significant. For the verbal passive without a *by-phrase* however, increased proficiency resulted in a significant decrease in acceptability. All other predictor variables were not significant.

Table 2: GLMER Results for Acceptability in Condition Ser without a By-phrase

	Estimate	Standard Error	z value	Pr(>|z|)
Intercept	3.2891	0.6697	4.911	9.05e-07 *
Imperfect	-0.2533	0.3797	-0.667	0.5048
Preterit	0.3245	0.4047	0.802	0.4227
GradSchoolYes	0.3966	0.5031	-0.788	0.4305
Native	0.9073	0.7458	1.217	0.2238
Proficiency	**-1.0726**	**0.4925**	**-2.178**	**0.0294 ***

For both adjectival passive conditions, no predictors were significant, save for preterit tense.

Table 3: GLMER Results for Acceptability in Condition Estar with a By-phrase

	Estimate	Standard Error	z value	Pr(>|z|)
Intercept	2.53220	0.54242	4.668	3.04e-06 *
Imperfect	0.11557	0.37688	0.307	0.75912
Preterit	**-1.12024**	**0.35039**	**-3.197**	**0.00139 ***
GradSchoolYes	0.07884	0.49021	0.161	0.87223
Native	0.60941	0.74149	0.822	0.41115
Proficiency	-0.67603	0.44833	-1.508	0.13159

Table 4: GLMER Results for Acceptability in Condition Estar without a By-Phrase

	Estimate	Standard Error	z value	Pr(>|z|)
Intercept	2.7599	0.6321	4.366	1.26e-05 *
Imperfect	0.1889	0.4057	0.466	0.6415
Preterit	**-0.7854**	**0.3707**	**-2.119**	**0.0341***
GradSchoolYes	-0.4455	0.5540	-0.804	0.4213
Native	1.0492	0.8530	1.230	0.2187
Proficiency	-0.6884	0.5108	-1.348	0.177

For the acceptability of the filler conditions, proficiency was also the only significant predictor variable, but only in the copula condition.

Table 5: GLMER Results for Acceptability in Condition Copula

	Estimate	Standard Error	z value	Pr(>|z|)
Intercept	2.41586	0.42893	5.632	1.78e-08 *
GradSchoolYes	-0.09494	0.41795	-0.227	0.82029
Native	0.18718	0.64363	0.291	0.77119
Proficiency	**-1.18281**	**0.39401**	**-3.002**	**0.00268 ***

To understand what variables drove the overacceptance of the unacceptable stimuli for each group, a further statistical analysis was run done using with the same generalised linear mixed model with the inclusion of the condition variable, to see whether the minimally different grammatical condition was rated as significantly different from the ungrammatical one. For native speakers, this was the case. The ungrammatical condition was rated as significantly less acceptable than its grammatical counterpart. The preterit tense was also as expected rated as significantly less acceptable compared to the present, while the imperfect was not. For heritage speakers however, none of the predictor variables were significant.

Table 6: GLMER Results for Acceptability in of Adjectival Passives for Native Speakers

	Estimate	Standard Error	z value	Pr(>|z|)
Intercept	3.3022	0.5842	5.653	1.58e-08 *
Imperfect	0.0609	0.4098	0.149	0.882
Preterit	**-1.9219**	**0.3882**	**-4.951**	**7.40e-07 ***
GradSchoolYes	-0.7222	0.8391	-0.861	0.389
ESTAR+ ByPhrase	**-0.6515**	**0.3056**	**-2.132**	**0.033 ***

7. Discussion

Though previous research has validated using MTurk to collect judgment data (Sprouse, 2011; Sprouse et al., 2013) compared to traditional pen and paper methods, this was done on purely syntactic phenomena and for phenomena in English. It is thus unknown whether this validation also holds for syntax-semantics phenomena like the one investigated here. I will argue that it does not. Chiefly because the environment of doing a study on MTurk crucially incentivizes one monetarily to finish quicker, than the environment of a traditional pen and paper study. The reason for this is that on MTurk one can do as many studies as one can achieve in a given amount of time. This is not the case in most traditional pen and paper studies. Thus, on MTurk a participant who finishes a study quickly has more time to do more studies and thus earn more money. Previous research also indicates that this incentive does not only apply to a few potential participants either. According to a Smith (2016), 25% of workers on online platforms such as MTurk earned their money from these sites because there were no job opportunities in their area. Thus, unlike with a pen and paper lab session (using mostly students), we cannot assume that this is something our participants on MTurk do on the side. Thus, potentially research investigating more processing heavy phenomena get more unreliable data on from MTurk. This could the case when investigating syntax-semantics phenomena compared to purely syntactic phenomena. Much research has for instance shown that adjunct phrases are interpreted slower than argument phrases (Boland, 2005; Boland & Boehm-Jernigan, 1998; Clifton, Speer, & Abney, 1991; Kennison, 2002; Liversedge, Pickering, Clayes, & Branigan, 2003; Liversedge, Pickering, Branigan, & Van Gompel, 1998; Schütze & Gibson, 1999; Speer & Clifton, 1998). The argument for the native speakers' over-acceptance of the ungrammatical condition would thus be that they over-accepted it because on average they did not take the time to sufficiently consider the acceptability of each item. This could also explain why they performed better on the purely syntactic items with copula selection of adjectives. Also, crucially, their performance also indicates that a differentiation is made between the grammatical and ungrammatical adjectival passives.

Another explanation would that maybe there has been language change in the native speaker group. This would be for instance supported by Silva-Corvalán (1994). The direction of the change – increased acceptability of ungrammatical passives formed with *estar* certainly goes in the right direction, as *estar* is slowly displacing *ser* in Spanish (Geeslin, 2003; Gutiérrez, 1992; Cortes-Torres, 2004; Ortiz-López, 2000; Geeslin & Guijarro-Fuentes, 2008; Guijarro-Fuentes & Geeslin, 2006). However, the time difference between this study and the original study is so small that a full-scale language change is unlikely. Also, the performance of the native speakers does not support it. If their grammar had changed, they should showcase no differentiation between the conditions like heritage speakers. Thus, while other explanations cannot be ruled out, it seems that conducting the experiment on MTurk best explains the results.

7. Conclusion

My partial replication of Valenzuela et al. (2015)'s experiment on the acceptability of *by-phrases* in adjectival passives in Spanish with US heritage speakers and native speaker controls seemed to indicate native speakers accept adjectival passives with *by-phrases* more liberally than reported in Valenzuela et al. (2015). After further statistical analyses were conducted a group effect was found whereby native speaker distinguished the grammatical condition from the ungrammatical one while heritage speakers did not. It was argued that this was the result of running the study on an online platform that incentivised participants monetarily to complete studies quickly. Overall, this research has highlighted the need for more research into how research conducted online affects the results of differing linguistic phenomena, something that will surely become more topical in the future as both a cheap and convenient way to conduct research will be needed to deal with economic and social developments around the world.

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Morphological Properties of Êbêra Language from Alto Sinú (Colombia)

Ernesto Llerena García
Universidad de Córdoba

1. Introduction

The embera group is made up of approximately 56,504 indigenous people who are located from the Darien province in Panamá, then through the colombian departments of Chocó, Antioquia, Córdoba, Caldas, Risaralda to Ecuador. This talk presents the general morphological properties of êbêra language from Alto Sinú, region located in the northern part of Colombia.

The ethnic group called embera and its language ([êbêra] in phonetic writing) is part of the Chocó Linguistic Family. This classification is due not only to the linguistic aspect but also to the common socio-cultural characteristics. This family is made up of embera and waunán groups located in Colombia. The êbêra language spoken in Alto Sinú, as also happens in the other êbêra macroglosses, has morphological properties of an analytical insulating language; most grammatical morphemes are free morphemes, although the verb and the name have an inflectional morphology.

There are also numerous prepositions to express grammatical categories and there are many auxiliaries. The analytical character lies in the lexicalization and grammaticalization of meanings that are implicit in other languages.

2. Morphological processes

In êbêra language, the noun and the verb have inflectional morphology for the expression of some grammatical categories. For other categories they use postpositions. Nominals in the êbêra language have case marks.

2.1. *Ergativity*

Êbêra is an ergative language where the single argument (subject) of an intransitive verb behaves like the object of a transitive verb, and differently from the agent of a transitive verb as is shown below:

A O

S

In example 1, the argument of an intransitive sentence does not have mark:

(1) ernesto-**Ø** wã-si-a
Ernesto-NOAG go-PAS-DECL
"Ernesto´s gone"

In example 2, the agent of a transitive sentence has a mark, and the object of the sentence dos not have a mark. For the expression of ergativity in this language there are two split processes: (i) Suffixation of *-a* with the pronouns 1pers.sing., 1pers.pl.ext., 2pers.sing., 3pers.sing., 3 pers.pl.noext:

(2) mʊ-**a** mejaca kâga bʊ-a do-Ø-ra
1PERS.SING–ERG much want AUX –DEC river-NO AG-TOP
"I want water very much"

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(3)	bʉ-**a**	kima-Ø	ero	bʉ-a
	2PERS.SING-ERG	wife-NO AG	have	AUX –DEC
	"You have a wife"			

(ii) Suffixation of *ba* with 1pers.pl.ext. (*dayirâ*), 2pers.pl., 3pers.pl.ext., names, demonstratives, questions, name substitutes and indefinite.

(4)	usa-**ba**	mitʃi- Ø	kakube-si-a
	dog-ERG	cat-NO AG	bit-PAS-DECL
	"The dog bit the cat"		

(5)	êbêra	wêra-**ba**	be	u	baria
	indígenous	woman-ERG	corn	farm	HAB
	"Indígenous woman farms corn				

(6)	kâ-**ba**
	DEM-ERG
	"This"

(9)	maʉ-**ba**	bakuru-Ø	tu	be	ê
	ANAPH-ERG	tree - NO AG	cut down	AUX.MOOD.CAP	NEG
	"Those (the aforementioned) cannot cut down the trees"				

(10)	dayirâ-**ba**	be	u	bada
	1 PERS.PL.EXT-ERG	corn	grow	HAB.EXT
	"We all grow corn"			

(11)	mara-**ba**	be	u	bada
	2PERS.PL-ERG	corn	grow	HAB.EXT
	"You grow corn"			

2.2. *Case marks*

2.2.1. The instrumental case suffixes *-ba*. Absolute / object cases are expressed with the alternating marks–*o* / *-ta*. The dative case marks *-a*, inesive locative, genitive *-de*, ablative *-deuba* are also suffixed.

(12)	Ûkuru-**ba**	de-ra	câsô	kidua-ba	joa	bada
	INDEF -ERG	house-TOP	cane	leaf-INSTR	thatch	HAB.EXT
	"Some thatch house with cane leaf"					

(13)	duga-**ba**	otʃidaɯ-Ø-de	origa-si-a
	tail-INSTR	neck- NO AG-LOC	scratch-PAS-DECL
	"With his tail he scratched him around the neck"		

(14)	kai-**ba**
	INT-ERG
	"Who?"

(15)	Âkore-**ba**	widi-si	bania-Ø	jêsêra-a
	êbêra god ERG	ask-PAS	water-NOAG	conga ant-DAT
	"The god êbêra asked the conga ant for water"			

(16)	jêsêra-**ba**	buru-de	bania-Ø	ayiru
	conga ant-ERG	head-LOC	water-NOAGEN	keep
	"The conga ant keeps a drop of water on its head"			

(17) na drua dayi-**de**-a
DEM land 1PERS.PL–GENI-DEC
"This land is ours"

(18) mʉ usa-ba begi-Ø juerta-si-a oi zoroma-**deuba**
1PERS.SING dog -ERG deer-NOAG chase-PAS-DEC big bush –ABL
"My dog chased a deer from the bush"

2.2.2. The name also suffixes the morpheme *-râ* that expresses the plural category of nouns and the morpheme *-ra* topic.

(19) Urra-ba nara widi bara ba-si-a yi bari–**râ**-a
Urra-ERG first ask MODL.DEO AUX.PAS-DECL DEF owner-PL.NAM- DAT
"Urrá should have asked the owners first"

(20) Âkore-ba jêsêra-a dia-si bania-**ra**
êbêra god ERG conga ant -DAT give-PAS water-TOP
"The god êbêra gave the water to the conga ant"

2.2.3. Locative cases, alative *eda*, limit *idu*, goal *ma*, and address and location morphemes are postponed.

(21) âyi homa de **eda** homa wâ-si
3PERS.PL all home AL all go-PAS
"They all went home"

(22) iya bania-Ø kuguru-de jue eda wâ-i-a do **idu**
3PERS.ERG water-NOAG basin-LOC collect Al GO-FUT-DECL river LIM
"She goes to the river to collect water in a basin"

(23) zagara pedro **ma** este-tua
ax Pedro GO take-IMP
"Take the ax to Pedro"

2.2.4. bari and *kakea* which express senses of "in honor of, instead of" and "because of" are also postponed.

(24) auru êbêra-ba Jumi **bari** nebura nube-si
another indigenous-ERG Jumi HON tell begin-PAS
"Another indigenous began to tell instead of Jumi"

(25) êbêra-râ bania **kakea** supureakua toto-si
Indigenous-PL.NAM water "because of" suffer-PAS
"Indigenous suffered because of water

2.2.5. In êbêra language the morphemes *-i-* verbalizer *-a* declarative, *-ta* non-agent / normalizer, *-si-* past tense, *-da-* plural, *-da* participle, *-ma* participle of result, *-ta* recessive, *-rua*, *-tua, rârua*, *-dutua* command morphemes are suffixed to the verbal base.

(26) iy-a bania-Ø kuguru-de jue eda wâ-**i-a** do idu
3PERS-ERG water -NOAG container-LOC collect go-VB-DEC river down
"She goes to the river to collect water in the container"

(27) mogara âyi ume-ba burebue-ta-**si-da**
stone 3PERS.PL two -ERG roll-REC-PAS-V.PL
"The stone was rolled by the two of them"

(28) pera-râ-**rua**
worry-NEG-ORD
"Do not worry "

2.2.6. All auxiliaries and the morphemes *ita* end of action, *bara* deontic modality, *buru* probability, and *ka* modal negation (by prohibition) are postponed to the verbal base.

(29)

kue-ra	ij-a	kâga	ku-de-ra	tse	pi bua	drua	surrua	**ita**
rain-TOP	3PERS.PL-ERG	want	AUX-LOC-TOP	come	AUX AUX	earth	wet	END

"When she (the moon) wants to let the rain come to wet the earth"

(30)

Urra-ba	nara	widi	**bara**	abasia	yi	bari-râ-a
Urra-ERG	first	ask	MOOD.DEO	AUX.PAS	DEF	owner-PL.NAM-DAT

"Urrá should have asked the owners first"

(31)

bʉ-a	bikâga	jara	**buru**	mʉ-a	Ûri	bua
2PERS.SING-ERG	slowly	speak	MOOD.PROB	1PERS.SING.-ERG	Understand	AUX

"If you speak slowly, I understand you"

(32)

mʉ	zeze	iyi	kaimokara	ûnatru	kajirua
1PERS.SING.POSE	father	3PERS.SING.POSE	dream	dawn	bad

buru	de-ra	mi	wâ	**ka**
MOOD.PROB	LOC-TOP	hunt	go	NEG

"When the dream is bad my father will not hunt"

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Pitch-Accent in Hidatsa

Zachary A. Metzler
California State University, Fresno

1 Introduction

Hidatsa is a Siouan language spoken primarily on the Fort Berthold reservation in North Dakota. The role pitch (Hz) plays in Hidatsa has proved difficult for linguists to describe and to agree upon. In this study, I investigate the role that pitch plays in Hidatsa prosody in an attempt to settle its disputed role. Previous analyses have attempted to account for the distribution of pitch variously through pitch tunes aligning to stress (Rivera 2017), pitch spreading across words (Park 2012), pitch being a phrasal phenomenon (Bowers 1996) and it playing no role whatsoever (Boyle et al. 2016).

Bowers (1996) is the first to identify pitch as a necessary aspect of Hidatsa. However, he claims that pitch is assigned not by the phonology but by grammatical tense. This is unattested in any Siouan language, including its close relative, Crow.

Park (2012) claims that pitch spreads from the left edge of the phrase to a marked, unstressed mora, after which a low tone spreads to the right edge of the phrase. In 2, I give a brief description of his phrasal pitch rules, though I will not directly investigate his claims. Rather, I show that, whatever syntactic or phrasal role pitch may have in Hidatsa, there are pitch contours that target the word and are assigned phonologically.

Boyle et al (2016) reject the notion that pitch plays a role in Hidatsa, and that Hidatsa employs a traditional left-aligned quantity sensitive stress system phonetically cued by vowel length and quallity.

Rivera (2017) claims that there are four tunes in Hidatsa, which align to quantity sensitive (QS) left-aligned iambs. The four she identifies are H*L, HL*, L*H, and “Other”. For the first three tunes Rivera identifies, the * indicates that the preceding tone attaches to the stressed syllable. Rivera’s “Other” class seems to align the high tone to the right edge of the word. Rivera’s reporting of her data is inconsistent throughout her thesis. Which is why I’ve elected to recreate her study here.

2 Previous Analyses

Bowers (1996) makes the claim that pitch in Hidatsa is assigned rhythmically across a verb phrase illustrated below in figure 1.

(1) a) V V V
[-pitch] becomes [+pitch] / [present] ¢#C___..#..¢
b) V V V
[-pitch] becomes [+pitch] / [-pitch] C___C(C)V
c) V V V
[-pitch] becomes [+pitch] / [+pitch] CC___C(C)V
Bowers (1996:50-51)

1 illustrates Bowers’ pitch assignment in verb phrases. a) places pitch on the initial syllable of the phrase, b) assigns pitch to syllables preceded by an open syllable with no pitch assigned to it, and c) assigns pitch

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to syllables preceded by a closed syllable that has already had pitch assigned to it. This is identical to his rule for accent assignment (rhythmic increased intensity according Bowers), though he goes on to say that further elision rules result in pitch and intensity not cooccurring.

I do not directly investigate whether or not pitch plays a role in tense-marking in Hidatsa, or its phrasal distribution, rather I show that pitch does play a role at the word level.

Park (2012:34) claims that Hidatsa has no stress whatsoever. He claims that instead, Hidatsa has a pitch-accent system where a high tone (H) is inserted at the left edge of words and spreads right until it comes to an unstressed, accented mora, after which a low tone (L) persists until the end of the word (39).

Park illustrates his pitch spreading rule with the word *cigua* 'sweet' illustrated in 2.

(2) H → V́ → L
cigúà [ʦigúà] 'sweet'
Park (2012:38)

Park's work is based on a series of elicitation sessions which he claims were recorded. However, he provides no spectrograms or measurements to support his claims.

Boyle et al (2016) rejects the idea that pitch plays a role in Hidatsa in favor of an iambic stress system. I have no explanation for why our data do not agree with one

Rivera (2017) accounts for minimal pairs in Hidatsa by proposing a series of pitch-tunes based on a suggestion by Chris Golston and his research into pitch in Hidatsa's close relative, Crow. 3 below shows how each of Rivera's pitch tunes functions.

(3) H*L - Default Class
aˈgági [a.ˈgá.gi] 'to be able'

HL* - Class II Initial Mora
áˈwashi [á.ˈwa.ʃi] 'cave; cellar'

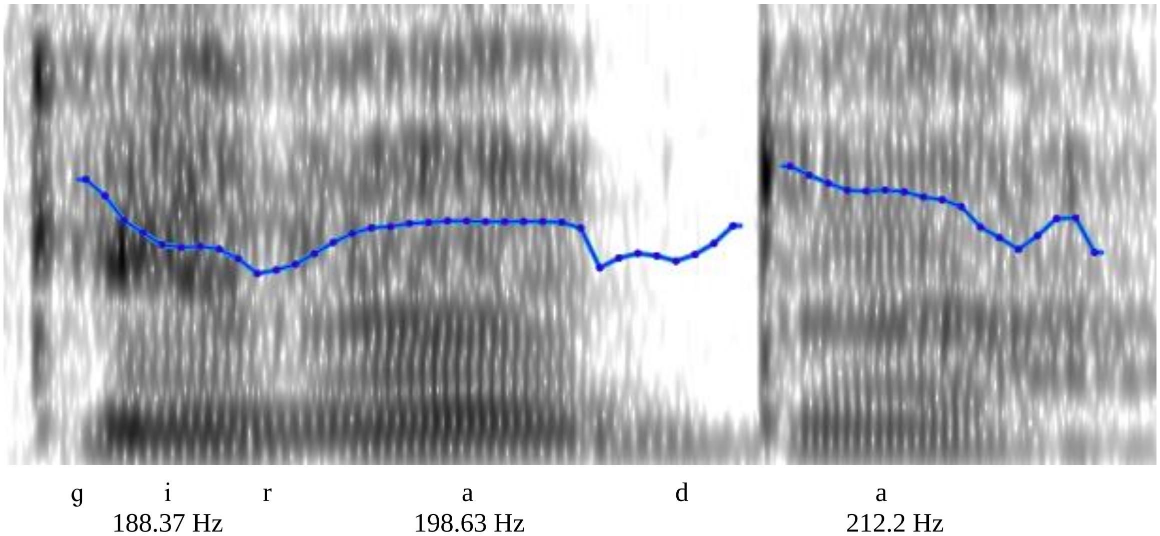
L*H – Accent on the First Mora to the Right of an Initial Iamb
gaˈrawí [ga.ˈra.wí] 'to remember'

Other Pattern
ˈookacía [ˈoː.ka.ʦía] 'to soar'
Rivera (2017:16-19)

There are a number of issues with Rivera's collection and reporting of her data and of her findings. One major problem is that Rivera claims to have a different number of data points throughout her thesis. Initially, she claims to have measured 861 roots with 779 falling into the H*L class, 32 falling into the HL*, 39 falling into the L*H class, 1 fitting the "Other" pattern, and ten falling into none of the four because they contained prefixes (13). Later Rivera claims to have measured 143 H*L words, 20 HL* words, and 38 L*H words resulting in a total of 201 tokens (20, 22), while in her appendix she lists a total of 307 words (31-39). Additionally, Rivera claims to have only measured trisyllabic roots (13), however she reports many disyllabic words (16-18).

Of the thirty words that Rivera uses as examples of her four pitch patterns, twelve, or forty percent, do not show highest pitch on the syllable she claims (16-19). I was unable to locate a recording of Rivera's only example of her "Other Pattern" in order to verify its readings. I believe that this number of discrepancies warrants further investigation into her claims.

(4) [gi.ra.da.] *gírada* ‘to like’



4 illustrates the type of discrepancy between what Rivera reports and what I’ve found. Rivera identifies this word as belonging to her HL* class, meaning that the high tone should fall on the initial syllable. However, the spectrogram above shows that the initial syllable, [gi], is in fact the syllable with the lowest reading and is nearly 24 Hz lower than the final syllable.

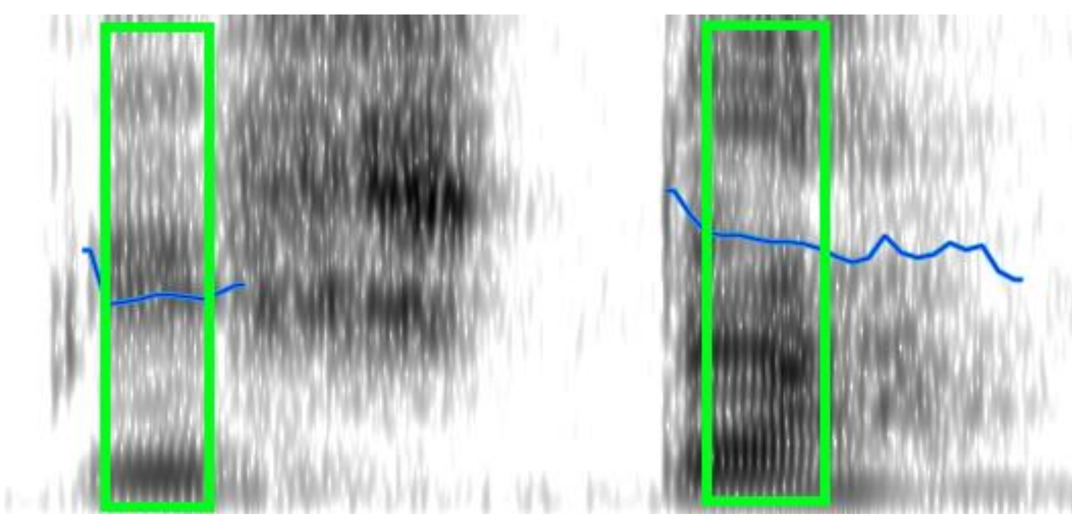
3 Data

Data for this study were provided by the Language Conservancy as part of their ongoing fieldwork with the Hidatsa. Thirty tokens were taken from Rivera’s examples and an additional 70 tokens were selected at random from a pool of 279 recordings representing 176 unique monomorphemic words. Four consultants are represented in the data: Martha Birdbear, Mary Gachupin, Arvell White, and Delvin Driver Senior.

3.1 *Collection and Analysis*

I opened each sound file in Praat (2015) and recorded the pitch for each vowel. Rather than record only the peak in pitch for each vowel, I measured the mean pitch from the most stable section of the vowel.

(5)



5 shows the window I measured for the word [iʃda] *ishdá* 'eye'. The blue lines indicate the pitch track across the word and the portions within the green boxes are what I measured. Note that the portions outside the green boxes are extreme or unsteady pitch readings.

Once all the data was collected, I compared the highest pitch syllable of each word to the other syllables in the word using a paired, two-tailed t-test to determine if the differences in pitch are significant. This test will tell us if the highest pitch of the word is indeed significantly different from the syllables with lower pitch. Due to there being consultants of both genders, a paired test is required to keep one speaker's naturally lower voice from muddying the results.

The second test I ran was to compare the highest pitch syllable to only those syllables preceding it. To do this, I removed all words whose initial syllable was the highest pitch of the word. This will tell us whether or not there is right-ward pitch spread from the left edge of the word as claimed by Park (2012:38).

3.2 *Results*

Comparing the pitch of the highest frequency syllable of each word to the pitch of the remaining syllables of each word revealed that difference in pitch was indeed statistically significant ($p<0.001$). This is evidence that pitch does play a role in the prosody of Hidatsa.

Using Rivera's pitch tunes, 57 recordings fell into the H*L class where the high tone aligns to QS iambic stress, 25 fell into the L*H class where the high tone falls on the syllable following the stressed syllable, 15 fell into the HL* class where the high tone falls on the syllable immediately preceding the stressed syllable, and 2 fell into the "Other" class with the highest pitch falling on the final syllable. The distribution I found is considerably different than either of the distributions Rivera reports.

(6)

	Rivera (2017:13)		Rivera (2017:20, 22)		Curent Study	
Tune	Tokens	Percentage	Tokens	Percentage	Tokens	Percentage
H*L	779	91.5	143	71.1	58	58
L*H	39	3.8	38	18.9	25	25
HL*	32	4.6	20	10	15	15
Other	1	0.1	0	0	2	2
Total	851	100	201	100	100	100

The second test I ran compared the syllable with the highest frequency to the syllable directly preceding it. This was to investigate Park's (2012) claim that a high tone is inserted at the left edge of words and spreads to an unstressed, accented mora after which a low tone persists to the right edge of the word. If this is true, we would expect the syllable preceding the syllable with the highest pitch to have the same or similar frequency.

The data for this test is a subset of the previous data pool. In order to compare the syllable with the high tone to a previous syllable, I excluded all the words where the high tone fell on the initial syllable. This resulted in a data pool of 61 words.

A paired two-tailed t-test comparing the F0 of the syllable with the highest pitch to the F0 of the immediately preceding syllable shows that there is a significant difference in their pitches ($p<0.001$). Were Park's claims with regards to pitch spread correct, there would be no statistical difference in pitch between the two syllables. This leads me to conclude that, while pitch is important to Hidatsa prosody, high tones do not spread from the marked syllable.

4 Discussion

I have found that the difference in pitch in Hidatsa is statistically different, and that these differences in pitch are best explained by Rivera's pitch tunes, despite the inconsistencies in Rivera's study.

One possible issue in both my and Rivera's studies is that limiting the study to monomorphemic words often limits word length to three or fewer syllables. This means that possible "Other" tunes will be misrepresented as L*H in the case of LLL, LHL, and LLH words.

While Rivera creates a fourth tune "Other" to describe these words with an unexplained last syllable pitch peak, I posit that there is no need of an "Other" class of word. Since only 2% of the words I investigated, and maximally 0.1% of the words Rivera investigated fall into this class, I propose that these are outliers and not necessarily a grammatical tune in Hidatsa.

Further study into pitch in Hidatsa should focus on longer, polymorphemic words to find out if Rivera's pitch tunes hold true. In addition, further study should investigate Bowers' claim of syntactically assigned pitch, dubious though it may be.

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Sonority Reversals in Russian. Do They Really Exist?*

Ekaterina Zhakun and Martin Krämer
UiT The Arctic University of Norway

1 Introduction

The Sonority Hierarchy is assumed to be a universal scale on which we find obstruents at the bottom, dominated by nasals, which are dominated by liquids, and vowels are of highest sonority (see, e.g., Parker 2002 for a discussion of variations on this scale and contributions in Parker 2012 and Ball & Müller 2016 for further discussions). Cross-linguistically, segments are organized into a syllable in adherence to the Sonority Sequencing Principle (SSP), according to which the sonority of segments should rise towards the syllable peak and fall towards the syllable margins (Selkirk 1984, Clements 1990, among many others). However, in some languages SSP-violations occur in consonant clusters[1], among which we can differentiate between sonority plateaus (1a-3a) and sonority reversals (1b-3b):

(1) Polish (Bethin 2011:3-4)
  a. *ptak* 'bird', *gdy* 'when'
  b. *rtęć* 'mercury', *mʃa* 'Mass'

(2) Russian
  a. *kto* 'who', *zvon* 'ring'
  b. *lb-a* 'forehead-GEN.SG', *lgat*^{j} 'to lie'

(3) Slovak (Bárkányi 2011:353, 359)
  a. *tkat*^{j} 'to weave', *ktorý* 'which'
  b. *lkat*^{j} 'to cry', *l*^{j}*piet*^{j} 'to stick to'

Focusing on Russian, we argue that tri- and tetraconsonantal clusters show that the phonotactics of Russian consonant sequences is not as liberal as it might seem. In tri- and tetraconsonantal clusters we do not find any sonority reversals among the two innermost consonants preceding the vowel. While the initial consonant in bi- and triconsonantal clusters can be almost any consonant, tetraconsonantal clusters are all morphologically complex, and in consonantal prefixes we find a highly restricted segment inventory. On the basis of these observations, we argue that Russian complex onsets are subject to Sonority Sequencing. The paper is structured in the following way: Section 2 introduces the theoretical background on sonority, Sonority Sequencing and syllabification. Section 3 shows multiconsonantal sequences and phonotactic restrictions in them. Section 4 discusses possible solutions, including Government Phonology (GP) proposals, Prosodic Licensing, and the Premargin model (Cairns & Feinstein 1982). Each of them will be shown inadequate to account for the above generalizations. In section 5, we propose an analysis of the consonant sequences in Russian that combines Prosodic Licensing and the Premargin model. Section 6 concludes.

2 The Sonority Sequencing Principle and syllabification

Clements (1990) traces back the origin of the concept of sonority to the nineteenth century. Every segment is assumed to have an inherent level of sonority and the relative sonority of segments determines

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* We would like to thank the audience at WECOL 2021 for stimulating feedback.

[1] SSP-violating sequences occur in both positions: coda and onset. The present paper focuses only on the onset.

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their position in a syllable and the syllabification of strings of segments via the Sonority Sequencing Principle (Sievers 1881) and the Syllable Contact Law (Hooper 1976, Murray and Vennemann 1983). There is some debate, though, what the phonetic correlate of sonority is. Sonority has been defined by degree of opening of the articulatory tract, audibility or inherent intensity (e.g., Parker 2002) or resonance (Foley 1970, Clements 1990, 2009). While quite a few different sonority scales have been proposed, they differ mostly in how fine-grained they are. Foley's scalar feature of resonance had six steps, i.e., oral stops, fricatives, nasals, liquids, glides, and vowels. Parker (2002) proposes a scale with 17 strata for different segment classes, while Clements (1990, 2009) restricts his discussion to a scale with five strata, as shown in (4).

(4) The Sonority Scale

Low sonority *High sonority*

obstruents < nasals < liquids < glides < vowels

The Sonority Sequencing Principle states that sonority rises within a syllable until it peaks (and then it falls). Clements (1990) revises the principle by adding Sonority Dispersion, "Sonority is maximally dispersed in the initial demisyllable and minimally dispersed in the final demisyllable." (Clements 2009:169) A demisyllable consists of all the segments from a margin to the peak. Dispersion is supposed to replace the Minimum Sonority Distance Principle (Harris 1983, Selkirk 1984), according to which a syllable or complex onset is most well-formed if sonority rises as much as possible (i.e., *kja* is better than *kna*, which is still better than *kta*), with individual languages setting language-specific thresholds for the steepness of the rise, i.e., one step on the scale, two steps, etc. English, for example, with its ban on previously present obstruent-nasal onset clusters requires a Minimum Sonority Distance of two steps on the scale.

Clements was aware of the reversals and plateaus found in Russian and other languages. Core syllabification, adhering to Sonority Sequencing, he postulates therefore, takes place at an abstract level, the lexical level of the phonology. (The same claim is extended to phonological typology generally by Kiparsky 2018.) Sibilant-obstruent clusters and other sonority reversals and plateaus are relegated to post-lexical phonology. These segments thus should be associated to higher level prosodic categories, such as the prosodic word (see the discussion of appendixes below) or parsed into syllables post-lexically, provided that Sonority Sequencing does not apply post-lexically. Excess consonants, such as the sibilants in English words like *street* or *extra* should thus be subject to Stray Erasure and the same holds for the initial consonant in the tautomorphemic clusters in the examples in (1-3). Thus, not all violations of the Sonority Sequencing Principle can be ignored this way and we will argue below that an account of Russian plateaus and reversals that places these consonants in an appendix is oversimplifying.

3 Multiconsonantal sequences in Russian

The logically possible triconsonantal combinations of sonorants (S) and obstruents (O) are the following: OOO, SSS, OSS, OSO, SOS, SOO, OOS, SSO. Orzechowska (2019), analyzing Polish consonant clusters, suggests to split the triconsonantal sequences in order to identify the existing biconsonantal sequences. Since Russian exhibits all the sonority patterns in biconsonantal clusters (OS, OO, SS, SO), we should compare the phonotactics of C_1C_2 and the phonotactics of C_2C_3 in $C_1C_2C_3$ sequences. This comparison will show if there are any phonotactic restrictions in any part of the split sequence.

Besides, some multiconsonantal clusters in Russian contain a morphological boundary, where C_1 or C_1C_2 is the prefix, and the following C_2 or $C_3(C_4)$ is a part of the stem. We deal with tautomorphemic (5a) and heteromorphemic (5b) sequences separately:

(5) Tri- and tetraconsonantal clusters
   a. *vdruk* 'suddenly', *mgla* 'mist', *vzdor* 'nonsence'
   b. *f-stat^j^* 'to get up', *s-plavat^j^* 'PFV-to swim', *fs-kriknut^j^* 'PFV-to scream'

Halle (1971: 57) states that tautomorphemic clusters contain maximally three consonants (regardless of one instance of occurrence of four consonants within one morpheme in *fstret͡ʃa* 'meeting'), while heteromorphemic sequences can contain up to four consonants. However, collecting the data from Shvedova's dictionary (2011) and from Tixonov's morphemic-orthographic dictionary (1996), we have noticed a few cases of heteromorphemic sequences of five consonants: *vz-bz-nut^j^ 'PFV-to fart (colloquial)*'. In this paper we account only for productive consonantal prefixes, which are *v-/f-*, *z-/s-*, *and vz-/fs-*. The C_1 in a heteromorphemic cluster is always a labial or coronal fricative.

The table in (6) below illustrates the occurrence/nonoccurrence of the triconsonantal combinations in Russian in both tautomorphemic and heteromorphemic positions. If the sequence occurs in Russian, an example word is provided. If the sequence does not occur a hyphen indicates its absence. Tautomorphemic OSS and OOOS clusters, as well as heteromorphemic OOOO occur only once – in the respective example given in the table. The only instance of OOOO is most probably OOOS, since /v/ leads a double life, as will be discussed later.

(6) Tautomorphemic and heteromorphemic multiconsonantal clusters

Type	Tautomorphemic	Heteromorphemic
OOO	*kstati* 'by the way', *fspɨlit^j* 'to get irritated'	*vz-baltɨvat^j* 'to stir', *f-skore* 'soon'
SSS	-	-
OSS	*smrad* 'stink'	-
SSO	-	-
OSO	-	-
SOS	*mgla* 'mist', *mgnovenie* 'moment'	-
SOO	*mzda* 'payment', *l^j^stit^j* 'to flatter'	-
OOS	*ʃtraf* 'fee', *fsm^j^atku* 'soft-boiled'	*f-klad* 'input', *s-prava* 'on the right'
OOOS	*fstret͡ʃa* 'meeting'	*fs-prɨgnut^j*, *vz-grusnut^j* 'to become upset'
OOOO	-	*vz-dvoit^j* 'to double'

Both, tautomorphemic and heteromorphemic CCC clusters can have an obstruent in the C_1 position: *kstati* 'by the way' and *f-skore* 'soon', respectively, and only the tautomorphemic sequence may begin with a sonorant: *mgnovenie* 'moment'. The C_2 position can be occupied only by an obstruent in both morphological types: *ʃtraf* 'fee' *and f-klad* 'input'. In the C_3 position both sonorant and obstruent can occur in both morphological positions: *fsm^j^atku* 'soft-boiled', *s-prava* 'on the right', *fspɨlit^j* 'to get irritated', *f-skore* 'soon'. Tautomorphemic C_1C_2 combinations include OO, OS, and SO sequences, but no SS, while the (tautomorphemic) C_2C_3 combinations include OS, OO, and SS clusters, but not SO. The heteromorphemic C_1C_2 combination can be occupied only by OO sequences, and C_2C_3 combinations can be OS and OO sequences. Such a restricted consonant inventory in the heteromorphemic C_1 position can be explained by the restricted consonant inventory occurring in the prefixes (as it has been pointed out, prefixes in Russian are reduced to labial and coronal fricatives). Crucially, SO occurs only in CC combinations, but neither of the morphologically different clusters has the reversal (SO) in the C_2C_3 combination. So, why does the reversal occur only in the C_1C_2 combination? Can we assume that C_1 is excluded from the phonotactics? Or is this just "an accidental gap" (Scheer 2007)? We will discuss GP (Government Phonology) approaches which try to explain the nature of triconsonantal (and multiconsonantal) clusters assuming that the absence of SO in the C_2C_3 combination is accidental and show how they fail.

After discussing existing approaches to initial clusters, we argue that the absence of OSO clusters shows that in C_2C_3 sonority reversals are not allowed and thus Sonority Sequencing (weakly) applies in Russian complex onsets. C_1 in CCC clusters is thus in a different constituent. Furthermore, the difference in the consonant inventories that we find in prefixes (two fricatives) and the initial C in tautomorphemic CCC clusters shows that there are two different positions outside the onset proper.

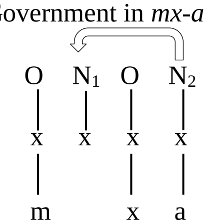
4 Government Phonology, Prosodic Licensing, and the Premargin

The difference between C_1C_2 and C_2C_3 is the occurrence of the sonority reversals in the former. The non-occurrence of SO in the C_2C_3 combination is either accidental or regulated by the grammar. In the following section we will analyze both hypotheses.

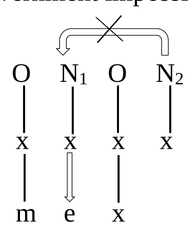
4.1 *Government Phonology* Scheer (2007: 347) states that within the Slavic languages “the absence of some particular cluster is always accidental”. Before the fall of the yers, a syncope pattern affecting certain mid vowels, Slavic exhibited only SSP-adhering clusters. In the C_1yerC_2 structure there was no restriction between C_1 and C_2. When the yer was lost, the C_1C_2 structure was “mechanically” created (Scheer 2007: 353). As a result, the sonority reversals and the sonority plateaus occurred.

According to Charette (1991), Lowenstamm (1996), Scheer (2007), and many others any sequence of segments should have the CV structure, i.e., a syllable has just an onset and a nucleus. The members of consonant clusters are separated by an empty nucleus, where the first consonant is the onset, as in (7) below. This empty nucleus is not phonetically realized if the cluster is followed by a non-empty nucleus, which takes care of the emptiness of the preceding vowel: in (7), N_1 is empty as it is governed by the following non-empty N_2. This process is called *Proper Government* (Cyran and Gussmann 1999: 5). If the vowel following the cluster is empty, like N_2 in (8), it cannot govern the preceding vowel, which is N_1 in (8), and this vowel becomes phonetically realized.

(7) Proper Government in *mx-a* ‘moss-GEN.SG’ (O-onset, N-nucleus)

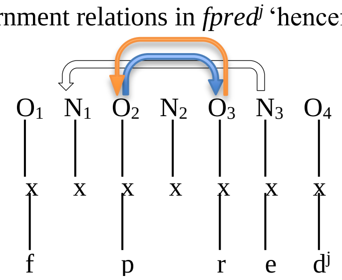


(8) Proper Government impossible in *mex* ‘moss.NOM.SG’



In triconsonantal sequences, as in *fpredʲ* ‘henceforth’, two empty nuclei are assumed within the cluster, represented in (9):

(9) Government relations in *fpredʲ* ‘henceforth’

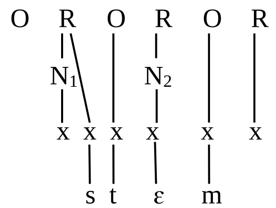


In (9), non-empty N_3 governs empty N_1. N_2 is not phonetically realized either because of Interonset Government (Cyran and Gussmann 1999: 10-11) or because of Infrasegmental Government (Scheer 2004/2007). These two competing analyses are similar in the idea that these two consonants, O_2 and O_3 in (9), are responsible for the emptiness of the nucleus between them, i.e., N_2 in (9). The difference is in the direction of the government: Interonset Government occurs from the obstruent in O_2 to the sonorant in O_3, represented by the blue arrow in (9), while Infrasegmental Government occurs from the sonorant in O_3 to the obstruent in O_2, marked with the orange arrow in (9). However, in Russian there are clusters containing only obstruents: *vzdor* ‘nonsense’, *fspɨlitʲ* ‘to fire up’, etc. Neither Cyran and Gussmann (1999) nor Scheer

(2004/2007) analyze such cases.

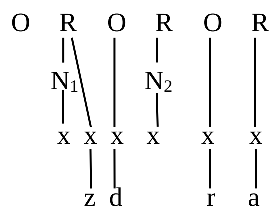
Alternatively, within GP, C_1 can be analyzed as a coda of an empty nucleus, i.e., a rhymal complement (Kaye 1992, Goad 2012, and many others). This analysis has been invoked epsecially for sibilant-obstruent sequences, leaving the strict CV analysis we just discussed for rising sonority onsets. (10) demonstrates the GP representation of English *stem* (Goad 2012: 355), where O is the onset, and R is the rhyme, and N is the nucleus.

(10) Word-initial coda in *stɛm* (Goad 2012: 355)



This approach works also with Russian triconsonantal sequences, where C_1 is the rhymal dependent, followed by two onsets separated by an empty nucleus. (111) demonstrates this analysis for the first part of the word *zdrastvuj* 'hello'.

(11) Word-initial coda in *zdrastvuj* 'hello'



Assuming that C_1 is a rhymal dependent, we should consider it as a word-medial coda. Avanesov (1956) states that the word-medial coda inventory differs from the word-final coda inventory in Russian. Word-internal codas are restricted to sonorants (12a). Intervocalic obstruent clusters are syllabified as onsets (12b). Word-final codas can be occupied by almost any consonant but voiced obstruents.

(12) Russian codas
   a. *son.t͡se* 'sun', *lan.dɨʃ* 'lily'
   b. zve.zda 'start'
   c. *svet* 'light', *kro[f]* (кровь) 'blood'

Thus, the word-medial coda inventory is restricted to sonorants, and we have seen in (6) that most triconsonantal (multiconsonantal) clusters begin with an obstruent (only two out of six combinations begin with a sonorant), as illustrated once more in (13). As the examples show, these initial obstruents can be voiceless (*kstati*) or voiced (*[vzvot]* 'military platoon').

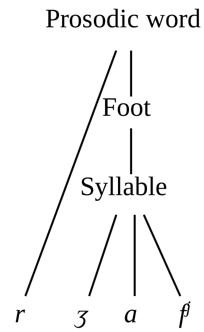
(13) Triconsonantal onsets
   skrip 'squeak', *vzvod* 'military platoon', *kstati* 'by the way', *smrad* 'stink'

The word-initial coda assumed in the GP analysis is thus not subject to the same markedness constraints (or licensing conditions) as word-internal codas in Russian, which weakens the proposal significantly. They are neither subject to the same constraints as word-final codas (no devoicing, see discussion on voicing in 4.2). See as well Krämer (2021) for discussion of the proposal of word-initial codas for sC clusters in the context of loanword assimilation.

4.2 *Prosodic Licensing* An alternative has been suggested by Rubach and Booij (1990), Vaux and

Wolfe (2009), and many others who claim that such unsyllabifiable consonants do not attach to the syllable, at least at some point of the derivation, instead they attach to a higher prosodic category, the Appendix, which is attached directly to the Prosodic Word (or foot). (14) represents the extrasyllabic rhotic in *rʒaʧʲ* ‘rust’.

(14) Extrasyllabic sonorant in *rʒaʧʲ* ‘rust’



According to Vaux and Wolfe (2009), the prosodic category the consonant is attached to is language-specific. Which prosodic node the rhotic in (14) is parsed into is still an open question. Analyzing a similar case in Polish - *rdza* ‘rust’, Rubach and Booij (1990) propose that the rhotic is attached to the prosodic word node. Rubach (1997) states that it should be parsed into the syllable node, while Rochon (2000) asserts that the sonorant should be licensed by the foot. One of her arguments is a different behavior of sonorants between obstruents word-initially on the one hand and word-medially and across word boundaries on the other hand: sonorants are transparent to voice assimilation word-medially and across word boundaries, but they are not transparent to assimilation word-initially. Russian sonorants between two obstruents remain a highly controversial issue, that is beyond the scope of this paper.

Considering the fact that in the C_2C_3 combination no sonority reversals occur, we can assume that the SSP applies to these two consonants, and only C_1 is outside the domain of the SSP. Besides, as discussed at the end of section 4.1, word-medially SO sequences are heterosyllabic, the sonorant is the coda of one syllable, and the obstruent is the onset of another. Only OO and OS are parsed in the onset word-internally. This representation of word-medial onsets corresponds to the representation of C_2C_3 in word-initial triconsonantal sequences. In other words, both exhibit only OS and OO.

That this internal subsequence of triconsonantal clusters is subject to Sonority Sequencing is further corroborated by the behavior of /v/ in voicing assimilation. Russian displays word-final devoicing of obstruents and regressive voicing assimilation, in which /v/ (or /w/, Hayes 1984) behaves in unexpected ways.

(15) Contrastive voicing (Kulikov 2013: 426):
a. *[t]am* ‘there’ - *[d]am* ‘give.FUT.1SG’
[g]oni ‘chase.IMP.2SG’- *[k]oni* ‘horses’
[t]rava ‘grass’ – *[d]rova* ‘firewood’
b. *le[t]ok* ‘bee-entrance’ - *le[d]ok* ‘thin ice’

In a sequence of obstruents, the preceding obstruent assimilates in voicing to the following obstruent in both word-initial (16a) and word-medial position (16b) (e.g., Hayes 1984).

(16) Regressive voice assimilation
a. *[v-b]it’* ‘to hit into’, *[f-p]adat’* ‘to fall into’
[vd]ova ‘widow’, *[fk]us* ‘taste’
b. *xo[dʲb]a* ‘walking’, *po[tpʲ]isatʲ* ‘to sign’

In word-final position, voiced obstruents are realized as voiceless (17):

(17) Final devoicing (Padgett 2002: 2)
ra[s] 'occasion.NOM.SG'- *ra[z]-a* 'occasion-GEN.SG'
kro[f^j] 'blood. NOM.SG' – kro[v]-i 'blood- ACC.SG'

Interestingly, the voiced fricative /v/ can function not only as an obstruent, but as a sonorant as well (Hayes 1984, Chew 2003, Bjorndahl 2018). Initial /v/ assimilates in voicing to the following obstruent regardless of morphological status: when it is a preposition, as in *v_gorot*, when it is a prefix (18a), and when it is a part of the stem (18a, second line), as in in *fsadnik*. Also, /v/ is subject to final devoicing, as in 'blood' (17). In (18c) we can note that /v/ cooccurs with preceding voiced as well as voiceless obstruents, as in *gvozdika*, or *kvartira*, respectively, and thus does not trigger assimilation.

(18) The special status of /v/:
a. *[v-g]orot* 'into the city', *[f-k]rovat^j* 'into bed'
[vz^j]at^j 'to take' – *[fs]adnik* 'horseman'
b. *proti[f]* 'against', *otzɨ[f]* 'review'
c. *[kv]artira* 'flat' - *[gv]ozdika* 'carnation (flower)'
[tv]er^j 'Tver^j (a small town in Russia)' - [dv]er^j 'door'

According to Chew (2003: 82, 132), "/v/ is lexically unspecified for the feature [±sonorant] in the phonological inventory; whether /v/ is [+sonorant] or [−sonorant] is determined by the phonotactics". (18) shows that in initial position, /v/ should be analyzed as an obstruent (also in the word-final position, where /v/ devoices like the other obstruents: *krofj/krovi* 'blood.NOM/ACC.SG', 17), and in immediate prevocalic position it should be considered a sonorant.

If C_1 does not take part in the syllabification, then can we assume that it is attached higher than the syllable node?

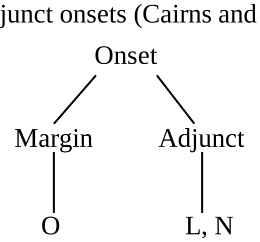
A minor issue arises for the appendix approach from the different segmental restrictions on the initial position in tauto- and hetero-morphemic clusters. As we pointed out earlier, the only prefixes that consist of a C only or CC, contain a labial or a coronal fricative or both. Other prefixes with other consonants all contain at least one vowel, e.g., *do- na-, pro-*. The initial C in tautomorphemic triconsonantal clusters can be almost any consonant of the Russian inventory. If there is only one extrasyllabic position, the appendix, this difference cannot be stated, for example as Markedness constraints on different positions.

4.3 *The Premargin Model of the Syllable* Cairns and Feinstein (1982) and Cairns (2009) build their proposal on Greenberg's (1969) typological observation on initial consonant clusters, which has shown the following implicational relations among onsets, where O stands for obstruents, L indicates liquids, N represents nasals, F fricatives, T indicates stops, and D stands for the voiced stops:

(19) Greenberg's implications (1969, cited in Cairns and Feinstein 1982: 198):
> OL > ON;
> FT;
> ND;

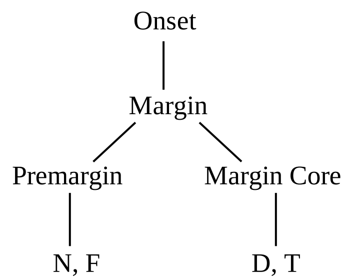
There is an implicational relation among onsets of rising sonority: if a language has ON clusters, it will also have OL sequences. Sonority plateaus, more specifically fricative-stop sequences, and sonority reversals, in the form of ND are related neither with the former nor with each other, but occur independently and in free combination with rising sonority clusters and each other. Relying on this observation, Cairns and Feinstein (1982) suggest to analyze the SSP-adhering clusters (OL, ON) in a different way than and the SSP-violating ones (FT, ND). In clusters of rising sonority, the obstruent constitutes the margin, and the sonorant constitutes the adjunct, and both are in the onset node, as shown in (18):

(20) Margin-Adjunct onsets (Cairns and Feinstein 1982: 200)



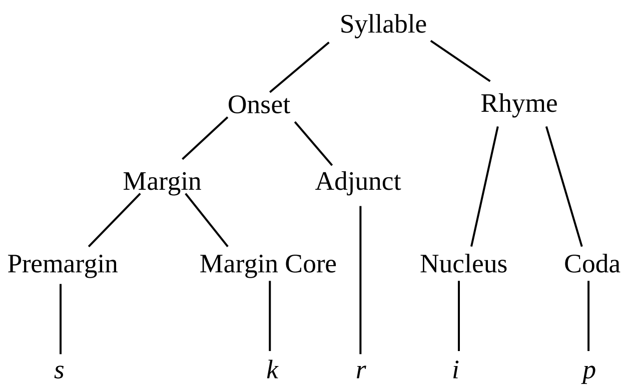
In SSP-violating sequences, the first consonant is the premargin and the second consonant is the margin core, both of which are licensed by the margin node, which is represented in (21):

(21) Premargin-Margin Core onsets (Cairns and Feinstein 1982: 200)



In a biconsonantal cluster, only the Margin Core is in the scope of the SSP. In triconsonantal clusters, C_1 is analyzed as the Premargin, C_2 is considered the Margin Core, and C_3 is supposed to be the Adjunct, as it is demonstrated in (22), which shows the representation of *skrip* ‘squeak’.

(22) Syllable structure of *skrip* ‘squeak’ according to Cairn’s (2009) model



In the triconsonantal sequence, the SSP considers only the Margin Core and the Adjunct, in (20) represented by stop -*k*- and rhotic -*r*-, respectively.

Cairns and Feinstein (1982) state that C_1 can be invisible to the SSP, regardless of being licensed into the onset node. Recalling the question about the prosodic level C_1 is attached to, we see that C_1 does not necessarily attach higher than the syllable node: it can attach even lower, to the onset node, as we have seen in (20-22), contrary to Vaux and Wolfe (2009), who claim that C_1 is attached higher than the syllable level, relying only on the SSP.

Rubach and Booij (1990) take voicing assimilation as the argument for extrasyllabicity, which does not occur between extrasyllabic consonants and syllabified ones, Rochon (2000) also relies on voicing assimilation, which either occurs across the sonorant or does not occur across the sonorant, when choosing between the foot and the prosodic word nodes. In Russian, voicing assimilation occurs word-initially and word-medially, the exception is /v/ which functions as a sonorant in certain contexts, as discussed earlier. However, it is still an open question if voice assimilation occurs across sonorants, which deserves a separate investigation, so we will not discuss this issue in the present paper. In the next section, we argue that the Russian patterns require a combination of the appendix and the premargin approach.

5 The Proposal: Appendix plus Premargin

As mentioned earlier, the consonant inventory of C_1 depends on the morphological affiliation of C_1: the consonant inventory of heteromorphemic C_1 is more restricted than the consonant inventory of tautomorphemic C_1, since the former is represented by prefixes v-/f-, z-/s-, vz-/fs-, as demonstrated in (23a).

The tautomorphemic C_1 can be represented by a consonant of any manner of articulation, as shown in (23b).

(23) Tautomorphemic and heteromorphemic consonant inventories of C_1
  a. *v-blizi* ‘nearby’, *s-prava* ‘on the right’, *vz-glʲanutʲ* ‘to look at’
  b. *kstati* ‘by the way’, *lʲstitʲ* ‘to flatter’, *ʃtraf* ‘fee’

The set of consonants that can appear as C_1 in heteromorphemic clusters is a subset of the tautomorphemic C_1 inventory. This could of course be due to the morphosyntactic status of the consonants. Russian prefixes, however, are not limited to labial and coronal place and fricative manner. The following list gives a choice of common prefixes, which contain also stops, nasals and liquids. It is only the prefixes that consist of only a consonant and that are not syllabified separately that are restricted to these two fricatives.

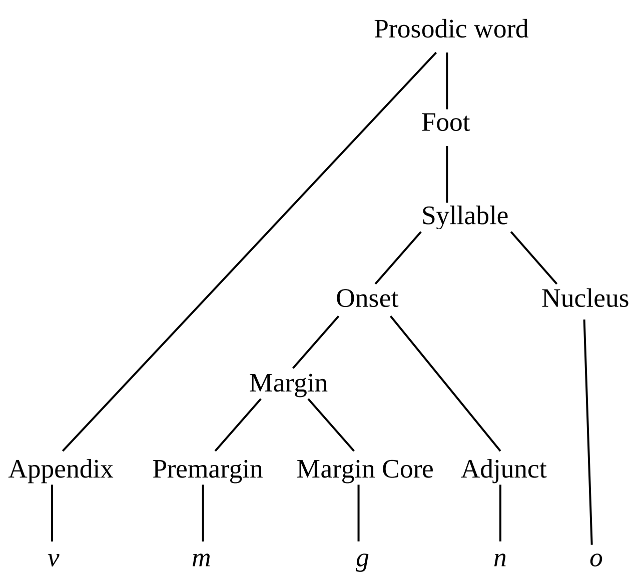
(24) Some Russian prefixes:

do-	‘up to/until/addition’
na-	‘on/onto’
(o)bez-	‘without/remove’
ot(o)-	‘away from’
pod(o)-	‘under/sub-’
pre-	‘trans-/excess’

Since we have not found any case of *vz-/fs-* attaching to a stem beginning with three consonants, we assume that the Russian word can begin with a maximum of four consonants.

To account for these observations, we propose that the heteromorphemic C_1 is licensed by higher prosodic categories: syllable, foot, or prosodic word, while the tautomorphemic C_1 is the premargin. (25) below visualizes this suggestion on initial part of the word *v mgnovenie* ‘instantly’. In fact, *v mgnovenie* ‘instantly’ consists of preposition *v-* and the noun *mgnovenie* in the locative case. “[T]he boundary between a preposition and a content word is also treated as a word-internal morpheme boundary” (Kulikov 2013: 425).

(25) Representation of the initial part of phonological word *v mgnovenie* ‘instantly’



In (25), C_1 occupied by fricative *v-* is a separate morpheme. Therefore, it is attached higher than the syllable node. The remaining three consonants, *-m-*, *-g-*, and *-n-*, being within the same morpheme, constitute the Premargin, the Margin Core, and the Adjunct, respectively. The sonority sequencing domain is the Margin Core and the Adjunct, while the Premargin and the Appendix are left outside its scope. It is impossible for

Russian to exhibit two appendices, so there are no examples of biconsonantal prefix *vz-/fs-* attaching to a stem starting with a triconsonantal sequence. Besides, the prosodic category the prefix is attached to is still an open question (either foot or the prosodic word, or even higher), that is not going to be discussed in the current paper. Word-internal clusters consist of maximally four consonants, as the underlined part [nstv] in усовершенствование 'improvement', of which the first is a coda, which suggests that the attachment site for the appendix most probably is the prosodic word and not a lower category in the Prosodic hierarchy, and the remaining three consonants are parsed as Premargin, Margin Core and Adjunct.

A biconsonantal cluster can consist of the Premargin and the Margin Core, e.g., *lgat^j 'to lie',* of the Appendix and the Margin Core, e.g., *f-xod 'entrance',* and of the Margin Core and Adjunct; e.g., *vlaga 'moisture'.* Interestingly, *v-/f-* and *z-/s-* can be a prefix or a part of the stem, so which prosodic category these fricatives are licensed by –the onset node, i.e., Premargin or Margin Core, or by the prosodic word or foot, i.e., as an Appendix– depends not only on how many consonants follow but also on their morphosyntax. The default parsing for biconsonantal clusters is as a complex onset, i.e., margin and adjunct, subject to the SSP, as evidenced by the behavior of /v/ as a sonorant in words such as *[kv]artira* 'flat'.

5 Conclusion

At first sight, Russian word-initial consonant sequences seem rather liberal in terms of onset phonotactics: there are not only biconsonantal clusters of rising sonority but SSP violating ones as well. Among the latter we can note many sonority reversals. In the present paper we have shed light on the tri- and tetraconsonantal sequences, in which phonotactics is more restricted. Taking the triconsonantal combination $C_1C_2C_3$ as a starting point, we have found out that the phonotactics of C_2C_3 is more restricted than the phonotactics of C_1C_2. Assuming that this is not an accidental gap, we discussed GP analyzes of the triconsonantal clusters, assuming both variants: that C_1 is the onset of an empty nucleus, and that C_1 is the coda of an empty nucleus. However, neither of them could satisfactorily account for the tri- and tetraconsonantal sequences in Russian. Also, we have figured out that the consonant inventory of C_1 in heteromorphemic clusters is more restrictive than the consonant inventory of C_1 in tautomorphemic clusters. Since this inventory restriction does not hold for prefixes that can be syllabified in a separate syllable, this suggests that the consonantal prefixes (and prepositions) are attached to a higher prosodic level than the C_1 in tautomorphemic sequences. We propose that both theories, the Premargin model and the Appendix approach, together explain the liberal phonotactics of biconsonantal clusters and the more restricted phonotactics of multiconsonantal sequences. In conclusion, there are no sonority reversals in Russian complex onsets, the phonotactics of which maximally allow for sonority plateaus.

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Opaque OCP in Longkou Disyllabic Tone Sandhi

Yi Jen Chen
National Chengchi University

1 Introduction

Longkou is a Shandong dialect spoken mainly in Longkou city, which is located in the northeastern area of Shandong Province. It is a subdialect of Mandarin and bears some resemblance to Mandarin Chinese in that they both went through the merging of voiced and voiceless stops, and that only few dialects retain checked tones or entering tones (Qien 2001). But Longkou, as well as other Shandong dialects, is still distinct from Chinese in many ways, especially in terms of tone sandhi.

In Longkou, a Shandong dialect spoken in Longkou city, China, some tone patterns observe OCP, while the others do not. The phenomenon is regarded as opaque if we define opacity in terms of surface generalizations (McCarthy 2007), rather than of counter-feeding or counter-feeding rule interactions. In other words, the surface generalization that OCP is present in some patterns is rendered opaque when OCP is not observed in the other patterns.

In a rule-based approach, such opacity cannot be explained because an OCP-triggered rule must apply when the environment is met. However, in a constraint-based approach, where OCP is treated as a violable constraint, OCP can be blocked by higher-ranked constraints, thereby predicting the presence of OCP in some patterns and its absence in the others. This study provides a constraint-based analysis of Longkou disyllabic tone patterns and adopts McCarthy (2003)'s Comparative Markedness constraints in tackling the grandfather effect encountered along the analysis.

2 Tonal inventory and tone sandhi

The Longkou data were recorded from 4 informants, 2 males (aged 26) and 2 females (aged 21 and 22). They were born in Longkou city and are native speakers of the dialect. One of the informants had lived in cities Jinan, Laishan (a Yentai district), and Beijing, and is now living in Longkou. Two of them had lived in Qingdao city during college, and resides in Longkou now. The other one has only lived in Longkou. The data consist of 362 monosyllabic words and 251 disyllabic words/phrases.

There are four tones in Longkou's tonal inventory, as shown in (1). For each tone, four example monosyllabic words and the glossary are provided in the first two columns. The IPA symbols for the words are omitted as segments are not the focus of the present study. The numeric tone value and the alphabetic representation of the tones are given in the third and fourth columns. The tonal representation consists of four hierarchically-structured tiers: root, register, contour, and contour feature tiers, based on evidence of spreading, OCP effects etc. (Duanmu 1990, 1994; Bao 1990, 1999; Chen 2000; Yip 1989, 2002). The alphabetic representation will be used throughout the rest of the paper.

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(1) Tonal inventory

Word	Gloss	Tone value	Tonal representation	
shui *xi* *shou* *mi*	‘water’ ‘wash’ ‘hand’ ‘rice’	13	Root tier Register tier Contour tier Feature tier	LM Lr *lh* l h
fei *dong* *shan* *hua*	‘fly’ ‘winter’ ‘mountain’ ‘flower’	31[1]	Root tier Register tier Contour tier Feature tier	ML Lr *hl* h l
dou *zuo* *mai* *yu*	‘bean’ ‘sit’ ‘sell’ ‘jade’	53	Root tier Register tier Contour tier Feature tier	HM Hr *hl* h l
niu *long* *yang* *pi*	‘cow’ ‘dragon’ ‘sheep’ ‘skin’	55	Root tier Register tier Contour tier Feature tier	H Hr *h* h

The first two tones, LM and ML, are low register contour tones. The LM tone is a rising tone, and the ML tone a falling tone. The third and the fourth tones, HM and H, are high register tones. The HM tone is a falling tone, and the H tone a level tone.

The disyllabic patterns are shown in (2), where the base tone of the non-final syllable is given in the leftmost column, and that of the final syllable in the topmost row. Examples are given below each surface disyllabic sequence. Out of the 16 (4*4) combinations of disyllabic tonal sequences, five of them undergo tone sandhi, as indicated by the boldfaced surface tones and their corresponding words, while the rest of them do not undergo tone sandhi, as indicated by the shaded cells.

(2) Tone sandhi

Final σ / Non-final σ	LM	ML	HM	H
LM	**H** LM ***xi*** *lian* ‘wash the face’	**H** ML ***shou*** *ji* ‘cellphone’	LM HM *sao di* ‘sweep floor’	LM H *lu you* ‘travel’
ML	ML LM *chun bing* ‘spring cake’	**H** ML ***fei*** *ji* ‘airplane’	ML HM *shan dong* ‘cave’	ML H *hua qien* ‘spend money’
HM	HM LM *bao zhi* ‘newspaper’	**H** ML ***zuo*** *jia* ‘writer’	HM HM *dian shi* ‘television’	HM H *qi you* ‘gasoline’
H	H LM *niu nai* ‘milk’	H ML *yang cong* ‘onion’	H HM *yang rou* ‘mutton’	**HM** H ***yang*** *mao* ‘wool’

[1] This tone may optionally be read as 313 in the final position due to final lengthening.

In Longkou, the sandhi position is always non-final, so tones in the final position never change. The sandhi patterns can be summarized into three patterns, as shown in (3). First, adjacent H tones undergo contour change, as in (3a). Second, falling tones (HM and ML) change into H before ML, as in (3b). Third, LM raises its register before low register tones (LM or ML). This paper argues that the sandhi patterns are resulted from multiple Obligatory Contour Principles (Leben 1973; Goldsmith 1976).

(3) Sandhi patterns
- a. H → HM / ___ H
- b. FALL → H / ___ ML
- c. LM → H / ___ Lr

3 A rule-based analysis

The sandhi patterns in (3) indicate three OCP at play, and the OCP-triggered rules are stated as (4)-(6). First, the contour change in rule (3a) is motivated by the OCP against adjacent H on the tone root tier (hereafter OCP-H), as shown in (4). The contour change in (3b) is motivated by the OCP against adjacent falling contours on the contour tier (hereafter OCP-Fall), as shown in (5). The register change in (3c) is motivated by the OCP against adjacent Lr on the register tier (hereafter OCP-Lr), as shown in (6).

(4) OCP-H
H → HM / ___ H = (3a)

(5) OCP-Fall
FALL → LEVEL / ___ Fall = (3b)

(6) OCP-Lr
Lr → Hr / ___ Lr = (3c)

The summarized sandhi pattern, (3b), actually entails two sandhi patterns: HM → H and ML → H before ML. The former sandhi environment only triggers OCP-Fall, which changes the contour of the non-final tone. The latter sandhi environment triggers OCP-Fall and OCP-Lr, so both contour change and register raising are observed.

The rule-based analysis, however, encounters two problems. First, if rule (6) is the only cause of tone change in pattern (3c), what accounts for the additional contour change? Second, why do rules (5) and (6) fail to apply when the environments are met, as shown (7)-(8).

(7) FALL → LEVEL / ___ FALL underapplies in
- a. HM → HM / ___ HM
- b. ML → ML / ___ HM

(8) Lr → Hr / ___ Lr underapplies in ML → ML / ___ LM

In a rule-based approach, these problems cannot be explained as a rule must apply when the conditioning environment appears. However, under the framework of Optimality Theory (Prince & Smolensky 1993/2004), since all constraints, including OCP, are violable, the absence of OCP can be attributed to constraints that rank higher than the OCP constraints.

4 A constraint-based analysis

In classic OT (Prince & Smolensky 1993/2004), an input generates a set of output candidates which is evaluated by the grammar or constraint hierarchy of the language. The candidate deemed best by the constraint hierarchy wins and becomes the optimal output. Traditionally, the hierarchy consist of two types of general constraints: faithfulness and markedness constraints. Faithfulness constraints ensure the output remains the same as the input. Markedness constraints eliminate output candidates with marked structures. When markedness constraints dominate faithfulness constraints, marked structures must be altered, thereby predicting phonological alterations.

In a constraint-based analysis, the phonological alterations described in (3) are expressed by the interaction between constraints (9)-(16), as demonstrated in tableaux (15)-(18).

(9) OCP-H
Assign one violation mark for every pair of adjacent H tones.

(10) OCP-Fall
Assign one violation mark for every pair of adjacent *hl* (falling) contours on the contour tier.

(11) OCP-Lr
Assign one violation mark for every pair of adjacent Lr on the register tier.

(12) *MH
Assign one violation mark for every MH tone.

(13) Ident-Contour
Assign one violation mark for every contour that is not identical to its correspondent.

(14) Ident-Register
Assign one violation mark for every register that is not identical to its correspondent.

(15) Ident-T-R
Assign one violation mark for every rightmost tone whose input is not identical to its output.

(16) Ident-T
Assign one violation mark for every tone whose input is not identical to its output.

Constraints (9)-(11) are OCP constraints that respectively rule out adjacent H tones, adjacent falling contours, and adjacent Lr. Constraint (12) is proposed to rule out MH tones in any possible candidates because there are no surface MH tones in Longkou. Constraint (13) penalizes any change of contour from the input to output, for instance, a falling tone becoming a level tone or a rising tone. Constraint (14) penalizes any change of register from the input to output, for instance, a Lr tone becoming a Hr tone and vice versa. Constraint (15) forbids any tonal changes in the rightmost tone. Constraint (16) forbids any tonal changes in a tone.

Tableaux (17)-(20) show how the alterations in (3) are derived. The asterisks are violation marks that denote the number of violations of each candidate. The exclamation marks symbolize the point where a candidate is ruled out. The violation marks in the shaded cells are not significant since the winner has already been selected by higher-ranked constraints.

As shown in (17), Ident-T-R and OCP-H dominate Ident-Contour and Ident-T, so that adjacent H tones undergo contour change, and that the rightmost tone never undergoes tone sandhi.

(17) H → HM / ___ H = (3a)

/H.H/	Ident-T-R	OCP-H	Ident-Contour	Ident-T
☞a. HM.H			*	*
b. H.H		*!		
c. H.HM	*!		*	*

Constraints Ident-T-R and Ident-T will be omitted from the rest of the tableaux because Ident-T-R will always be top-ranked and Ident-T bottom-ranked. Candidates whose rightmost tone undergo tone sandhi will also be omitted from the candidate set for they will never win.

A shown in (18)-(19), OCP-Fall dominates Ident-Contour, so that a falling tone becomes a level tone before a falling tone. The parentheses indicate that either violation mark is fatal.

(18) FALL → H / ___ ML = (3b)

/HM.ML/	OCP-Fall	Ident-Contour
☞a. H.ML		*
b. HM.ML	*!	

(19) FALL → H / ___ ML = (3b)

/ML.ML/	OCP-Lr	OCP-Fall	Ident-Register	Ident-Contour
☞a. H.ML			*	*
b. ML.ML	*(!)	*(!)		
c. LM.ML	*!			*

Besides contour change, register raising is observed in (19) because OCP-Lr dominates Ident-Register. OCP-Lr is also active in (20).

(20) LM → H / ___ Lr = (3c)

/LM.ML/	OCP-Lr	*MH	Ident-Register	Ident-Contour
☞a. H.ML			*	*
b. MH.ML		*!	*	
c. LM.ML	*!			

Though candidate (20b) satisfies OCP-Lr and has fewer faithfulness violation than (20a), it violates *MH and is thus ruled out. This provides an explanation for the first problem mentioned at the end of section 3. The additional contour change in (3c) is motivated by *MH, which dominates Ident-Contour.

The second problem mentioned in section 3 is the absence of OCP-Lr and OCP-Fall in three forms, ML.LM, ML.HM, and HM.HM. The absence of OCP-Lr and OCP-Fall in ML.LM and ML.HM can simply be attributed to Ident-ML, as defined in (21). Ranking Ident-ML above OCP-Fall and OCP-Lr prohibits any change of the ML tone in spite of the violation of OCP-Fall and OCP-Lr.

(21) Ident-ML
Assign one violation mark for every ML tone that is not identical to its correspondent in the output.

However, tone sandhi still applies to ML before another ML, so OCP-ML, as in (22), is proposed and ranked above Ident-ML.

(22) OCP-ML
Assign one violation mark for every pair of adjacent ML tones.

Tableau (23) demonstrates the derivation of three disyllabic sequences with an ML tone in the non-final position. The ML tone is retained before HM, as in (23a), and before LM, as in (23c), because Ident-ML dominates OCP-Fall and OCP-Lr. The ML tone undergoes tone sandhi before another ML, as in (23e), because OCP-ML dominates Ident-ML.

(23) ML → ML / ___ HM

/ML.HM/	OCP-ML	Ident-ML	OCP-Fall	OCP-Lr	Ident-Reg	Ident-Cont
☞a. ML.HM			*			*
b. LM.HM		*!				
/ML.LM/						
☞c. ML.LM				*		
d. HM.LM		*!			*	
/ML.ML/						
☞e. H.ML		*			*	*
f. ML.ML	*!		*	*		

There is still one pattern that ignores OCP-Fall, that is, HM.HM. One might propose Ident-HM and rank it above OCP-Fall to forbid HM to change, as shown in (24a, b). However, the ranking predicts the wrong result, as in (24d), because HM is subject to OCP-Fall before ML.

(24) Opaque OCP-Fall

/HM.HM/	Ident-HM	OCP-Fall	Ident-Contour
☞a. HM.HM		*	
b. H.HM	*!		*
/HM.ML/			
c. H.ML	*!		*
💣d. HM.ML		*	

The problem here is that HM ignores OCP-Fall before HM but not before ML. Namely, a constraint must be proposed to rule out (24b) but not (24c).

The faithfulness approach, which uses Ident-HM, is not feasible, as discussed earlier, so the markedness approach is adopted here to distinguish (24b) from (24c). A conjoined markedness constraint, as defined in (25), is proposed to rule out (24b) without affecting (24c).

(25) [OCP-Hr & OCP-h]
Assign one violation mark for every pair of tones with adjacent Hr and adjacent feature *h*.

The conjunction combines OCP-Hr and OCP-h to rule out sequences with adjacent H tone elements, such as **H**.**H**, **H**.**H**M, etc. Note that OCP-H forbids adjacent H *tones*, while [OCP-Hr & OCP-h] forbids adjacent H *tone elements*. Therefore, the sequence that violates OCP-H, i.e. H.H, is subsumed into the many sequences that violate [OCP-Hr & OCP-h].

[OCP-Hr & OCP-h] successfully predicts the correct output forms, as shown in (26). Nevertheless, the ranking over-predicts tone sandhi in H.HM, as shown in (27).

(26) HM → HM / ___ HM

/HM.HM/	[OCP-Hr & OCP-h]	OCP-Fall	Ident-Contour
☞a. HM.HM		*	
b. H.HM	*!		*
/HM.ML/			
☞c. H.ML			*
d. HM.ML		*!	

(27) Wrong prediction

/H.HM/	[OCP-Hr & OCP-h]	OCP-Fall	Ident-Contour
a. HM.HM		*	
💣b. H.HM	*!		*

Hence, a distinction must be made between the H.HM in (26b), which is forbidden, and the H.HM in (27b), which is allowed. The present analysis adopts McCarthy's (2003) *Comparative Markedness* and separates [OCP-Hr & OCP-h] into a new version, $_{N}$[OCP-Hr & OCP-h], and an old version, $_{O}$[OCP-Hr & OCP-h]. The new markedness constraint penalizes the marked structure that does not exist in the input. The old markedness constraint penalizes the marked structure that already exists in the input. The constraints have been proposed to account for opaque processes that pose a great challenge to classic OT, such as grandfather effects, counterfeeding opacity, and so on. The proposed comparative markedness constraints are defined as follows.

(28) $_{N}$[OCP-Hr & OCP-h]
Assign one violation mark for every pair of tones with adjacent Hr and adjacent feature *h* which do not exist in the input.

(29) $_{O}$[OCP-Hr & OCP-h]
Assign one violation mark for every pair of tones with adjacent Hr and adjacent feature *h* which already exist in the input.

The new markedness constraint, as in (28), rules out (26b), but not (27b). The old markedness constraint, as in (29), rules out (27b), but not (26b). A distinction between the same output form, H.HM, is thereby made, as demonstrated in (30).

(30) A comparative markedness solution

/HM.HM/	$_{N}$[OCP-Hr & OCP-h]	OCP-Fall	Ident-Cont	$_{O}$[OCP-Hr & OCP-h]
☞a. HM.HM		*		
b. H.HM	*!		*	
/HM.ML/				
☞a. H.ML			*	
b. HM.ML		*!		
/H.HM/				
☞a. H.HM				*
b. HM.HM		*!	*	

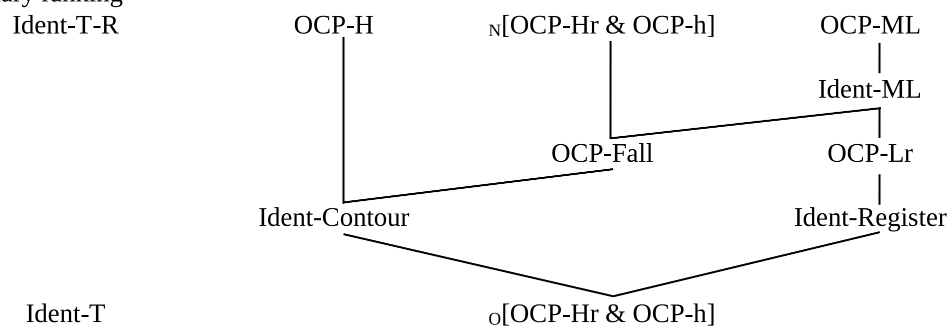
By ranking $_{N}$[OCP-Hr & OCP-h] above OCP-Fall, and $_{O}$[OCP-Hr & OCP-h] below Ident-Contour, the correct outputs are predicted. The ranking implies that derived adjacent H tone elements are forbidden, but non-derived ones are allowed, which is also called a grandfather effect[2].

6 Conclusion

The grammar of Longkou disyllabic tone sandhi is summarized in (31). The ranking implies that Longkou tone sandhi is triggered by OCP-H, OCP-ML, OCP-Fall, and OCP-Lr. OCP-H and OCP-Fall triggers contour change, while OCP-Lr triggers register raising. OCP-ML triggers both contour change and register raising. Ident-T-R, which is undominated, ensures that tone sandhi only occurs in the non-final position. Ident-T is bottom-ranked.

[2] The term "grandfather effect" originates from "grandfather clause", which is a provision that allows activities that were approved before to be exempt from new laws, regulations, etc.

(31) Summary ranking



The OCP generalizations are obscured when OCP-Fall is blocked by $_{N}$[OCP-Hr & OCP-h] and Ident-ML, and OCP-Lr is blocked by Ident-ML. Consequently, adjacent falling tones are allowed under two circumstances: first, when HM is followed by HM; otherwise, adjacent H tone elements would be derived; second, when ML is followed by HM, but not by ML, for OCP-ML dominates Ident-ML. Likewise, OCP-Lr is blocked when ML is followed by LM, but not by ML. $_{O}$[OCP-Hr & OCP-h] is dominated by Ident-Contour and Ident-register, to prevent the base tone sequence with adjacent H tone elements, H.HM, from tone sandhi.

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‘*Relics*’ of Place Harmony in Atypical Phonological Development in Child Greek

Ioanna Kappa, Katerina Iliopoulou, and Maria Gatsou
University of Crete

1 Introduction

Consonant Harmony (CH), is the process of long-distance assimilation between non-adjacent consonantal segments (e.g. Hansson, 2001, 2010[1]; Rose & Walker, 2004; i. a.), contrary to local assimilation, which requires strict segmental adjacency. Cross-linguistically, CH -a process not common in adult systems, with sibilant CH being the dominant pattern- may apply within various domains, such as within a morpheme, or a stem/root, or across a root-affix boundary, generally speaking within a word (Hansson, 2010). According to Cole and Kisseberth (1994), there is a phonetic motivation for harmony, which is attributed to factors such as enhanced perceptibility of distinctive features, as well as articulator stability.

CH is widely attested in the early stages of typical phonological development in the child speech of various languages (see §2) and, in the literature, it has been viewed as a repair mechanism that facilitates and promotes acquisition of structures at a stage where not all phonemic contrasts are acquired (e.g. Vihman, 1978; Stoel-Gammon & Stemberger, 1994; but, cf. Berg, 1992, who proposes that CH is rather a processing problem).

In the speech of Greek children with *Developmental Language Disorder (DLD)*, CH seems to be still active in advanced ages, as a relic of earlier developmental stages, in contrast to typical development where CH only occurs at the early developmental stages. The present study explores the emergent CH and its underlying constraints in children with DLD in comparison to children with typical development. We propose that CH in children with DLD is motivated, as argued by Bat-El (2009), by *a-synchronization* between the gradual development of the prosodic word and the delayed development of contrast among the consonants (see §3, §4).

2 Background

The process of consonant harmony is active in developing grammars only during the early stages of phonological development, at the age of, approximately, 1;5 (1 year; 5 months) up to a maximum of 3;6 (3 years; 6 months), while it shortly fades in later developmental stages (Grunwell, 1982). Examples of CH in the speech of children acquiring a range of different languages are shown (1), (2). The examples illustrate DORSAL harmony in Dutch (1a), English (1b), Greek (1c), Hebrew (1d), and Spanish (1e). In the latter examples, a LABIAL (1a) or a CORONAL (1b-e) segment assimilates to the DORSAL Place of Articulation (PoA) of a non-adjacent segment, thus a regressive (1a-c), or a progressive (1d-e) long-distance assimilation occurs. Examples in (2) show instances of LABIAL CH in Dutch (2a), English (2b), Canadian French (2c), German (2d), Greek (2e), Spanish (2f), and Hebrew (2g), where the PoA of a CORONAL or DORSAL segment assimilates to the PoA of a, following, non-adjacent LABIAL segment (regressive CH). In the literature on

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[1] Hansson (2010) offers a comprehensive typological survey of consonant harmony systems, investigating CH in more than 130 (adult) languages and dialects.

child phonology, regressive CH is the dominant directionality pattern, in contrast to progressive CH (e.g. Pater & Werle, 2003; Rose & dos Santos, 2004; among many others).

		Input		Child's output	Gloss
(1)	DORSAL harmony				
	Regressive CH				
a.	Dutch (Levelt, 1994):	/ˈblɔkə/	→	[ˈkɔko]	'blocks'
b.	English (e.g. Rose, 2000, a. o.):	/dʌg/	→	[gʌg]	'duck'
c.	Greek (Kappa, 2001):	/ˈtaki/	→	[ˈkaci]	'Takis' (name)
	Progressive CH				
d.	Hebrew (Gafni, 2012):	/ken/	→	[geg]	'yes'
e.	Spanish (Macken & Ferguson, 1983):	/ˈkasa/	→	[ˈkaka]	'house'

(2)	LABIAL harmony				
	Regressive CH				
a.	Dutch (Level, 1994):	/ˈtafəl/	→	[ˈpafy]	'table'
b	English (Pater & Werle, 2003, a. o.):	/tɑp/	→	[pap]	'top'
c.	Canadian French (Rose, 2000):	/kaˈfe/	→	[pəˈfɛ]	'coffee'
d.	German (Berg, 1992):	/ˈto:mas/	→	[ˈpo:mas]	'Thomas'
e.	Greek (Kappa, 2001):	/ˈkapa/	→	[ˈpapa]	'Kappa'(surname)
f.	Spanish (Macken & Ferguson, 1983):	/ˈsopa/	→	[ˈpopa]	'soup'
g.	Hebrew (Gafni, 2012):	/ʃo.ˈχe.vet/	→	[ʃo.ˈfe.fet],	'(she) lies down'(RM 2;03.01)

In the phonological literature, largely on English child speech[2], research on CH is mainly from the segmental point of view, focusing on the features which are CH triggers or targets, and on directionality. On the contrary, Goad (2001) suggests that the CH patterns may be due to prosodic licensing requirements, while Rose (2000, 2001, p. 484) argues for 'licensing relationships' between segmental PoA features and the heads of prosodic constituents, such as foot and prosodic word, resulting in featural interactions in the speech of English and Canadian-French speaking children. Levelt (1994, 1996) and Lleó (1996) argue that, in the child speech of Dutch and Spanish, respectively, a C(onsonant)-V(owel) featural interaction occurs, rather than CH.

2.1 *CH in typical development in SMG* In Standard Modern Greek (SMG) phonological acquisition, CH is attested in the early speech of toddlers with typical phonological development from, approximately, 2 years old until the age of 3;5. It has been argued that it is a featural interaction among heterosyllabic, underlyingly non-identical onset consonants, affecting mainly the PoA features, while the intervening vowel[3] is *transparent* and does not interact with the CH process (cf. Kappa, 2001; Tzakosta, 2007a; Poulidakis, 2018). CH can be partial, involving only one or two feature(s); e.g., CH can be an instance of long-distance PoA assimilation, as in the regressive LABIAL CH in (3); the underlying CORONAL /t/ (3a) and the underlying DORSAL /k/ (3b) are harmonized to the PoA of the following LABIAL /p/, thus realized as a LABIAL [p].

(3) CH of PoA

a.	/ˈ**t**ipos/	→	[ˈ**p**ipo]	'type -M.SG.NOM'	(Sof: 2;06.14)	(Kappa, 2001, p. 405)
b.	/ˈ**k**upa/	→	[ˈ**p**upa]	'cup- F.SG.NOM'	(Boy: 2;08)	(Poulidakis, 2018, p. 52)

Additionally, Tzakosta (2007a) provides empirical evidence that CH may affect the realization of the Manner of Articulation (MoA) and/or voicing, e.g. in (4), the underlying voiced LABIAL FRICATIVE /v/ (in bold)

[2] e.g. Smith, 1973; Ingram, 1974; Menn, 1975; Cruttenden, 1978; Vihman, 1978; Donahue, 1986; Stemberger & Stoel-Gammon, 1991; Berg, 1992; Macken, 1995; Stoel-Gammon & Stemberger, 1994; Stoel-Gammon, 1996; Pater, 1997, 2003; Dinnsen, Barlow & Morrissette, 1997; Goad, 1996, 1997; Bernhardt & Stemberger, 1998; Rose, 2000, 2002; Pater & Werle, 2003; Inkelas & Rose, 2003; Rose & dos Santos, 2004; among others.

[3] The Greek empirical child data do not support the emergence of C-V featural interaction, as in Dutch and Spanish child speech, cf. Levelt (1994, 1996) and Lleó (1996), respectively.

harmonizes to the MoA and voicing values of the onset segment of the following syllable, i.e. of the voiceless LABIAL STOP /p/. As a result, the target /v/ is realized as a voiceless STOP [p] (in bold).

(4) CH of MoA
/ˈ**v**lepo/ → [ˈ**p**epo] not *[ˈvepo] 'see-1.PR.SG.' (Stef: 2;05.08) (Tzakosta, 2007a, p.15)

The CH can also be full**,** i.e. the harmonized segments agree in all three dimensions (voicing, MoA and PoA). In (5a), regressive DORSAL CH occurs; the input CORONAL LATERAL /l/ harmonizes to all features of the voiceless DORSAL STOP /k/, resulting in the realization of a DORSAL STOP [c][4]. In (5b, c), there are examples of regressive LABIAL CH; in (5b), the voiceless DORSAL STOP /k/ and in (5c), the voiceless CORONAL STOP /t/ are realized as a voiced LABIAL FRICATIVE [v], respectively, thus agreeing to all the features of the onset segment of the following syllable.

(5) Full CH

a.	/ˈ**l**i.kos/	→ [ˈ**c**i.kos]	'wolf- M.SG.NOM'	(Girl 2;06.05)	(Poulidakis, 2018, p.186)
b.	/ˈ**k**a.vu.ras/	→ [ˈ**v**a.vu.las]	'crab- M.SG.NOM'	(Boy: 2;08.07)	(Poulidakis, 2018, p.183
c.	/s**t**a. ˈvro/[5]	→ [**v**a.ˈvo] not *[ta.ˈvo]	'cross-ACC.SG'	(B.M: 1;10.18)	(Tzakosta, 2007a, p. 15)

In her developmental case study, Kappa (2001) argues that in the very early stages of phonological development, the harmonic domain is the minimal prosodic word, which, in Greek child speech, is the trochaic foot (see also Kappa, 2002). She also argues that the directionality of CH is related to stress, namely that consonants in unstressed syllables are more prone to assimilation than consonants in stressed syllables. She claims that CH in Greek child speech is driven by the PoA hierarchy of CH triggering segments: LABIAL >> DORSAL >> CORONAL, i.e. segments with LABIAL PoA are more inclined to trigger CH, than segments with any other PoA, while (underlyingly) CORONAL segments are the CH targets and are realized with their PoA agreeing to the PoA of the trigger.

In congruence to Kappa (2001), Tzakosta (2007), investigating developmental data from 10 children, also argues that CH takes place mainly within the prosodic word. The directionality of CH is mainly regressive (78%), motivated not only by the feature interactions, but rather resulting from the interplay of segmental (un)markedness and stress. Tzakosta argues that her data indicate a proneness to CH being predominately triggered by unmarked segments for PoA and MoA, i.e. by CORONALS and STOPS, respectively, due to their high frequency in the ambient language. Regarding the PLACE harmony, she proposes the following order for the harmony triggers, according to their PoA: CORONALS >> LABIALS >> VELARS, whereas the mirror image scale, VELARS >> LABIALS >> CORONALS, holds for MANNER harmony. Finally, Tzakosta claims that CH seems to manifest rather as PoA harmony, than as MoA harmony. In the example in (6) below, the PLACE harmony is triggered by a CORONAL NASAL, targeting a leftmost VELAR STOP (in bold), which is realized as a CORONAL (in bold).

(6) /ˈ**k**ani/ → [ˈ**t**ani] 'do-PRES. SG.' (B.M.: 2;02.12) (Tzakosta, 2007, p.15)

2.2 *CH in atypical development* CH is also attested in the speech of children whose phonological development follows a diverse trajectory (a developmental trajectory termed *atypical* in the literature).

Bat-El (2009) argues for *a-synchronization* as the motivation for CH in atypical acquisition. Namely, the prosodic word gradually develops while, at the same time, the development of contrast among the consonants in the word still remains in the initial developmental stages. In the following examples from SMG

[4] The DORSAL STOP is realized as a palatalized [c] in the environment of an adjacent (following) front vowel [i].

[5] Regardless of CH, the target/input branching [OBSTRUENT+SONORANT] clusters and/or non-rising [s+OBSTRUENT] clusters with adjuncts are not realized by Greek L1 children at this developmental stage, therefore they are reduced to the less sonorous OBSTRUENT segment (cf. Kappa, 2002; Tzakosta, 2003, 2007b; Coutsougera & Shelkovaya-Vasiliou, 2008; Ploumidi, 2020, i. a.) conforming to the cross-linguistic pattern. The investigation of cluster reduction is beyond scope in this paper.

(7) and Hebrew (8a, b), the number of syllables in the prosodic word, is realized faithfully. This is made explicit in the Hebrew examples where, in (8a), there are three syllables and in (8b) four target syllables.

			Target		**Child's output**	**Child - Age**	**Gloss**
(7)	Greek (Syrika et.al., 2007):		/ˈkedro/	→	[ˈ**t**eto]	PD4 - 4;03	'center'
(8)	Hebrew (Bat-El, 2009):	a.	/tarneˈgol/	→	[gageˈgol]	RF - 4;07	'rooster'
		b.	/eliˈkopter/	→	[pepiˈpope]	IO - 4;09	'helikopter'

The phonology of children acquiring Greek as ambient language (L1), who follow diverse (atypical) trajectories in their phonological development remains understudied to date. This is especially true for CH in Developmental Language Disorder (DLD), where CH seems to be still active in advanced ages, in contrast to typical development where CH only occurs at the early developmental stages, as we already mentioned. To our knowledge, there is no account on CH in children with DLD acquiring Greek as L1.

3 Present study

3.1 *Participants and methodology* In this study, we investigate CH in children with DLD, acquiring Greek as L1. Our dataset is drawn from the data presented in Stavgiannoudaki (2010) (tagged [STAV]), Kalisperaki (2010) ([KAL]), and Giannakaki (2020) ([GIAN]). In all cases, the same picture naming task was used for data collection. The data collection was cross-sectional, and the researchers interacted with the children at the kindergarten. In this dataset, we spotted 73 cases of CH in the productions of 21 children. The children were selected by the above authors, based on their phonological delay and/or DLD diagnosis. The ages of the participants range from 4;06 to 6 years, (mean age 5;08).

3.2 *Findings* In the grammars of the participants studied in this paper, the development of the prosodic word (i.e. number of syllables) is accomplished faithfully to the target word syllable number. The data indicate that CH occurs among non-adjacent non-sonorant consonants, i.e. among OBSTRUENTS, in two distinct groupings:
(i) among non-sonorants with identical MoA: [*α*continuant…*α*continuant], i.e. [STOP-STOP] (9, 10), at a ratio of 3.17%, and [*β*continuant…*β*continuant] FRICATIVE-FRICATIVE, at a ratio of 19.27% (11, 12)[6].

	Target	**→**	**Child's Output**	**Gloss**	**Child's #No/Name**	**(Source)**
(9)	/'per.go.la/	→	['per.bo.la]	'arbor'	Mich.	(KAL)
(10)	/'to.kso/	→	['ko.kso]	'bow'	#5	(STAV
(11)	/ˈɣlo.sa/	→	['ɣlo.ça]	'tongue'	#2	(GIAN)
(12)	/ðel.ˈfi.ni/	→	[ve.ˈfi.ni]	'dolphin'	#9	(GIAN)

(ii) among non-sonorants with different MoA: [*α*continuant…*β*continuant], i.e. [STOP-FRICATIVE] (in either order), at a ratio of 7.27% (as seen in 13, 14, 15).

(13)	/a.ˈkri.ða/	→	[a.ˈkri.ja]	'grasshopper'	#1	(GIAN)
(14)	/ˈðra.kos/	→	[ˈja.kos]	'dragon'	#28	(GIAN)
(15)	/ˈfa.da.zma/	→	[ˈsa.da.ma]	'ghost'	#4	(STAV)

It seems that LIQUIDS, which are exclusively CORONAL in SMG, are transparent and they are skipped in CH, as seen in example (16), because they cannot physically realize a different PoA (DORSAL or LABIAL) in SMG.

(16)	/psa.'li.ði/	→	[psa.'li.vi]	'scissors'	#26	(GIAN)

Our study aims to analyze and define the conditions for harmonizing segments to emerge, determine the harmonizing domain(s), and identify what drives the CH and its directionality (if any).

[6] Simplification processes can be present, in addition to CH in the data. This study focuses solely on CH, thus any analysis of additional processes is out of scope.

4 Discussion

At the segmental level, the data show that the children's grammars sporadically exhibit a protracted CH, as a relic of earlier developmental stages. This means that their grammars still demand no contrast in PoA features to some extent, a pattern not attested in typically developing children of this age in SMG, where CH declines considerably earlier and is not observed after the age of 3;5 (see §2). The relict demand for no contrast results in a partial harmony, which involves only the major PoA, thus neutralizing the PLACE contrast within a harmonizing domain, while the MoA and the [±voice] features are realized faithfully, and stress seems to not be involved. In general, it seems that CH among PoA features affects the natural class of non-sonorant consonants and applies within harmonic domains restricted to two non-adjacent consonants (Onset-Onset). Specifically, in our data (9-16, see §3.2), CH affects mainly OBSTRUENTS with two identical features, namely MoA and [-sonorant], being in contrast only to the PoA feature. Therefore, it is attested systematically between STOPS (see above in 9, 10), and between FRICATIVES (see above in 11, 12). It slightly affects OBSTRUENTS with different MoA and PoA, i.e. consonants identical only for the feature [-sonorant].

We argue that Consonant Harmony in children with DLD preconditions *feature similarity* (e.g. Walker, 2000; Hansson, 2001) over the natural classes defined by distinctive features. The effects of feature similarity are manifest in two distinct patterns. We propose that CH among POA features is *parasitic*[7], i.e. the trigger and the target of the CH are required to agree to one or more features (see above (i, ii), which are restated below, as (17), (18) . The parentheses indicate the harmonic domain for CH).

(17) Obstruents with identical MoA
([-sonorant, αcontinuant]…[-sonorant, αcontinuant]) : (STOP… STOP)
([-sonorant, βcontinuant]…[-sonorant, βcontinuant]) : (FRICATIVE …FRICATIVE)

(18) Obstruents with contrast in MoA
([-sonorant, αcontinuant]…[-sonorant, βcontinuant]): (STOP…FRICATIVE) in either order

The CH patterns are analyzed by means of Span Theory (McCarthy, 2004), and Agreement By Correspondence theory (ABC; Rose & Walker, 2004), couched within the general framework of Optimality Theory (OT; Prince & Smolensky, 2004). In OT, the optimal output candidate (realized form) is evaluated based on the satisfaction or violation of hierarchically ranked constraints that require identity to the input (Faithfulness Constraints) and constraints that forbid the realization of marked structures/segments (Markedness Constraints).

We assume that CH among PoA features applies within harmonic *headed spans*. Following McCarthy's (2004) *Span Theory*, we define a *harmonic domain* as a headed span of a PoA feature, i.e. the segments participating in CH must have the same PoA within the span. The two span segments are always prosodically licensed under Onset, and agree for some feature(s) (cf. (17), (18)). The span includes the onset of the stressed syllable of the target word. The span is headed by a consonant whose PLACE is essentially faithful to the input (underlying representation of the segment) and determines the realization of the PoA feature of the other span segment, see (10), repeated below (the parentheses indicate the span boundaries; the span head is underlined).

(10) /'to.kso/ → ('ko.<u>k</u>so) 'bow'

In the case of trisyllabic words, the parsing of the span depends upon the location of its head. The spans may be parsed:

a) At the beginning of the word, as in the span (ˈ<u>p</u>er.bo) in (9), where the final syllable with a sonorant Onset constructs its own span; see above examples with trisyllabic words in (9), (12), and (15), which are repeated below.

[7] *Parasitic harmony* occurs when a segment A copies a feature [±F] from a segment B under the condition that both segments A and B have the same value for a feature [±G] (cf. Nevins, 2010, p.123 and references therein for vowel harmony). For parasitic consonant harmony, see Shaw, 1991; Odden, 1994; Gafos, 1999; Hansson, 2001, 2010; Rose & Walker, 2004; Mackenzie, 2009; Jurgec, 2013; among others.

(9) /'per.go.la/ → ('p̠er.bo).(l̠a) 'arbor'
(12) /ðel.ˈfi.ni/ → (ve.ˈf̠i).(n̠i) 'dolphin'
(15) /ˈfa.da.zma/ → (ˈsa.d̠a).(m̠a) 'ghost'

b) At the end of the word, as (ˈk̠ri.ja) above in (13), repeated below.

(13) /a.ˈkri.ða/ → a.(ˈk̠ri.ja) 'grasshopper'

The head selection satisfies the faithfulness constraint HEAD[α/βcont, α/βsonorant], [γF] which demands an [α/βcont, α/βsonorant] segment identical to its input [γF] as the head of a span. The span segments agree in the [γF] feature of the head. In our analysis, the feature [γF] is the PLACE feature of the head segment, i.e [γPLACE], targeting only [-sonorant] segments in this analysis. The HEAD[α/βcont, α/βsonorant], [γPLACE] constraints relevant to our study are described in (19), (20).

(19) HEAD[-cont, -sonorant], [γPLACE] assign a [-cont, -son] segment as the head of a [γPLACE] Span

(20) HEAD[+cont, -sonorant], [γPLACE] assign a [+cont, -son] segment as the head of a [γPLACE] Span

Based on our data, we argue that the unmarked [-continuant] MoA is selected as head in the pattern of restricted similarity, see (18); hence the resulting hierarchical ranking of (19, 20) is stated in (21):

(21) HEAD[-cont, -sonorant], [γPLACE] >> HEAD [+cont, -sonorant], [γPLACE]

The ABC model (Rose & Walker, 2004) suggests that greater similarity between two output segments leads to a stronger tendency for correspondence, hence agreement. This is also psycholinguistically backed-up, as it has been claimed that slip of the tongue interactions between consonants are more frequent when said consonants share phonological features (e.g. Shattuck-Hufnagel & Klatt, 1979; Frisch, 1996). The correspondence CORR-C↔C family constraints (Rose & Walker, 2004; McCarthy, 2004) are Markedness constraints that dictate a CC-Correspondence in the output form, between similar segments. The instantiations of CORR-C↔C constraints relevant for our study are stated in (22)-(24).

(22) $\text{CORR}_{K\leftrightarrow D}$ Consonants C_K and C_D in the output string of segments are in relation, i.e. C_K and C_D are each other's correspondent; where C_K, C_D: pair of STOPS

(23) $\text{CORR}_{FRIC\leftrightarrow FRIC}$ Consonants C_{FRIC} and C_{FRIC} in the output string of segments are in relation, i.e. C_{FRIC} and C_{FRIC} are each other's correspondent; where C_{FRIC}, pair of FRICATIVES

(24) $\text{CORR}_{OBST\leftrightarrow OBST}$ Consonants C_{OBST} and C_{OBST} in the output string of segments are in relation, i.e. C_{OBST} and C_{OBST} are each other's correspondent; where: C_{OBST}, pair of OBSTRUENTS

The CORR-C↔C constraints (22)-(24) are ranked as described in (25). The unranked $\text{CORR}_{K\leftrightarrow D}$ and $\text{CORR}_{FRIC\leftrightarrow FRIC}$ constraints that require correspondence between broadly similar segments, i.e. between STOPS and FRICATIVES, respectively, are ranked higher than the $\text{CORR}_{OBST\leftrightarrow OBST}$ constraint that requires similarity in the [-sonorant] feature only, namely any OBSTRUENTS.

(25) $\text{CORR}_{K\leftrightarrow D}$, $\text{CORR}_{FRIC\leftrightarrow FRIC}$ >> $\text{CORR}_{OBST\leftrightarrow OBST}$

We propose that the head of the span stands in an Output-Output (OO) Correspondence relation with the segment that is assimilated to its [F] specification for PLACE. CH is driven by featural CC-correspondence (cf. ABC; Rose & Walker, 2004). In this case, CC-correspondence is limited to two proximal and similar span segments. The two OO-correspondents must agree in PLACE, satisfying the relevant FAITH-CC correspondence constraint (Rose & Walker, 2004, p.14) in (26):

(26) IDENT-CC[PLACE] A C_i consonant in the Output and its OO correspondent C_j must have the same PoA

In our analysis, we employ the following IDENT-CC[PLACE] correspondence constraints (27)-(29):

(27) IDENT-CC[LAB] Let a C_i consonant in the Output and its OO correspondent C_j. If the PoA of C_i is LABIAL, then the PoA of C_j must be LABIAL

(28) IDENT-CC[DOR] Let a C_i consonant in the Output and its OO correspondent C_j. If the PoA of C_i is DORSAL, then the PoA of C_j must be DORSAL

(29) IDENT-CC[COR] Let a C_i consonant in the Output and its OO correspondent C_j. If the PoA of C_i is CORONAL, then the PoA of C_j must be CORONAL

The hierarchical ranking of the IDENT-CC[PLACE] constraints for broad feature similarity (cf. 17) is represented in (30). The realized PoA is determined by the PLACE-feature of the head.

(30) IDENT-CC[LAB] >> IDENT-CC[DOR] >> IDENT-CC[COR] (broad feature similarity)

In the case of restricted feature similarity (cf. 18), the IDENT-CC[PLACE] constraints are unranked, because they do not play any role in the head selection (31).

(31) IDENT-CC[LAB], IDENT-CC[DOR], IDENT-CC[COR] (restricted feature similarity)

The constraints (22-24) for featural CC-correspondence are also in interaction with FAITHFULNESS constraints for PLACE, demanding that the feature specification for PoA is identical between corresponding Input - Output segments (McCarthy & Prince, 1995). We implement the following IDENT-IO[PLACE] constraints (32)-(34):

(32) IDENT-IO[LAB] If there is a LABIAL segment in the Input, its corresponding segment in the Output must be also LABIAL

(33) IDENT-IO[DOR] If there is a DORSAL segment in the Input, its corresponding segment in the Output must be also DORSAL

(34) IDENT-IO[COR] If there is a CORONAL segment in the Input, its corresponding segment in the Output must be also CORONAL

Our data imply the following ranking of the constraints in (32-34) according to the hierarchical ordering for PLACE features: LABIAL >> DORSAL >> CORONAL (see 35).

(35) IDENT-IO[LAB] >> IDENT-IO[DOR] >> IDENT-IO[COR]

We claim that the head parsing (head selection) is dependent on the featural similarity in (17, 18), therefore it is subject to different requirements for (un)markedness:

- If the span segments have a *broader* similarity, namely a similarity in two (or more) features, such as [-sonorant, *α/β* continuant, *α/β* voice], i.e. a STOP and a STOP, e.g. /'**p**er.**g**o.la/→ ('**p**er.**b**o).(la) (correspondents in bold), or a FRICATIVE and a FRICATIVE, e.g. /**ð**elˈ**f**ini/→ (**v**e.ˈ**f**i).(ni), /ˈ**ɣ**lo.**s**a/ → ('**ɣ**lo.**ç**a), (correspondents in bold), then the span is headed by a consonant with a specified, marked PoA feature, LABIAL or DORSAL, respectively; CORONALS are considered underspecified for PoA in the phonological literature; (cf. Stemberger & Stoel-Gammon, 1991, i.a.).

- If the span segments have a *restricted* similarity to only one feature [-sonorant], namely OBSTRUENTS with a different MoA, then the segment with the higher *consonantal strength*, which is the STOP, with the unmarked [-continuant] MoA, is parsed as head, and the FRICATIVE agrees to the head PLACE feature; e.g /ˈ**f**a.**d**a.zma/ → (ˈ**s**a.**d**a).(ma) (correspondents in bold). The strength scale for SMG (Kappa, 1995) shows that the consonantally stronger (less sonorous) STOPS are unmarked for MoA (36).

(36) STOPS > FRICATIVES > s > z > NASALS > LIQUIDS (l > ɾ) (>: stronger than)

unmarked MoA (STOPS); marked MoA (FRICATIVES > s > z)

Finally, we assume the effect of an IDENT-IO[MoA] constraint (37), which is undominated in this grammar, thus faithfully demanding the input MoA features in the output.

(37) IDENT-IO[MoA] Assign a violation for every MoA feature in the output which does not correspond to its input

We claim that the intermittent occurrences of CH in the realizations of the children in this study are the outcome of the sporadic activation of two relict grammars where CC-Correspondence constraints are highly ranked, demanding correspondence and identity between output segments with some degree of similarity. HEAD[α/βcont, α/βsonor], [γF] constraints are ranked lower than correspondence constraints, playing a secondary role in the request for similarity, nonetheless having a crucial role in the head selection and the directionality of CH, which results from an interaction of ranked Markedness and Faithfulness constraints, determining the left or right position of the head (McCarthy, 2004).

The two grammars that result in the realization of CH, are statistically *peripheral grammars*[8], which are activated in complementary distribution. Specifically, *Grammar 1* is activated in case (17), i.e. non-sonorants with identical MoA: STOP-STOP or FRICATIVE-FRICATIVE, where feature similarity is broad. The ranking in *Grammar 1* is shown in (38).

(38) IDENT[MOA] >> CORR $_{K\leftrightarrow D}$, CORR $_{F(RIC)\leftrightarrow F(RIC)}$ >> CORR $_{O(BST)\leftrightarrow O(BST)}$ >> IDENT-CC[LAB] >> IDENT-CC[DOR] >> IDENT-CC[COR] >> HEAD $_{[-cont, -son][\gamma PLACE]}$ >> HEAD $_{[+cont, -son][\gamma PLACE]}$ >> IDENT-IO [LAB] >> IDENT-IO [DOR] >> IDENT-IO [COR]

The evaluation of candidate outputs by *Grammar 1*, is illustrated in Tables 1, 2.

In Table 1: (CORR $_{F(ric)\leftrightarrow F(ric)}$ is irrelevant to this data and is not included in Table 1 for reasons of economy of space). Candidate (a) fatally violates the undominated IDENT-IO[MoA] constraint, after changing the [-continuant] MoA of the input segment /g/ to the [+continuant] [v], thus (a) cannot be evaluated as optimal. The constraint CORR $_{K\leftrightarrow D}$ is satisfied by (b), (c), and (d) and is neither satisfied nor violated by candidate (a), which does not have two consonants with the same MoA. CORR $_{O(BST)\leftrightarrow O(BST)}$ is satisfied by every candidate is this table, as they all include corresponding OBSTRUENTS in the span. Candidate (b), which is faithful to the input, fatally violates IDENT-CC[LAB], because the two corresponding STOPS do not agree in the LABIAL PoA feature. In (c), the span head is a [-continuant] non-sonorant segment, and the other non-sonorant span segment agrees to its DORSAL PoA. Candidate (c) is not selected as optimal, as it violates the IDENT[LAB] constraint, which is ranked higher than IDENT[DOR]. (d) is the optimal candidate in this grammar, and it is realized, because it satisfies the higher ranked IDENT[LAB] constraint.

Table 1

/ˈpergola/	IDENT [MOA]	CORR K↔ D	CORR O↔0	IDENT-CC[LAB]	IDENT CC[DOR]	HEAD [-cont, -son], [γPLACE]	HEAD [+cont, -son], [γPLACE]	IDENT [LAB]	IDENT [DOR]
a. (**<u>p</u>**ₓer.**v**ₓo).(la)	*!		✓	✓		✓		✓	*
b. (ˈ**p**ₓer.**g**ₓo).(la)	✓	✓	✓	*!	*	*		✓	✓
c. (ˈ**c**ₓer.**<u>g</u>**ₓo).(la)	✓	✓	✓		✓	✓		***!**	✓
d. ☛(ˈ**<u>p</u>**ₓer.**b**ₓo).(la)	✓	✓	✓	✓		✓		✓	*

In Table 2: CORR $_{K\leftrightarrow D}$, which is irrelevant to this data is not presented here for reasons of economy of space. Candidate (a) violates the undominated constraint IDENT-IO[MoA], due to the output segment [b], which does not correspond in MoA to the input segment /ð/. The two output FRICATIVES in the spans of (b), (c), and (d), are in correspondence relation, satisfying CORR $_{F(RIC)\leftrightarrow F(RIC)}$, while all candidates satisfy the

[8] The children also have a statistically frequent core grammar, where the correspondence and the HEAD[α/βcont, α/βsonor], [γPLACE] constraints are ranked very lowly, outranked by faithfulness constraints. This grammar has the ranking of the adult SMG grammar. (For a more detailed discussion on co-phonologies, or multiple grammars, cf. the Multiple Parallel Grammars Model; e.g. Antilla, 1998, among many others).

Corr$_{O(BST)\leftrightarrow O(BST)}$ constraint, having two Obstruents that correspond to one another in a span. The corresponding segments in candidate (b) do not correspond in PoA specification, violating the highly ranked Ident-CC[Lab] and Ident-CC[Cor] constraints, therefore it is ruled out. Candidates (c) and (d), compete with one another as optimal candidates. (c) is ruled out because it violates Ident[Lab], which dominates the Ident[Cor] constraint, as the Labial segment /f/ in the input does not have a Labial correspondent in the output, whereas candidate (d) satisfies the Ident[Lab] constraint and is selected as the optimal output.

Table 2

/ðelˈfini/	Ident [MoA]	Corr F↔ F	Corr O↔ O	Ident-CC[Lab]	Ident-CC[Cor]	Head [-cont, -son], [γPLACE]	Head [+cont, -son], [γPLACE]	Ident [Lab]	Ident [Cor]
a. (**b**$_x$e.**f**$_x$i).(ni)	*!		✓	✓			✓	✓	*
b. (**ð**$_x$el.ˈ**f**$_x$i).(ni)	✓	✓	✓	*!	*		*	✓	✓
c. (**ð**$_x$e.ˈ**θ**$_x$i).(ni)	✓	✓	✓		✓		✓	*!	✓
d. ☛(**v**$_x$e.ˈ**f**$_x$i).(ni)	✓	✓	✓	✓			✓	✓	*

In the case of non-sonorants with different MoA (see 18), namely Stop…Fricative (either order) where feature similarity is restricted, *Grammar 2* is activated. In this case, the Ident-CC[Place] constraints are unranked (cf. 31). The lowly ranked Head$_{[-cont, -son]\,[\gamma Place]}$ constraint plays the crucial role for the parsing of the span head, as this constraint demands an unmarked [-continuant] segment as head, whose PoA is faithful to the input. The ranking in *Grammar 2* is shown in (39).

(39) Ident-IO[MoA] >> Corr$_{K\leftrightarrow D}$, Corr$_{F(RIC)\leftrightarrow F(RIC)}$ >> Corr$_{O(BST)\leftrightarrow O(BST)}$ >> Ident-CC[Lab], Ident-CC[Dor], Ident-CC[Cor] >> Head$_{[-cont, -son][\gamma PLACE]}$ >> Head$_{[+cont, -son]\,[\gamma PLACE]}$ >> Ident-Io [Lab] >> Ident-Io [Dor] >> Ident-Io [Cor]

Table 3: It illustrates the evaluation of candidates in *Grammar 2*. Candidate (a) violates the undominated MoA constraint, as the input /f/ is realized as a Stop [t]. Restricted feature similarity, i.e. different MoA, results in candidates that satisfy the Corr$_{O(BST)\leftrightarrow O(BST)}$ constraint (specific constraints Corr$_{K\leftrightarrow D}$ and Corr$_{FRIC\leftrightarrow FRIC}$ are irrelevant and are not presented in Table 3 for reasons of economy of space). In addition, the faithful to the input (b) violates both Ident-CC[Place] constraints, as the corresponding Obstruents do not agree in PoA. The competing candidates in (c) and (d) equally satisfy the highly ranked constraints Ident-Io[MoA] and Corr$_{O(BST)\leftrightarrow O(BST)}$, as well as the unranked constraints Ident-CC[Lab] and Ident-CC[Cor], respectively. *Grammar 2* requires that the span head is a non-continuant (unmarked for MoA) segment, and that the span Obstruents agree to the head PoA specification, as specified in the input. In (c), the span head is [f], a [+continuant] segment, which violates the higher ranked Head$_{[-cont, -son], [\gamma PLACE]}$ constraint, therefore it is ruled out. Candidate (d) satisfies the latter constraint, therefore it is selected as the optimal output.

Table 3

/ˈfa.da.zma/	Ident [MoA]	Corr O↔O	Ident-CC[Lab]	Ident-CC[Cor]	Head [-Cont, -Son], [γPLACE]	Head [+Cont, -Son], [γPLACE]	Ident [Lab]	Ident [Cor]
a) (**t**$_x$a.**d**$_x$a).(ma)	*!	✓		✓	✓		*	✓
b) (**f**a.**d**a).(ma)	✓	✓	*!	*	*	*	*	✓
c) (ˈ**f**a.**b**a).(ma)	✓	✓	✓		*!	✓	✓	*
d) ☛(ˈ**s**a.**d**a).(ma)	✓	✓		✓	✓		*	✓

5 Conclusion

Concluding**,** the CH data from these Greek-speaking children with DLD are not in parallel with the patterns that were observed in eleven toddlers (ages: 1;07-3;05) acquiring Greek as ambient language at the early stages of their typical phonological acquisition (cf. Kappa, 2002; Tzakosta, 2007a). There is a great difference between the ages of the participants with DLD that were examined in this study (mean age 5;08), and the ages when CH is attested in the typical acquisition track of the above toddlers, indicating a delay in the track of phonological acquisition in these Greek speaking children with DLD. The traits characteristic of how CH is applied in the children's grammar are the following.

The studies on the phonology of typically developing children (Kappa, 2001, 2002; Tzakosta, 2007a) have shown that CH is prosodically circumscribed; i.e. CH applies within the domain of foot and/or of the prosodic word. The directionality pattern is mainly right-to-left (78% regressive CH in Tzakosta) driven by the demand for preservation of the rightmost elements (cf. Pater & Werle, 2003), where stress, in interplay with featural (un)markedness for PoA, seems to play a significant role. The dominating consonant that triggers PLACE harmony is either a LABIAL STOP (Kappa) or an unmarked CORONAL (Tzakosta). MoA harmony is also attested to an extent.

In the children with DLD, the CH affects only the major PoA, while the MoA and the [±voice] features are realized faithfully, and stress plays no role. PLACE harmony affects only the natural class of OBSTRUENTS and applies within harmonic domains (spans) restricted to two consonants (Onset-Onset) that agree for some feature(s); thus, the CH preconditions feature similarity. The spans are constructed at the end or at the beginning of the prosodic word, according to the location of their head (the segment that triggers CH). The head parsing is dependent on the featural similarity of the segments within the span, therefore it is subject to different requirements for (un)markedness: (i) If the span segments have a *broad* featural similarity, i.e. two identical features (MOA and [-sonorant]), such as the STOPS or the FRICATIVES, then the OBSTRUENT with a specified, marked POA is parsed as head, according to the markedness ordering for PLACE: LABIAL >> DORSAL >> CORONAL. (ii) If the span segments have a *restricted* featural similarity (only the feature [-sonorant]), then the OBSTRUENT with the unmarked, [-continuant] MOA, i.e. a STOP is parsed as head. The directionality of CH results from the constraint interaction of markedness and faithfulness constraints, determining the left/right position of the head span.

The low ratio of Consonant Harmony that is present in the dataset in sum, and individually for each child, points to the fact that CH is fading in their system, and that the sporadic instances are relics of a previous stage, where CH was used as a simplification process to improve perceptibility and articulator stability.

Future research on this subject should focus on developmental data, in order to determine the ages when CH is a statistically frequent process, and whether it fades gradually, but is protracted until older ages, or, rather, if it stops at some age, leaving only some scarce relics behind. In the latter case, it would be also useful to research whether these relics are observed at a later age, through developmental studies.

Finally, several limitations have arisen, as this is a preliminary study, regarding the number of data with CH, as well as the fact that the data presented here are cross-sectional and lack a developmental perspective. More research is needed in order to establish whether the POA of the segment in the onset position of the stressed syllable is assigned as head span in the grammar(s) of individual children.

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Types of Epenthesis in Hijazi Arabic

Hassan Bokhari

Indiana University Bloomington

Abstract

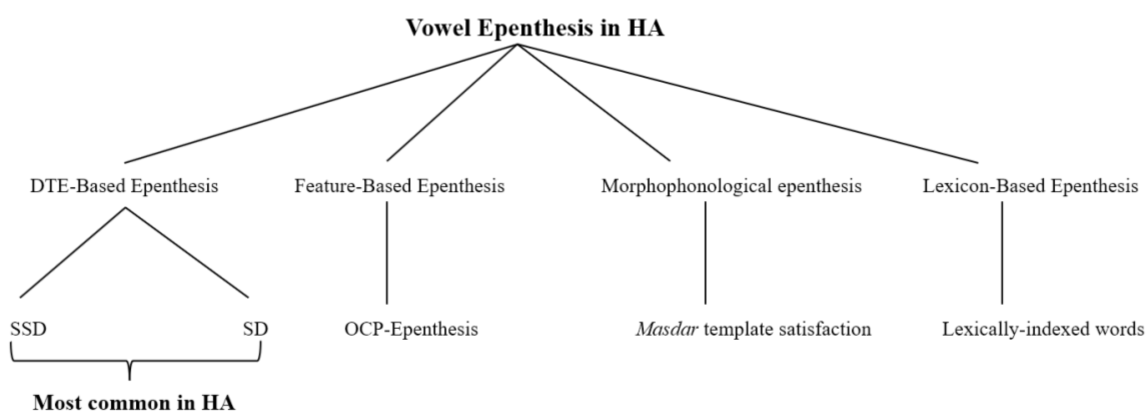
Hijazi Arabic (HA) exhibits several types of epenthesis, one of which is DTE-based epenthesis, which itself is divided into syllable structure-driven epenthesis (SSD epenthesis) and sonority-driven epenthesis (SD epenthesis). The default vowel for each type is different. For SSD epenthesis, the default epenthetic vowel is [a], whereas the default epenthetic vowel for SD epenthesis is [i]. The motivation for SSD epenthesis is the avoidance of word-internal superheavy syllables (CVVC and CVCC). The motivation for SD epenthesis is the avoidance of word-final rising-sonority coda clusters. In both SSD epenthesis and SD epenthesis there is a relationship between the type of prosodic unit where epenthesis occurs and the quality of the default epenthetic vowel (De Lacy, 2006). The quality of the SD default epenthetic vowel is a result of the interaction between two types of universal markedness constraints, the non DTE of the foot and the universal place markedness constraints as described in Lombardi (2002). The study also accounts for other uncommon types of epenthesis in HA where other phonological, morphological, and lexical factors play a role in the epenthesis in the coda cluster of a potential word-final CVCC syllable.

1 Introduction

Hijazi Arabic (HA), a prominent Arabic dialect spoken in western Saudi Arabia, recognizes several types of vowel epenthesis. In this paper, five types of epenthesis are presented, one of which is the unique DTE-based epenthesis, which itself is divided into two types. The first type is syllable structure-driven epenthesis (SSD epenthesis) and the second type is sonority-driven epenthesis (SD epenthesis). SSD and SD epenthesis are the most common types of epenthesis in HA. Other uncommon types are feature-based epenthesis, morphophonological epenthesis, and lexicon-based epenthesis.

The environment of epenthesis depends on the specific type of epenthesis. SSD (DTE-based) epenthesis occurs word-internally to prevent potential CVCC and CVVC syllables from surfacing faithfully. SD (DTE-based) epenthesis, OCP epenthesis, *Masdar* template satisfaction epenthesis, and lexically-indexed word epenthesis all occur in monomorphemic potential word-final CVCC syllables. The following tree demonstrates the types of epenthesis, motivation of epenthesis, and result of epenthesis.

Figure 1. Types of Vowel Epenthesis in HA



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Previous studies on the dialect such as Abu-Mansour (1987) and Kabrah (2004) have also studied epenthesis in the dialect, but this study contributes a detailed analysis that differentiates two major types of epenthesis in the dialect. In addition, it sheds light on other uncommon types of epenthesis, based on other phonological, morphological, and lexical factors. All data analyzes in this paper come from Bokhari (2020).

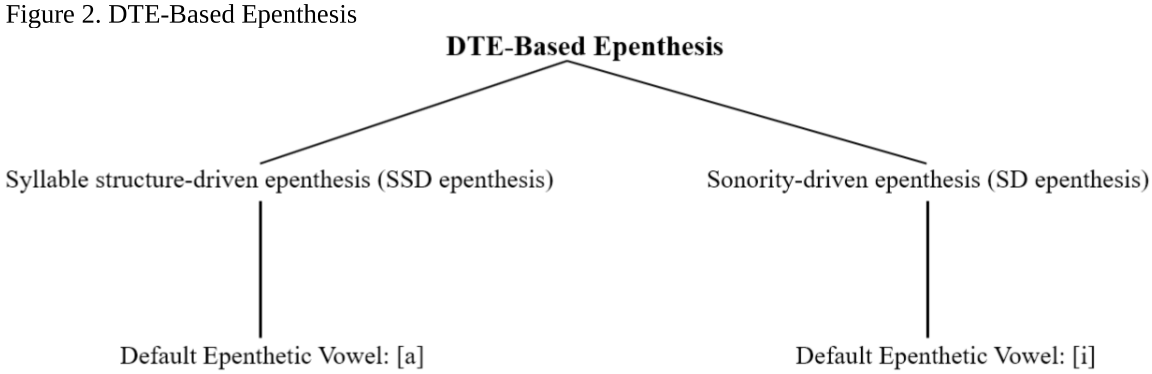
This paper is organized as follows. Section 2 discusses two types of DTE-based epenthesis in HA. Section 3 the other uncommon types of epenthesis in HA. And finally, section 4 discusses the findings of the analysis and concludes the paper.

2 DTE-based Epenthesis

This section discusses two types of DTE-based epenthesis in HA: syllable structure driven epenthesis (SSD epenthesis) and the default SD epenthesis (SD epenthesis) as shown in Figure 2.

De Lacy (2006) provides several universal sonority-based constraint hierarchies and relates them to different positions of prosodic constituents. These sonority-based constraint hierarchies provide the right tool to set up the analyses of both types of default epenthesis.

Figure 2. DTE-Based Epenthesis



De Lacy (2006) argues that variation in the quality of the epenthetic vowel across languages can be analyzed as the result of competing constraints, imposed by different Designated Terminal Elements (DTEs). Designated Terminal Elements refer to the head of a given prosodic unit, such as a mora, syllable, or foot. He differentiates between the head and non-head positions of these constituents, which are the DTEs (also abbreviated as Δ) and non-Designated Terminal Elements (non-DTEs, also –Δ), respectively.

According to de Lacy, universally, low vowels, which are higher in sonority than other vowels, tend to be favored as epenthetic vowels in DTE positions, i.e. the head position of the prosodic constituent, whereas high peripheral vowels [i, u], tend to be epenthesized in non-DTE positions—that is, in unstressed syllables, moras, or feet. Moreover, according to de Lacy (2006, p. 305), vowel epenthesis in Arabic dialects cannot be accounted for in terms of DTE constraints alone. He provides an example of high vowel epenthesis in DTE position—that is, in a stressed syllable, which represents the head of the foot—in Cairene Arabic (CA), which is at odds with the prediction made by looking only at constraints on DTE positions. Instead, he suggests that other markedness values may restrict the quality of the epenthetic vowel for CA, as proposed by Lombardi (2003). For example, the universal preference for front vowels in epenthesis over back vowels may exclude [a] in positions where it is favored by the sonority hierarchy and its relationship with DTE/non-DTE positions.

However, in Cairene specifically, [i] is epenthesized to fill the nucleus of the degenerate syllable. For example, /katab-t-l-u/ → [katab.ˈti.lu], *[katab.ˈta̲.lu] "I wrote to him" (de Lacy 2006, p. 305, following McCarthy, 1979). According to Farwaneh (1995), this epenthetic vowel is stressed by the default stress rule of CA, which states that the penult is stressed, unless both the antepenult and penult are light, in which case the antepenult is stressed. In CA, de Lacy proposes that the unexpected high vowel is the product of a higher-ranked preference for front vowels over back vowels, outranking the requirements imposed by DTE-sonority constraints.

In HA, however, the DTE of the prosodic constituents is in some way connected with the sonority of the epenthetic vowel, in which the high-sonority vowel [a] is epenthesized in the DTE position of the syllable in SSD epenthesis. This vowel forms the head of the final trochaic foot, which is unstressed by the general rule of word-final foot extrametricality in HA. In contrast, the low sonority vowel [i] is epenthesized in the non-head position of the foot in SD epenthesis. Since HA has two major types of epenthesis, SSD epenthesis and default SD epenthesis, it is worth elaborating and differentiating between the two types. I start by elaborating on SSD epenthesis in section 2.1, then explain default SD epenthesis and summarize some issues related to it.

2.1 *SSD epenthesis* Regarding the SSD epenthetic vowel [a], following Farwaneh (1995) and Gouskova (2003), this vowel, which is higher in sonority than any other vowel in HA, is inserted as a way of strengthening a weak degenerate syllable, which consists of only a single consonant as a syllable onset. This also can be accounted for with the constraints proposed by de Lacy (2006, p. 68), in which this vowel ([a]) represents the DTE of the syllable. This epenthetic vowel could fall in DTE or non-DTE position of the foot. In other words, the DTE of the syllable takes priority, in which the high sonority vowel fills the nucleus of the degenerate syllable. The trigger of this epenthetic vowel is the syllabic structure, in which an onset with an empty nucleus is not allowed in the dialect. Consider /ka.tabt.lu/ "I wrote for him", which becomes [ka.tab.ta.lu], and /baab.na/ "our door", which becomes [baa.ba.na]. The vowel [a] is inserted after the [t] in the first example, which forces resyllabification of the [t] into the onset of the new syllable. The same is true in the second example, when [a] forms a new syllable with the preceding [b] in the process of resyllabification. Figure 3 demonstrates the vowel insertion and the foot structure of SSD epenthesis.

Figure 3. Vowel Insertion and Foot Structure of SSD Epenthesis

a. /baːb-na/ → [baː.b.na] → [ˈbaː.ba.na] "our door"

degenerate syllable epenthetic vowel

b. /katab-t-l-u/ → [ka.tab.t.l.u] → [ka.ˈtab.ta.lu] "I wrote for him".

degenerate syllable epenthetic vowel

Foot structure: [(ˈbaː)(ba.na)] "our door' [ka.(ˈtab)(ta.lu)] "I wrote for him"

Note that word-final foot extrametricality prevents penultimate stress in these words. Thus, the constraint ranking for this type of epenthesis is $*\Delta\sigma \leq \{i, u\} >> *\Delta\sigma \leq a$.

Gouskova (2003) elaborates on the status of the low vowel [a], regarding two phonological processes, syncope and epenthesis, in HA. According to her, [a] is epenthesized and is never syncopated under any circumstances, whereas [i], which is lower in sonority, syncopates in double-sided open syllables if this syncope does not incur other phonotactic violations, such as impermissible consonant clusters. The syncopation of [i] occurs because of the tendency of the language to avoid marked nuclei. Consider the examples /kibirat/ → [kib.rat], whereas /katabat/ → [ka.ta.bat], *[kat.bat].

According to Gouskova, [a] does not delete, even if it falls in the foot margin—that is, the –ΔFt position in de Lacy's terminology. This is because MAX dominates all constraints which favor syncope, except for *NUC/{i, u}, which dominates MAX, allowing [i] to syncopate in double-sided open syllables. Gouskova's constraints concerning high vowel syncope in weak position is consistent with de Lacy's proposal about HA, in which [i] as the DTE of the syllable is eliminated if it does not violate syllable phonotactics.

Farwaneh (1995), Gouskova (2003), and de Lacy (2006) all relate the sonority of the vowel to the head of the syllabic constituent; however, both Gouskova's and de Lacy's proposals have a wider scope, in which they consider several universal sonority hierarchies of segments and how they interact with the head or non-head position of different constituents.

2.2 *Default SD epenthesis* In HA, the default SD epenthetic vowel is [i]. Consider the data in Figure 4, in which [i] is inserted to break up the rising-sonority cluster.

Figure 4. Default SD epenthesis

	UR	Gloss	Surface	Poss.3P.MASC
a.	/lakm/	"punching"	[la.kim]	[lak.mu]
b.	/tˤagm/	"set (of things)"	[tˤa.gim]	[tˤag.mu]
c.	/ʃamʕ/	"wax"	[ʃa.miʕ]	[ʃam.ʕu]
d.	/fagʕ/	"type of mushroom"	[fa.giʕ]	[fag.ʕu]
e.	/ʃatm/	"cursing"	[ʃa.tim]	[ʃat.mu]
f.	/nad͡ʒm/	"star"	[na.d͡ʒim]	[nad͡ʒ.mu]
g.	/waʃm/	"tattoo"	[wa.ʃim]	[waʃ.mu]

As can be noted from the data, epenthetic [i] is not determined by the surrounding consonants. Regarding the examples in e-f, the [t] and [d͡ʒ] are not the trigger of [i]-Epenthesis, even though they agree with the vowel [i] in the feature [coronal]. This is because the epenthetic vowel is required to harmonize in coronality with the following consonant, and not with the preceding consonant. Therefore, [i] is epenthesized when there is no harmony requirement between it and the segments in the coda cluster. In this dialect, the only coda cluster permitted by the syllabic structure is the coda in word-final CVCC. This monosyllabic word also consists of a trochaic foot, in which the stem vowel is the head of the foot, even if the coda cluster of this syllable violates the sonority requirement and receives an epenthetic vowel. This epenthetic vowel is never stressed, and it falls in the non-head position of the foot—that is, the unstressed part. Therefore, adopting de Lacy's DTE model mentioned above, we can determine the type of default epenthetic vowel in this position, following de Lacy's constraint ranking in the non-DTE position of the foot, by having the constraint $*\text{–}\Delta\text{Ft}\geq a$ outrank $*\text{–}\Delta\text{Ft}\geq\{i,u\}$. This leaves us with the two high vowels [i, u] as potential candidates for a default vowel.

On the basis of the Place of Articulation hierarchy, [u] is universally more marked than [i] (see de Lacy, 2006, pp. 35–36; Jakobson, 1941; Lombardi, 1995; Prince & Smolensky, 1993). Consider Figure (5), which presents the universal Place of Articulation hierarchy.

Figure 5. Universal Place of Articulation Hierarchy (de Lacy, 2006)

*[DORS] >> *[LAB] >> *[COR] >> *[PHAR]

Therefore, we can say that *[DORS] outranks *[COR]. By these two different rankings by de Lacy and Lombardi, we reach the conclusion that the most appropriate default epenthetic vowel is [i] in SD epenthesis in HA.

In order to analyze final coda clusters in HA, the study utilizes the Split Margin Approach to the syllable (Baertsch, 2002; Baertsch & Davis, 2009). In this approach, onset and coda positions (i.e., syllable margins) are optionally split into two positions based on their sonority profiles. M2, which is higher in sonority, is the position closest to the nucleus of the syllable in each margin. M1, which is lower in sonority, is the position farthest from the nucleus. A singleton onset occupies M1 and a singleton coda occupies M2. For example, in a word such as [bard] 'cold', the sonorant liquid [r] occupies the M2 position, while the obstruents [d] and [b], which are lower in sonority than [r], occupy the M1 position. It's worth noting that HA does not allow rising-sonority coda clusters, e.g., /badr / surfaces as [badir] "full moon", and generally tolerates level-sonority coda clusters, e.g., /ʕagd/ surfaces faithfully as [ʕagd] "contract/lease" with no epenthesis.

Figure 6. Split Margin Hierarchy

$*M_1$/Vowel >>$*M_1$/Glide >> $*M_1$/ʕ >>$*M_1$/ Liquid>> $*M_1$/Nasal>> $*M_1$/VcdFri>> $*M_1$/Obs

$*M_2$/Obs >> $*M_2$/ VcdFri >>$*M_2$/ Nasal >>$*M_2$/ Liquid >>$*M_2$/ʕ>> $*M_2$/Glide>>$*M_2$/ Vowel

The following tableau in Figure (7) demonstrates how this approach functions in HA. Note that the conjoined split margin constraint $*O_2N_1]_{\sigma}$ militates against a rising sonority cluster consisting of an obstruent followed by a nasal.

Figure 7. Default Sonority-Driven [i]-Epenthesis

/lakm/ "punching"	$*O_2N_1]_\sigma$	DEP	$*\text{–}\Delta_{Ft}\geq$a	*[DORS]	$*\text{–}\Delta_{Ft}\geq\{i,u\}$	*[COR]	*[PHAR]
a. [lakm]	*!						
☞ b. [ˈla.kim]		*			*	*	
c. [la.kam]		*	*!		*		*
d. [la.kum]		*		*!	*		

Candidate (a) loses because it violates the undominated rising-sonority Split-Margin constraint. Candidate (b) wins because it respects both *–ΔFt≥a and *[DORS] by epenthesizing a coronal vowel, even though it violates DEP and low-ranked *–ΔFt≥{i,u} and *[COR]. Candidate (c) loses because the epenthetic vowel [a] violates *–ΔFt≥a; in addition, it violates *–ΔFt≥{i,u} and *[PHAR], because [a] as a pharyngeal vowel is greater in sonority than [i] and [u]. Candidate (d) loses because it epenthesizes a dorsal vowel, violating the high-ranked *[DORS]; in addition, it violates *–ΔFt≥{i,u}. This tableau shows that whenever there is no harmony requirement between vowels or consonants and vowels, default [i] is epenthesized to break up a potential rising-sonority coda cluster.

A key difference between SD epenthesis and SSD epenthesis in HA is the motivation of these types of epenthesis and the outcome of these processes. The motivation for SD epenthesis is the rising-sonority coda cluster, which is not tolerated by the grammar, and the outcome of this epenthesis is that the default vowel [i] is epenthesized between these two consonants, forming a CVC syllable after a light syllable (e.g. /tˤagm/ → [ˈtˤa.gim] "set of things"). In contrast, the motivation for SSD epenthesis is the tendency of the dialect to avoid word-internal superheavy syllables by epenthesis and then with subsequent resyllabification, in which the last stray consonant of the word-internal CVVC/CVCC is resyllabified to form the onset of the default [a] epenthetic vowel. The outcome of this epenthesis is the new syllable, which is formed by the unsyllabified last consonant of the superheavy syllable and the epenthetic vowel, and this syllable is preceded by a heavy syllable (e.g., /baːb- na/ → [ˈbaː.ba̲.na] "our door;" /katab-t-l-u/ → [ka.ˈtab.ta̲.lu] "I wrote for him"). In both types of epenthesis, stress location is preserved, even after epenthesis. Thus, we can conclude from all above that the SSD epenthetic [a] is higher in sonority than the default sonority-driven epenthetic [i], because [a], as the highest sonority vowel, strengthens the stray consonant by forming the nucleus of the syllable, i.e. the DTE of the syllable, which itself is the head of the unstressed final foot, whereas the lowest sonority high front vowel [i] is epenthesized in the default SD epenthesis in the non-DTE position of the foot.[2] Having

[2] There are several cases of non-default SD epenthesis in which the epenthetic consonant harmonizes with either the stem vowel or the coda consonants of the potential word-final CVCC syllable. These cases are analyzed in detail in Bokhari (2020) and "Patterns of Epenthesis in HA" (to appear).

provided the analysis of differentiating the two major types of epenthesis, the following section analyzes uncommon types of epenthesis in HA.

3 Uncommon Types of Epenthesis in HA

This section presents an analysis for other uncommon types of epenthesis in the dialect. These uncommon types are feature-based epenthesis (OCP epenthesis), morphophonological epenthesis (Masdar-Template Satisfaction Epenthesis), and lexicon-based Epenthesis (Lexically-indexed word epenthesis). All of these types of epenthesis have in common that they occur in the coda of a potential word-final CVCC syllable and that sonority does not trigger the phonological alternation in these forms. Rather, their distinctive features, morphophonological nature, and non-phonological factors such as the lexicon seem to play a role in triggering these types of epenthesis. Moreover, there is no default quality of the epenthetic vowel in all these types of epenthesis.

3.1 *Feature-based epenthesis (OCP Epenthesis)* Some types of coda clusters of level sonority do not occur in HA. These cluster types include nasal + nasal, which is excluded due to an OCP effect. The sequence /nm/ is extremely rare in HA and in most Arabic dialects; however, /mn/ occurs in underlying coda clusters, which surface with vowel epenthesis to separate two adjacent nasals as shown in Figure 8.

Figure 8. OCP Effect in Codas with Nasal + Nasal Cluster

a.	/ʔamn/	[ʔamin]	"safety, security"
b.	/samn/	[samin]	"shortening, fat"
c.	/tumn/	[tumun]	"one-eighth"
d.	/ʁunm/	[ʁunum]	"plundering"

It is clear from the data in Figure 8 that the underlying nasal cluster /m + n/ is separated by vowel epenthesis in the surface form due to the effect of OCP-[nasal], defined in Figure 9:

Figure 9. OBLIGATORY CONTOUR PRINCIPLE – [NASAL] (OCP-[NAS]):
"Two consonants with the feature [nasal] cannot be adjacent in the output of the syllable coda. Assign a violation for any two [nasal] consonants which are adjacent in the output of the syllable coda." (Kabrah, 2004, p. 190)

In the tableau in Figure 10, the constraint OCP-[NAS] outranks both faithfulness constraints DEP and CONTIG(UITY),allowing epenthesis to occur to separate two nasal consonants.

Figure 10. OCP Effect on Nasal Coda Clusters

/samn/ "shortening"	OCP-[NAS]	DEP	CONTIGUITY	$*N_2N_1]_\sigma$
a. [samn]	*!			*
b. ☞ [sa.min]		*	*	

Candidate (b) wins, even though it violates Dep and Contig by inserting a vowel between the potential coda cluster. This is because the OCP nasal constraint prevents two adjacent nasals from surfacing faithfully in a syllable coda. The OCP effect is not limited to just preventing two nasal consonants from surfacing in a syllable coda in HA. It also prevents two sonorant coronal consonants from surfacing faithfully in a potential word-final syllable coda. Figure 11 illustrates a few words in which epenthesis separates out two sonorant coronal consonants word-finally.

Figure 11. OCP Effect in Codas with Sonorant Coronal Consonants

a.	/garn/	[garin]	"century; horn, antler"
b.	/furn/	[furˤun]	"furnace"

The following constraint prevents two adjacent sonorant consonants from surfacing adjacent to each other in a syllable coda.

Figure 12. OBLIGATORY CONTOUR PRINCIPLE – [SONORANT, CORONAL] (OCP-[SON, COR]):

"Two segments with the features [+coronal] and [+sonorant] cannot be adjacent in the output of the syllable coda. Assign a violation for any two [+coronal, +sonorant] consonants which are adjacent in the output of the syllable coda." (Kabrah, 2004, p. 190;see also Davis and Shin, 1999, for a similar constraint in Korean).

Figure 13. Falling Sonority Clusters with OCP-driven Epenthesis

/furn/ "oven"	OCP-[SON, COR]	DEP	CONTIGUITY	*L2N1]σ
a. [furˤn]	*!			*
☞ b. [fu.rˤun]		*	*	

In the tableau in Figure 13, OCP-[SON, COR] crucially outranks DEP, which outranks *L2N1]σ. The ranking of OCP-[SON, COR] is independent of the Split-Margin constraint. DEP, which dominates the Split-Margin constraint, militates against epenthesis in the output form; however, because DEP (and CONTIG) are outranked by an OCP constraint which militates against [sonorant, coronal] clusters, candidate (b) wins, because it respects the undominated OCP constraint.

3.2 *Morphophonological Epenthesis (Masdar-Template Satisfaction*

There are some words in HA in the pattern of the *masdar faʕil* (a verbal noun template) which surface with vowel epenthesis, even though the coda cluster is of falling or level sonority, and hence epenthesis should not be predicted by the sonority rule. This optional epenthetic vowel istriggered in order to satisfy the templatic requirement of the *masdar*.

Figure 14. Words in the Pattern of *faʕil* with Optional Epenthesis

Epenthesis in Falling Clusters		
/mizħ/	[miziħ]	"joking"
/liʕb/	[liʕib]	"playing"
Epenthesis in Level Clusters		
/dˤiħk/	[dˤiħik]	"laughing"
/kidb/	[kidib]	"act of lying, saying falsehood"

It is clear from the examples in Figure 14 that a vowel is epenthesized in a place where it is not expected based on the Sonority Sequencing Principle (SSP). The reason for the vowel epenthesis may be the effect of the *masdar* pattern *faʕil*, which requires the underlying CVCC monosyllabic word to match the template CVCVC of the *masdar*. The problem is that the first vowel of the word, which is [i], does not match the first vowel of the *masdar*. For example, the word [dˤaħik] "laughing" is the *masdar* ofthe verb [jadˤħak] in MSA. This verbal noun is pronounced in HA as [dˤiħik]. I propose that the output [dˤiħik] is the result of the ranking of the constraints MASDAR TEMPLATE SATISFACTION and IDENT-IO-V above DEP and CONTIG, which themselves outrank any level or plateau *M2/*M1 Split-Margin constraints. Figure (15) provides the definition for the proposed constraints MASDAR TEMPLATE SATISFACTION and IDENT-IO-V.

Figure 15. MASDAR TEMPLATE SATISFACTION and IDENT-IO-V

MASDAR TEMPLATE SATISFACTION (MTS):

"The output must match the prosodic shape of the *masdar* template, CVCVC. Assign a violation for any *masdar* in the output which is not of the prosodic shape CVCVC."

A. IDENT-IO-V (IDENT-V):

"A vowel in the output must be identical to its correspondent in the input. Assign a \ constraint violation for any vowel in the output which differs from its correspondent in the input."

Tableau in Figure 16 shows that both MTS and IDENT-V must outrank DEP and CONTIG, causing a vowel to be epenthesized in same level- and falling-sonority clusters.

Figure 16. Masdar-Triggered Epenthesis

/dˤiħk/ "laughing"	MTS	IDENT-V	DEP	CONTIG	*O2O1]σ
a. [dˤiħk]	*!				*
b. ☞ [dˤi.ħik]			*	*	
c. [dˤa.ħik]		*!	*	*	
d. [dˤa.ħak]		*!	*	*	

The faithful candidate in (a) loses because it violates high ranked MTS. Candidate (b) is the winner because it satisfies MTS by epenthesizing a vowel in the coda cluster. Candidates (c) and (d) lose because they violate IDENT-V by having a low vowel in the stem. The tableau in Figure 16 shows that MASDAR-TEMPLATE-SATISFACTION (MTS) outranks DEP and CONTIG, causing epenthesis to occur in a level sonority coda cluster, which should not receive an epenthetic vowel in the typical case.

3.3 *Lexicon-based Epenthesis (Lexically-indexed words)* In HA, coda clusters of some words surface unfaithfully with vowel epenthesis even though the cluster is not rising. These words are shown in the dataset in Figure (17).

Figure 17. Lexically Optional Epenthesis in Coda Clusters

Optional Epenthesis in Falling Clusters	
[d͡ʒurˤħ] ~ [d͡ʒurˤuħ]	"wound"
[rˤuʕb] ~ [rˤuʕub]	"horror"
[film] ~ [filim]	"film"
Optional Epenthesis in Level Clusters	
[taħt] ~ [taħat]	"downstairs"
[subħ] ~ [subuħ]	"morning"
[muʃtˤ] ~ [muʃutˤ]	"comb"

As illustrated in Figure (17), although these words have falling and plateau coda clusters, they surfacewith an epenthetic vowel to break up these clusters in the surface form. As a solution, I propose Pater's (2002, 2007) lexically indexed constraint approach, in which some morphemes or stems are the target of lexically specific constraints (marked with "-L"). The coda clusters in the data in (17) surface with epenthesis due to a high-ranking lexically indexed constraint which prevents coda clusters, *COMPLEX^{COD}-L. This constraint outranks both faithfulness constraints DEP and CONTIG, which themselves outrank both types of general markedness constraints *COMPLEX^{COD} ("codas are simple;" Kager, 1999, p. 97) and any falling or plateau conjoined Split-Margin constraints (represented by *O2O1]σ here).

In the tableau in Figure (18) lexically exceptional words surface with epenthesis, whereas other words with a similar cluster surface faithfully. This is because lexically indexed *COMPLEX-L, which necessitates vowel epenthesis in lexically exceptional words (b), is satisfied vacuously by unexceptional words (c–d) in the tableau. The same constraint ranking that holds for sonority plateaus holds for other lexically exceptional words with falling sonority clusters such as /ruʕb/ and /d͡ʒurħ / in (17), with the change of the Split-Margin constraint from level *M2/*M1 to falling *M2/*M1, which makes these words surface with epenthetic vowels in the output form. Candidate (c) represents a typical case of plateau sonority, which would surface faithfully with no vowel epenthesis.

Figure 18. Epenthesis in Some Lexical Words

/taħtL/ "downstairs"	*COMPLEX^{COD}-L	DEP	CONTIG	*COMPLEX^{COD}	*O2O1]σ
a. [taħt]	*!			*	*
b. ☞ [ta.ħat]		*	*		
/naħt/ "carving"	*COMPLEX^{COD}-L	DEP	CONTIG	*COMPLEX^{COD}	*O2O1]σ
c. ☞ [naħt]				*	*
d. [na.ħit]		*!	*!		

The grammar of HA eliminates exceptional lexical words with rising sonority clusters by the general strategy of epenthesis. Even if these unattested exceptional forms were to exist hypothetically, the lexically indexed constraint would be vacuously satisfied by the general grammatical rule blocking rising sonority coda clusters.

4 Discussion and Conclusion

This paper has presented and analyzed several types of epenthesis in HA. These types are DTE-Based Epenthesis, OCP epenthesis, Masdar template satisfaction epenthesis, and lexically-indexed word epenthesis.

The most common type of epenthesis is DTE-Based Epenthesis, which itself is divided into SSD epenthesis and default SD epenthesis. In SSD epenthesis, the low vowel [a], which is also the highest vowel in sonority in HA, is epenthesized in the DTE position of the syllable to form the nucleus of the stray unsyllabified consonant. For example, /baab.na/ "our door" becomes [ˈbaa.ba.na] and /ka.tabt.lu/ "I wrote for him" becomes [ka.ˈtab.ta.lu]. The high sonority epenthetic [a] strengthens the weak degenerate syllable and prevents it from being syllabified with the preceding heavy syllable to form an undesired word-internal superheavy syllable such as CVVC and CVCC, which are not allowed by the grammar of HA.

In contrast to syllable-driven epenthesis, the low sonority high peripheral vowel [i] is the default epenthetic vowel in sonority-driven epenthesis. It gets epenthesized in the non-DTE position of the foot. For example, /lakm/ "punching" becomes [ˈla.kim]. The low sonority epenthetic vowel forms the nucleus of the unstressed second syllable in the trochaic foot of the word, i.e. it falls in the non DTE position of the foot.

The default epenthetic vowel violates *–ΔFt≥{i,u} and *[COR], but respects the high-ranked constraints *–ΔFt≥a and *[DORS], resulting in [ˈla.kim], not *[ˈla.kam] and *[ˈla.kum]. This is because *[ˈla.kam] and *[ˈla.kum] violate one of the high-ranked constraints *–ΔFt≥a or *[DORS].

The study also accounted for other uncommon types of epenthesis in HA such as OCP epenthesis, Masdar template satisfaction epenthesis, and lexically-indexed word epenthesis. Some level- and falling-sonority coda clusters do not surface even though they are allowed by the general rules of HA grammar. This is because they exhibit an OCP violation by having two adjacent nasal or sonorant coronal segments within the potential coda cluster. For example, the word /samn/ 'shortening' surfaces with vowel epenthesis as [samin], /furn/ 'furnace' surfaces with vowel epenthesis as [fu.rˤun] and /garn/ "century" as [ga.rin]. Besides OCP-[NAS] and OCP-[SON, COR], which are ranked independently of the Split-Margin constraints and which prevent some falling- and level-coda clusters from surfacing faithfully, there are still other constraints that force epenthesis in the output form such as MTS. This constraint requires the output form of some level- and falling-sonority coda clusters, which would otherwise surface faithfully, to surface with an epenthetic vowel. For example, the word /liʕb/ "playing", which would exhibit a falling-sonority coda cluster, surfaces as [li.ʕib] and the word /dˤiħk/ "laughing", which would exhibit a plateau sonority coda cluster, surfaces as [dˤi.ħik]. These words surface with an epenthetic vowel that separates the consonants in the coda cluster, matching the Masdar template *faʕil*, which exhibits a high vowel in the second syllable. Yet, some level- and falling-sonority coda clusters surface with epenthesis even though similar coda clusters in other words surface faithfully. This is because the lexical effect on these certain words forces these words to surface with an epenthetic vowel. Consider, for example, the word /taħt/ "downstairs", which surfaces with an epenthetic vowel as [ta.ħat] in order to satisfy the high-ranked *COMPLEXCOD-L. On the other hand, /naħt/ "carving", which has the same consonants in the coda cluster, surfaces faithfully without an epenthetic vowel. This is because this word is governed by the general rule of sonority-driven epenthesis and not restricted by the lexical constraint, *COMPLEXCOD-L.

To sum up, HA has 4 main types of word-internal vowel epenthesis. These are DTE-Based epenthesis, which can be further divided into SSD and SD epenthesis, and it is the most common type of epenthesis in HA. The other types are OCP epenthesis, Masdar template satisfaction epenthesis, and lexically-indexed word epenthesis. SSD (DTE-Based) epenthesis occurs word-internally to prevent potential CVCC and CVVC syllables from surfacing faithfully. SD (DTE-Based) epenthesis, OCP epenthesis, Masdar template satisfaction epenthesis, and lexically-indexed word epenthesis all occur in monomorphemic potential word-final CVCC syllables. SSD and SD epenthesis have a default quality of the epenthetic vowel. OCP epenthesis, Masdar template satisfaction epenthesis, and lexically-indexed word epenthesis do not have a default quality of the epenthetic vowel.

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How Linguistic is Verse Meter?*

Tomas Riad
Stockholm University and the Swedish Academy

1 Introduction

In the linguistic study of poetic meter, it is common to assume that there are two simultaneous prosodic structures present in the lines of verse. Most scholars will agree that one of these structures is the regular prosodic structure that comes with any utterance. Regarding the nature of the other, the one that constitutes the verse meter, there are differences of opinion.

The standard approach to meter that has been developed within the linguistic research tradition since the 60's is known as generative metrics. Generative metrics assumes that verse meters are derived from a universal set of abstract meters, alternatively composed of a universal set of metrical properties. The source for the metrical structure is a module which is concerned specifically with meter (the 'template generator' in Blumenfeld's 2015 model, the 'structure parameters' in Hanson & Kiparsky's 1996 model, the 'grid construction rules' in Fabb & Halle's 2008 model). This module is able to produce abstract meters for all languages. In order for the abstract meters to work (and work well) in a given language, there are forces that help select suitable meters/properties from the universal set, as well as constraints that relate the linguistic characteristics of the regular prosody of the language to the properties of the meter. In this way, the properties of dactylic hexameter in Classical Greek and in Modern Swedish, respectively, will be different, and those differences will make sense in terms of the differing phonologies of the two languages. But the meters are ultimately the same, drawn from the universal module. For general outlines, see Hayes (1988), Hanson & Kiparsky (1996) and Blumenfeld (2016). When poetic text is produced, the modular organisation crucially involves a matching between the regular prosodic structure that the text requires and the meter. The purpose of the matching is to establish the relative well-formedness of lines and/or to exclude ill-formedness of lines. This judgement of the metricality of lines is much like the judgement of grammaticality of linguistic structures. I will refer to the standard approach as Universal Generative Metrics, or UGM for short. Prominent work in this tradition includes Halle & Keyser (1966, 1971), Magnuson & Ryder (1970, 1971), Kiparsky (1973, 1975, 1977, 2006), Prince (1989), Hayes (1988, 1989), Hanson & Kiparsky (1996), Fabb & Halle (2008), Blumenfeld (2015, 2016).

I will here defend a different approach to the structure of meter. The main claim is that, not only the regular prosodic structure, but also the meter as such, is brought about by the linguistic grammar. In the overview given in Blumenfeld (2016), this approach is referred to as "holistic" referring to work by Golston & Riad (1997, 2000, 2005). One part of the proposal is that the categories of the metrical tree are ontologically the same as the categories of the regular prosodic tree (Golston & Riad 2000). This means that e.g. a verse foot is an authentic unit of prosody, most often the prosodic word. Another part of the proposal developed here and in Riad (2013, 2017) is that the higher levels of the metrical tree (colon, halfline, line) are the same type of linguistic objects as prosodic morphemes. The fact that the meters used in a language are suited for that language then follows from the direct involvement of grammar in the production and control of meters. By the same token, to the extent there are universal features visible in meter, those are the same universal features as can be observed directly in grammar. I shall refer to this approach of generative metrics as Prosodic Metrics, or PM for short.

Everybody agrees that there is a strong relationship between the prosodic properties of the language and character of the meter used in that language. If stress is prominent in the language, then it will tend to be important in meter. If vowel quantity is employed in the language, then it is likely to be regulated in meter. The theory of poetic meter should capture such patternings. In UGM, assumptions of

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correspondence have been called the development hypothesis (Fabb 2010ab) and the grounding hypothesis (Blumenfeld 2015). The close affinity is also recognizable in overlapping terminology for prosody and meter, e.g. *ʿarūḍ* 'prosody' in Arabic (Weil 1960), *feet* in the theory of stress (Hayes 1995). Thus, the issue is not *whether* language is involved in meter, but *how*.

UGM's answer is that while meter originates in a module that is external to language, there are constraints on the selection of meters (FIT and INTEREST, in Hanson & Kiparsky's terms), on metrical positions and on the correspondence between the meter and the linguistic prosody of the text (matching).

PM, by contrast, crucially derives the structure of meter directly from grammar, without positing a separate module for poetic meters. In PM, meter is internal to language, in the same way as the more familiar structures of prosodic morphology. There are several consequences of such a move. One is the expectation of similarities between categories of verse and prosody, respectively. Another is structural parallels between familiar instances of prosodic morphology and meter. Yet another is that grammar should be directly involved in constraining the meter, reducing the need for meter-specific constraints. I go over some of these consequences below in order to make clear what is at stake for the PM position on the status of meters.

2 Two structures

Let us first take a look at a couple of representations of lines of meter. Here are first two lines as analyzed in Blumenfeld (2015:93). The first illustrates the perfect matching between linguistic prosody and the metrical template. The meter is iambic pentameter and it is represented below the text. The regular prosody is given above the text. Both structures are here represented as bracketed grids.

(1) Shakespeare, Sonnet 106

```
          *               *               *               *               *
(   .  (  *  ))(  .  (  *  ))(  .  (  *  ))(  .  (  *  ))(  .  (  *  ))
   *  (  *  )    *  (  *  )    *  (  *  )    *  (  *  )    *  (  *  )
  of    hand     of   foot     of   lip      of   eye      of   brow
(  *      *   )(  *      *   )(  *      *   )(  *      *   )(  *      *   )
          *               *               *               *               *
```

Few lines exhibit such an iconic match. More typically there will be deviances, as in the next example. The highlighted syllables (as in the original) mark mismatches between the prominence structures of the meter (strong positions) and the regular prosody (unstressed syllables). Note that the initial syllable of *after* also deviates from iconic matching in being stressed but occurring in a weak position in the meter. In other positions that line-initially this is usually disallowed.

(2) Robert Frost, Afield at dusk

```
   *                 *                              *
(  *  .  )(  .   (  *       .      .  ))(  .    (  *       .      .  ))
(  *  *  )   *  ((  *       *  )  *  )    *  ((  *       *  )  *  )
   after     an     in-     ter- val     his   in-    stru-  ment
(  *  *  )(  *        *  )(  *      *  )(  *       *  )(  *      *  )
      *               *             *               *             *
```

In UGM the metrical template is external to language and metered verse is understood as a relationship between linguistic prosody and the external template. Evaluation of metricality proceeds by matching functions. Previous work on PM, on the other hand, denies the presence of external templates (Golston & Riad 1995, Golston 1998, Golston & Riad 2000). Instead, the analysis assumes a reranking of the relevant prosodic constraints over syntactic constraints for the purposes of meter. Constraints on binarity, alignment of prominence and rhythm thus become unfettered by e.g. alignment with syntactic categories, otherwise the rule in prose. In that conception, there will only be a single tree. At present there are some unclarities regarding whether or not that view can be reconciled with the demands of *regular* prosody in metered poetry. If there is only one prosodic tree, how should we reconcile the shaping of every prosodic word as a verse foot all the while that we expect alignment with lexical words to remain as in prose? In languages where syllabification is bounded by prosodic words, like Germanic, resyllabification does not take place according to verse feet (=prosodic words) in meter. For reasons like this, we return here and in Riad (2017) to the standard assumption of two trees. However, the metrical tree is not conceived of as an external template, but as a linguistic template of the same kind as prosodic morphemes.[1] In the version of PM pursued here, we agree with UGM on the presence of two simultanteous structures, but differ on the nature of the metrical template as well as on how the two tree structures relate to each other. UGM assumes matching between the external template and regular prosody, while we assume that the two trees relate individually to the string of words (and not at all to each other).

If meter is fully linguistic, we should ideally find evidence for a similar arrangement with two simultaneous prosodic structures in familiar linguistic areas. In the next section we argue that prosodic morphology is such an area.

2.1 *Prosodic morphology* In order to make the argument that meter is a brand of prosodic morphology we now turn to the structural similarities between verse meter and prosodic morphology. In the best-known instances of prosodic morphology, a morpheme consisting of a prosodic domain is provided, typically a syllable, a foot, or a prosodic word (Marantz 1982). When used as prosodic morphemes these prosodic domains tend to exhibit phonologically unmarked shapes. This is the main reason why they are taken to emerge from the linguistic grammar, as proposed in McCarthy & Prince (1986, 1993, 1994). Prosodic morphemes can however also contain lexical specifications, that is marked properties. A summary of current approaches to analyzing prosodic morphology is given in Downing (2006).

In the following discussion, we are not going to address the issue of how prosodic morphemes get their shapes, what parts carry meaning, and so on. The conceptual and technical issues connected with that go beyond the purposes of this article. But we will assume that meters are derived in the same way as prosodic morphemes (however that is done), the claim being that they are ontologically the same type of object.

Let us now look for the presence of two simultaneous structures in prosodic morphology and see what parallels we can find for the conception of meter that we are exploring. Typical types of prosodic morphology are reduplication, truncation and root-and-pattern formation.[2] Examples are given in (3) where the prosodic morpheme is rendered underneath the form and the regular prosody above, in anticipation of the analysis.

[1] The notion of 'template' is used differently according to theoretical assumptions. We use the term in a theory-neutral sense here, referring to the structure that constitutes the meter or the prosodic morpheme, as the case may be. There are major issues relating to *how* that tree comes about that can't be addressed here.

[2] More phenomena are sometimes included under the same heading, including prosodic subcategorization and minimality conditions.

(3) Prosodic morphemes and regular prosody[3]

```
                                 (            )
a.             (      )          (      )(    )       Regular prosody
Kinande         ku-gulu          ku-gulu--gulu         'real leg'
reduplication                            [ σ σ]       Prosodic morpheme

                                 (     )
b.             (        )        (   )                Regular prosody
German          Brigitte          Big-i                nickname
truncation                       [ σ<]                Prosodic morpheme

                                 (          )
c.             (      )          (     )(   )         Regular prosody
Arabic          jundub            junay--dib           'locust (diminutive)'
root&pattern                     [ L H ]              Prosodic morpheme

                                 (       )
d.             (    )            (       )            Regular prosody
Arabic          nafs              nufay-s              'soul (diminutive)'
                                  Janay-d              'young man; name'
root&pattern                     [ L H ]              Prosodic morpheme
```

It is a standard assumption that phonological material has to be integrated into regular prosodic structure in order to be realized. Only prosodically licensed material will be produced (e.g. Demuth 2014). This is one of the rationales behind Exhaustivity (Selkirk 1995). Thus, regular prosody organizes the whole structure. The prosodic morpheme, however, does not aim for exhaustive parsing. Rather, prosodic morphemes are often, even typically, smaller than the structure as a whole. It is essential that a prosodic morpheme can be extracted from the rest of the prosodic structure, and then identified and interpreted.

With reduplication the prosodic morpheme shows up *beside* the other material, which is left unaffected. The prosodic morpheme is here separated from the rest, which makes it highly visible/audible. Interaction with the regular prosody and phonology is mild (copying, resyllabification).

With truncation we often get shortening (*William* > *Will* [wɪl]), or shortening plus some affixation (*Willy* [wɪlɪ], *Brigitte* > *Biggi* [bɪgɪ]). If there is too little phonological material in the base for truncation to take place, segmental material can be added within the prosodic morpheme (cf. (4) below). In truncation, the prosodic morpheme is highly visible/audible just as with reduplication, since the base form is *replaced* by the prosodic morpheme (e.g. Wiese 2001).

With root-and-pattern, a prosodic pattern is superimposed on the whole or on part of the base form.[4] For instance, with *jundub* > *junaydib* 'locust, dim.' above we look at a base from which a part (*jun-*) is extracted as input to the root-and-pattern process (e.g. Lombardi & McCarthy 1991). The rest of the morpheme remains and may undergo other processes separately (vowel change). With root-and-pattern, the visibility of the prosodic morpheme is less straightforward as it is *simultaneous* with the rest of the base, and integrated with it. This makes root-and-pattern the case of prosodic morphology that provides us with the most relevant information for verse meter.

We turn now to the arguments for separating regular prosody from the prosodic morpheme, in language. If that can be shown, then we have a direct parallel with the two trees in poetic texts that almost everybody assumes.

2.2 *Two trees in prosodic morphology* The first argument comes from the size difference between the full form and the templatic part of the form that we have seen in all three types above. Already the size difference indicates that there are two trees. In *junaydib* there is a syllable *-dib* which is integrated into the regular prosody (as everything pronounced must be), but not into the prosodic morpheme. In forms like *nufays* 'soul, dim.' and *Janayd* 'young man (name)', the single final consonant is licensed by regular

[3] 'σ<' represents a branching rhyme.

[4] In the classic case of Arabic (and Tashlhiyt that we look at below), the starting point for the prosodic morphology process is different from the other types, in that the input form may consist of radicals only.

prosody rather than by the prosodic morpheme.

The final /s/ of *nufays* is not a suffix but part of the root. A final consonant in an already heavy syllable is extrametrical. That is a general fact of the language, hence an issue for the regular prosodic system. With reduplications like *kugulugulu*, the same basic situation holds. *Part* of the form is a prosodic morpheme ([gulu]), while the *whole* form is integrated into regular prosody (kugulu[gulu]).

A related argument holds for cases where the prosodic template is larger than the base or the phonological material that the base makes available. A case in point is nickname formation of short names in Swedish, like *Bo* [buː]. The prosodic template for the root is a branching rhyme ([σ<]) and the template for the whole form is a prosodic word, where the second syllable is supplied by a suffix (or by reduplication). For *Bo* this means that the structure should be [[bʊsː]-ɛ] or [[bʊsː]-[ɛ]].

(4) Swedish nicknames

```
               (  )          (      )          Regular prosody
Swedish         Bo            Boss-e            nickname
expansion                    [[σ<]-ɛ]          Prosodic morphemes
                             [[σ<][-ɛ]]
```

An epenthetic segment [s] is supplied in order to fulfill the size requirement of a branching rhyme in the root template. Whether the suffix is attached to the root template or forms a prosodic foot of its own, we leave as an open issue here.

A second argument comes from conflicting syllabification between the prosodic morpheme and the regular prosodic structure. This situation points to the presence of two separate structures operating separately on the same phonological string. The illustration is here drawn from Tashlhiyt Berber where there are several root-and-pattern formations in the morphology (Dell & Elmedlaoui 1992/2001). We shall look at the deverbal noun formation called TIFRDI and the state-denoting noun formation called TIRRUGZA. The prosodic shape of TIFRDI is [LL] and that of TIRRUGZA is [L.H.L] (Dell and Elmedlaoui 1992/2001, 2002, 2013, Jebbour 1999, Bensoukas 2001). In both cases a prefix *ti-* is attached to the stem, constituted by the prosodic morpheme. We provide two realizations of each type in (5), where syllable weight is indicated in both structures. In the first realization of each type the syllable structure of the regular prosody agrees with that of the prosodic morpheme, while in the other the co-syllabification of the prefix with the stem occasions a contrast.

(5) Prosodic morphemes and regular prosody in Tashlhiyt

```
Tashlhiyt      ( L    L   L)              Regular Prosody
Tifrdi          ti- f r d i                'graze/grazing'
                     [L   L]              Prosodic morpheme

                 (   H    L)              Regular Prosody
                  ti- n m i                'be straight/straightness'
                     [L   L]              Prosodic morpheme

Tashlhiyt       ( L    L    H    L)       Regular Prosody
Tirrugza         ti- n m m u ɣ r a         'state of notability'
                      [L    H    L]       Prosodic morpheme

                ( H      H    L)          Regular Prosody
                 ti- r r u q z a           'manhood'
                    [L    H    L]         Prosodic morpheme
```

In the first example of each type the prosodic morpheme is readily identifiable. In the second example of each type the prefix *ti-* forms a heavy syllable with a following radical consonant (*tin.mi, tir.rug.za*). This partially conceals the shape of the prosodic morpheme in the output (which is always the regular prosodic structure). The point here is that this conflict occurs as the result of two structures with different demands on one output. In Tashlhiyt Berber, regular prosody simply overrides the demands of the prosodic morpheme in this type of situation. Another strategy would have been to supply an epenthetic consonant

(+ti*t*rrugza). This strategy is marginal but not foreign to Tashlhiyt (Dell & Elmedlaoui 2002:28fn.).

The third argument relates to the discontinuity of prosodic morphemes. The relevant situation is found in so-called secret languages of Tashlhiyt, known as TAGNAWT and TAQJMIT and used exclusively by women (Douchaïna 1996, 1998, Lahrouchi & Ségéral 2009, 2010ab). In the analysis of Riad (submitted), both employ the same prosodic template [L.LL.L], a variant of [L.H.L] (cf. TIRRUGZA above), which is repeated for each content word across the utterance. Secret languages contain deliberate elements of concealment and one such element here is the reduplication *across* a non-templatic affix. This makes the realization of the template discontinuous in the output, as seen in (6).

(6) Prosodic morphology in Tashlhiyt secret languages

```
Tashlhiyt    (L   L   L   L   L    L)    Regular Prosody
Tagnawt       aj- q g a ž d -wa- ž d      'complain'
                 [L   L   L   -    L]    Prosodic morpheme

Tashlhiyt    ( H      L   L   L    L)    Regular Prosody
Taqjmit       ti- k k a r f -ju- r f      'do'
                 [L   L   L   -    L]    Prosodic morpheme
```

Both TAGNAWT and TAQJMIT have a prefix (*aj-* and *ti-*, respectively), and both have what is often called an infix (*-wa-* and *-ju-*, respectively). These affixes are stable.[5] The infix is attached to a prosodic category [LL], which forms the inner foot of [L [LL] L] (for motivation of this structure, cf. Dell & Elmedlaoui 2008 and Riad 2017; see also McCarthy 1982). Reduplication takes place across that affix.

The prosodic morpheme is discontinuous in both secret languages, and remains faithful to the lexical specification required to maintain L.LL.L in the face of the less marked LL.LL. The regular prosody is continuous, as always. The most direct interpretation of this situation is that each of the two prosodic structures refers separately to the phonological string.

The result from this brief inspection of some cases of prosodic morphology is that there is good reason to assume the presence of two prosodic structures that refer separately to one and the same string of segments simultaneously, in well-known linguistic processes. Once we take this step for the analysis of prosodic morphology, the implications for the theory of meter can begin to be articulated. If linguistic grammar can instantiate two simultaneous prosodic structures that each refer separately to the same string of phonemes, then so can poetic meter.

2.3 *Two trees in metrical verse* The very fact that many different regular prosodic structures are compatible with one and the same metrical template indicates that there are two structures in meter. This is seen in any corpus of lines of a single meter (e.g. the blank verse in Shakespeare's *King Lear*), as well as in the available, alternative pragmatic interpretations instantiated as different prosodic structures of one and the same line of verse (*To be or not to be, that is the question* is a classic example).

In our conception, both structures are prosodic and generated by grammar. This means that both trees consist of the same units drawn from the prosodic hierarchy. When we look at these prosodic units in each tree we see that they are often incongruous. For instance, if both trees would have equal demands on the prosodic grouping of words, there would be conflicts. In the examples below we assume that the metrical structure consists of ten syllables (=prosodic feet), organized into five verse feet (=prosodic words), in turn organized into two halflines (=prosodic phrases) and one line (=intonation phrase).

(7) Incongruities in meter

words and verse feet:	[My mis-][tress' eyes][are no-][thing like][the sun]
extrametricality:	… [that is][the ques]<tion>
enjambement:	O balmy breath, that dost almost persuade Justice to break her sword! One more, one more.

[5] TAQJMIT has the same conflict of syllabification with the prefix *ti-* as we saw with TIFRDI and TIRRUGZA in (5) above. In *ti-k.ka.rf.-ju.-rf* the first syllable comes out as H where the prosodic morpheme would have had it L.

If there were only one prosodic tree, generated by the reranking of some constraints in grammar, we run into the following problem: In meter, the prosodic word (=verse foot) is [my mis-], whereas in regular prosody it's (my mistress'). If there is only one tree, we must be able to determine which one is right in this line, a task that seems impossible. Intuition rather has it that speakers of English can *both* sense the regularity of the meter *and* assign a normal linguistic phrasing to the line. That points to the necessity of a flexible regular prosodic structure which is separate from, but simultaneous with, a rigid metrical template, which is the same, line after line. Mutatis mutandis, this is the same situation as with root-and-pattern constructions where both the prosodic morpheme and the whole form are produced simultaneously.

3 Meters are prosodic 'morphemes'

We have argued that the structure with two trees in meter is in fact a property also of prosodic morphology. Next, we will argue that meter is a brand of prosodic 'morphology', that is, that meters are like large prosodic 'morphemes'. There is a terminological issue in that 'morpheme' refers to units the size of words or smaller, and as such they tend to be associated with lexical meaning. These things may distract. The shared point between prosodic morphemes and meters is the linguistic mechanism for producing prosodic units that can be connected to a phonological string for some purpose. Meanings that are associated with prosodic morphology are often grammatical: 'plural', 'nominal derivation', 'iterative', 'intensive', 'participle' and such. In nickname formation or secret language formation, meanings are quite general and could be said to compare with the situation in meter: 'hypocoristic' for nicknames, 'concealed' for secret languages, perhaps 'artful' for meters.

Here are some examples of prosodic morphemes (set in square brackets) at various levels of the prosodic hierarchy.

(8) Prosodic 'morphemes' including meters

Intonation Phrase	English	[My mistress' eyes are nothing like the sun]
	Spanish	[cuando empecé a crecer, un vago y dulce son]
Prosodic phrase	English	[My mistress' eyes]
	Spanish	[cuando empecé a crecer]
Prosodic word	Diyari	[tjilpa]-tj̲ilparku 'bird species'
	Arabic	nafs, [nufay]-s 'soul /dim.'
Foot	Kinande	kugulu-[gulu] 'real leg'
	Tashlhiyt	ti-[frdi] 'graze'
Syllable	Gothic	gretan, [ge]-groot 'cried'
	Samoan	a:[va]-vága 'elope, erg.'
Mora	Greek (augment)	[e]-ekousa (akoúō) 'I heard'

There are prosodic morphemes in four familiar sizes here: mora, syllable, foot and prosodic word. And then there are the categories used only in meter (or meter-like linguistic expressions): prosodic phrase and intonation phrase. Of course, the lower parts of the prosodic hierarchy are used also in meter. They are then referred to as metrical position (foot, syllable, mora) and verse foot (prosodic word, foot), depending on language and descriptive tradition.

If meter and prosodic morphemes are the same types of object, as claimed here, it also follows that the prosodic hierarchy and the metrical hierarchy are homologous (Golston & Riad 2000, 2005, Riad 2017). There are many indications of this, such as the typical similarity of verse feet with prosodic words. In the case of Tashlhiyt, the prosodic morphemes L.H.L, L.LL.L and also H.H (UKRIS) are prosodic words. Verse feet in the same language are L.H.L, L.LL.L and LL.H (Dell & Elmedlaoui 2008). In Swedish, the prosodic overall shape of nicknames is the same as the shape of trochaic verse feet, that is disyllabic with initial stress. Another indication is the rather closely corresponding numbers of verse feet and actual prosodic words in lines of Greek anapestic dimeter and dactylic hexameter. For the counts, see Golston & Riad (2000: 120, 134). Metrical positions are typically prosodic feet in quantitative languages and so on. These things all come out as natural if meters are fully linguistic (in the same sense as prosodic morphemes), rather than being drawn from a language-external, universal poetry module, as assumed by proponents of

UGM.[6] The argument we are making here is that meters are simply the same type of object, but made of the higher categories of the prosodic tree, as illustrated in (8). We turn now to some consequences of our proposal.

4 Binarity and rhythm

If the units of meter come from the same source as prosodic morphemes, we get a partial answer to some issues of markedness on binarity and rhythm. In analyses of prosodic morphology, it is always noted that the prosodic morphemes tend to exhibit unmarked prosodic structure. The unmarkedness has been taken to emerge from the grammar, as set up in Optimality theory (Prince & Smolensky 1993/2004, McCarthy & Prince 1994, Downing 2006). Unmarkedness is also typical of verse meter, especially relatively simple types, like anapestic tetrameter in Greek and trochaic tetrameter in Swedish.

At the same time, it is clear that there is markedness, too, in prosodic morphology as well as in meter. In a language that has several prosodic morphemes it is necessarily the case that some should be more marked than others. Tashlhiyt is a case in point. TIFRDI and IMPERFECTIVE are both an unmarked foot [LL] (Dell and Elmedlaoui 1992/2001, Jebbour 1999, Bensoukas 2001), while TIRRUGZA L.H.L and TAGNAWT L.LL.L that we have looked at above clearly contain marked properties (misalignment of feet), beside the unmarked size for a prosodic word (two feet, four moras). The same thing holds for meter, as we should predict. In Tashlhiyt meter, the structures L.H.L and L.LL.L are very frequent and occur in many meters in alternation with LL.H (Dell & Elmedlaoui 2008, Riad 2017). On one analysis, Greek dactylic meter (H.H and H.LL) is marked for rhythm (clash), but unmarked for size (four moras; Golston & Riad 2000, cf. (11) below). The diminutive and broken plural of Arabic, for instance, instantiate an ideal quantitative iamb (LH). This structure is rhythmically unmarked, but marked on binarity (three rather than four moras). The same structure is prominent in Arabic meter (Golston & Riad 1997, 2016). The Tashlhiyt prosodic morpheme known as UKRIS (H.H) is unmarked on the number of moras (four), but marked by virtue of containing a clash. Clash violation is enough to ban H.H from Tashlhiyt meter (Jouad 1995). In Greek, however, H.H is a very common verse foot (spondee). Thus, both marked and unmarked properties are found in prosodic morphology as well as in meter. Marked properties, if constant in a structure, can be lexical and we can think of meters as underlying forms in this regard (as also in UGM; Blumenfeld 2016:81).

In the following section we discuss some of the consequences of the proposal that verse meter is a brand of prosodic morphology.

5 Extrametricality

Some cases of incongruity in prosodic morphology follow from the difference in size between the prosodic morpheme, which has a fixed shape, and the regular prosody, which includes everything. In meter, a size difference occasions extrametricality. We shall first look at Ruben Darío's alexandrines where (9) illustrates perfect alignment, and (10) extrametricality in both halflines. The metrical line is made up of two halflines of 6 syllables each. Some prominences are also marked in anticipation of the further analysis.

[6] Even though there are differences of opinion regarding just how prosodic morphemes should be derived and represented, no one argues that they come from a universal prosodic morpheme module that is external to linguistic grammar, as is done for meter in UGM.

(9) Darío, meter and regular prosody coincide[7]

```
(                                          ) IP
(                   T*)  (               T*) PPh
(     )(     )(     x )  (      )(      )(x ) PWd
( x   )    (x)      (x )    (x  )  (x   )(x ) Ft
Cuando empecé a crecér, un vago y dulce son    De otoño 6
[S    S] [S  S]  [S S ] [S  S][S   S][S  S ] Ft  verse feet
[             ]  [    ] [          ][     ] PWd dipodies
[                   T*] [               T*] PPh halflines
[                                          ] IP  line
```

(10) Darío, meter and regular prosody do not coincide (extrametricality)[8]

```
(                                            )  IP
(                   T*  )(               T*  )  PPh
(x)  (     x   )  (   x   )(     x)  (      x   )  PWd
(x)  (x  )(x   )     (x   )     (x)        (x   )  Ft
Yo, pobre árbol, produ<je> al amor de la bri<sa>   De otoño 5
[S   S] [S   S]  [ S S]   [S S][S  S] [S   S ]    Ft  verse feet
[             ]  [     ]  [         ] [      ]    PWd dipodies
[                   T*]  [               T*]    PPh halflines
[                                           ]    IP  line

(                                          ) IP
(             T*     )  (               T*     ) PPh
(        x  )(x      )  (         x  )( x      ) PWd
(   )    (x  )(x)       (    (   )(x  )( x)      Ft
Es la mañana má<gica> del encendido tró<pico>  Tutecotzimí 35
[S  S][S S][S S ]     [S  S][S  S][S  S ]     Ft  verse feet
[        ][    ]     [          ][     ]     PWd dipodies
[             T*]     [               T*]     PPh halflines
[                                       ]     IP  line
```

Regular prosodic structure must organize the whole line, whereas the meter remains rigid and constant in size. When there is a size difference we get extrametricality looking much like what we have seen in the instances of prosodic morphology in (3) above. Extrametricality, in this view, is the result of an incongruity between the two structures, rather than a property of the metrical template.[9]

6 Metrical control

The issue now is how meters should be characterized. As our general proposal is that meters are linguistic structures, the further characterization should also be linguistic, which means that meters should be regulated by (chosen) linguistic constraints. These constraints could either be *distinctively violated* in the meter, requiring a marked property to occur, or they could be obligatorily obeyed in the meter, causing increased unmarkedness. We shall refer to the latter type of constraint as *privileged*.

6.1 *Distinctive violation* The first case, distinctive violation, is the same thing as lexical specification. Lexical properties in an underlying form can simply be registered as distinctive, hence required, violations incurred by that form on the relevant constraints. For the original proposal for linguistic phenomena in general, including prosodic morphology, see Golston (1996), and Golston & Riad (2000, 2005) for the extension to meter. Assuming now that meters and prosodic morphemes are ontologically the same, their marked properties should be lexical in the same way. The most typical such property in metrics is line

[7] 'When I began to grow, a vague and sweet sound…'.
[8] 'I, poor tree, produced, to the love of the breeze…', 'It is the magical morning of the tropical fire.'
[9] One might ask why the regular prosody doesn't just go on and on after the meter's end. There are meters where only part of the line is metrified but the situation is not very common. One reason might be that structure tends to become stricter rather than looser towards the end of a line, as prominence builds (Kiparsky 1977, Hayes 1989).

length. Any length that deviates from complete binarity requires a lexical specification, by distinctive violation of the relevant binarity constraints (see Riad 2017 for discussion and examples). In Darío's alexandrines above, each halfline consists of three verse feet each, which means there is a deviation from unmarked binarity (which would have resulted in two or four). The specification in the PM model defended here occurs at the level of dipodies/prosodic words, where one is binary and the other is unary, in each halfline. The specification will hence be a distinctive violation on ProsodicWord-Binarity (PrWd-Bin) for each halfline.

In UGM, by contrast, line length is stipulated in the grammar-external meter module. This means that there is no difference in markedness between lines that are 4 or 8 verse feet long (i.e. binary), and lines that are 5 or 7, everything else being equal. This is counterintuitive and also not in line with the findings for Tashlhiyt meter in Riad (2017).

UGM also stipulates headedness in order to account for rhythmic properties. A clear statement of these things is given in Hanson & Kiparsky (1996:289): "The structure parameters, number of feet and headedness, are formally independent of phonological structure. They determine straightforwardly the familiar properties of line length, and of whether a meter is rising (right-headed) or falling (left-headed)." Much if not all properties that are considered rhythmic follow from this in UGM. In PM, headedness in verse should follow from linguistic constraints. Similarly, the linguistic constraints on rhythm (NoClash, NoLapse) should be directly employed in the control of meter, as we shall now see.

A rhythmic property can be distinctively marked in the lexical representation of a meter, as in Greek dactylic hexameter, as analyzed in Golston & Riad (2000). Dactyls are invariably four moras, which is the unmarked size for a verse foot/prosodic word consisting of two metrical positions/prosodic feet. The grouping of four moras into syllables can be done in six different ways as charted in (11) below. Given that the prosodic foot of Greek is the moraic trochee ([μ́μ]) these groupings lead to variable rhythmic properties (cf. Kager 1993).

(11) Verse feet based on two moraic trochees

	shape	syllabic prominence	moraic prominence	rhythmic property
dactyl	H LL	x x .	x . x .	clash
spondee	H H	x x .	x . x .	clash
anapest	LL H	x . x	x . x .	—
proceleusmatic	LL LL	x . x .	x . x .	—
amphibrach	L H L	. x .	. x . .	lapse
"resolved amphibrach"	L LL L	. x . .	. x . .	lapse

The set of clashing verse feet – the dactyl and the spondee – is what occurs in dactylic meter. To capture this fact, Golston & Riad (2000) proposed that the required violation of the linguistic, rhythmic constraint NoClash is a constitutive property of the Greek dactylic metron. No headedness beyond what is found in the prosodic feet of the language (moraic trochees) is needed to capture the nature of this meter. The clash is the result of the particular constellation of prosodic feet where the first is monosyllabic. The two verse feet in this set are picked out by the required markedness, without deriving the one from the other.

While we are looking at the table in (11) we may note that violation of NoLapse picks out another set verse feet {[L.H.L], [L.LL.L]}.[10] These are used more or less interchangeably in Tashlhiyt meter, in alternation with the unmarked anapest LL.H (Dell & Elmedlaoui 2008, Riad 2017). The same shapes are familiar also from the prosodic morphology of Tashlhiyt, as we have seen, and could indeed be analyzed in just the same way there.

6.2 *Privileged constraints* A meter could also be controlled by what we could call enhancement of unmarked properties (Riad 2013, 2017). Enhancement or improvement in poetry relative to regular prosody has often been observed, anecdotally if nothing else. Statements like meter being "language imitating itself"

[10] Both violate NoLapse at the moraic level, L.LL.L also NoLapse at the syllabic level.

(Thompson 1961) or poetry really being “spoken language rather tidied up” (Daunt 1946) are of this kind. We will propose a linguistic way of instantiating enhancement. Given the linguistic nature of the meter, grammar can be engaged directly for metrical control of some property in the metrical tree. The way we propose to do this is by singling out grammatical constraints as relevant for a given meter. Thus, while the full grammar applies to the regular prosodic tree, only part of the grammar applies to the meter.[11] We will call such a constraint the *privileged constraint* (Riad 2017). In the case of Darío above, the privileged constraint is the alignment of phrasal prominence with the right edge of the prosodic phrase.

(12) ALIGN-R (T*, PRPH) ‘Every nuclear T* is at the right edge of a prosodic phrase’

Piera (2001) notes that the alignment of intonational prominence is the main feature of Darío’s hexameter, rather than prominence at lower levels. The most direct way to express this is by engaging this specific linguistic constraint in the control of the meter. In the two lines cited earlier, the phrasal prominence (T*) is perfectly aligned with the right edge of the prosodic phrase in the metrical tree. In the regular prosodic tree, the alignment is sometimes perfect (9) other times not (10). Phrasal prominence always appears on stressed syllables, but since stressed syllables are not always word-final, a phrasal prominence will often occur one or two syllables away from the right edge of the prosodic phrase, in the language. This in turn is due to the fact that regular prosodic structure must organize the whole expression. The metrical tree (like other prosodic morphemes), however, is not required to include everything and can therefore meet the constraint on alignment of phrasal prominences, perfectly or to a much higher degree than the regular prosody. Whenever the stress of the phrase-accented word isn’t word-final, the poststress syllables are extrametrical relative to the metrical tree, as seen in (10). The net result is the effect of overall enhanced unmarkedness on the alignment of phrasal prominence.

Headedness in Darío’s alexandrines is expressed by the right-alignment of phrasal prominence. As mentioned, it is not clear that headedness is controlled at any other level in this meter. Prominence in the 12th positions is mandated, and very common in the 6th position (depending on whether there is a nuclear prominence in the structure). In the 8 lines of *De otoño* there are 15 nuclear accents. Other prominences occur mostly in even positions (16) but often enough in odd positions (7). To illustrate, here are the two first lines, which have different prominence profiles in other positions than 6 and 12.

(13) Prominence profiles in *De otoño*[12]

1 2 3 4 5 6 7 8 9 10 11 12
Yo **sé** que hay **quie**nes **di**cen: ¿por **qué** no **can**ta ahora
con a--**quel**---la lo--**cu**ra ar-mon-**io**--sa de an**ta**ño?

Our analysis does not provide an aprioristic metrical headedness structure like UGM does. In fact, no prediction is made that verse feet should be predominantly right- or leftheaded in this meter.[13] Hanson (1997:65) discusses the lack of headedness of Italian verse feet in meters similar to the Spanish alexandrine that we are looking at here, yet does not question the aprioristic headedness provided in UGM. If the relatively free distribution of prominence in other positions than 6 and 12 can be further substantiated, there is no reason to even assume the presence of a metrical prominence structure at the level of the verse foot. That is a basic tenet of PM (Golston & Riad 1998).

Let us now look at an example of Swedish hexameter as written by August Strindberg. This meter is controlled much like Darío’s alexandrines, but at the level of so-called big word accents. In Central Swedish pitch accents occur with different tonal shapes at two prominence levels, referred to as small

[11] Note that the proposal here does not involve reranking as in the previous analysis of Golston & Riad (2000, 2005). Of course, ranking a constraint high would in principle yield the same effect as a designated privileged constraint, but would have the undesired effect of losing the regular grammar, which clearly remains relevant in the regular prosodic tree.

[12] ‘I know there are those who say: Why don't you sing now with that harmonious madness of last year?’

[13] For a discussion of prominence variation in the Spanish alexandrine, see Navarro Tomás (1972:81ff.).

accent (t*) and big accent (T*).[14] Big accents are typically the culminative property of the maximal prosodic word or the prosodic phrase (Myrberg & Riad 2015). The privileged constraint that regulates the big accents is given in (14).

(14) ALIGN-LEFT (T*, PRWD) ‘Every big accent (T*) is at the left edge of a PrWd’

This constraint is relevant in the regular prosody, as stresses tend to be root-initial, and when there is more than one stress in a structure (compounds, some derivations), it is the leftmost that obligatorily gets the accent (often referred to as ‘primary stress’ in descriptive accounts). To illustrate how this constraint plays out in the meter, consider the following two lines from Strindberg’s poem *Trefaldighetsnatten* ‘Trinity eve’.

(15) Strindberg’s hexameter[15]

```
(          x  )(                 )(                  x  )IntPh
(          x  )(             )(x )(      x    )(     x  )PrPh
(T*)(     (T*))( t*)(T*      )(T*)(     (T*  ))( t*)(T* )PrWd
 Nu är det vår! Bryt fönsterna ut liksom böljan bröt isen
[T*      ][T*      ][T*      ][T*      ][T*        ][T* ]PrWd
[                  ][        ][                    ][   ]PrPh
[                            ][                         ]IntPh

(                               x                 x   )IntPh
(            x )(      x )(     x                 x   )PrPh
(t*    )(t*)(T*)(      T*)(  )((T*)(  )(          T* ))PrWd
 har jag än kvar en bukett åt  ång-båts-restauratrisen
[t*        ][T*      ][T*    ][ T*    ][        ][T*  ]PrWd
[                    ][      ][                 ][    ]PrPh
[                            ][                       ]IntPh
```

In the first example of (15) every verse foot begins with a big accent (T*), while small accents (t*) are not aligned in this line. In the second example there are fewer big accents but they are all left-aligned in the meter. In the regular prosody, however, left-alignment with the prosodic word edge does not always happen, e.g. in words like *buˈkett* ‘bouquet’ where stress is final.

In order to generalize left-alignment, Strindberg must tolerate verse feet that are heavier than what other authors admit. Thus, compounds like *ˈångˌbåten* ‘the steam boat’ or *ˈsmällˌfeta* ‘superfat’ are common. For other authors, such compounds must be differently aligned, with the second stress in the first position of a verse foot (example in (17) below). Thus, Strindberg admits all verse feet in (16), while Tegnér, Stagnelius and Runeberg only accept the verse feet above the line.

(16) August Strindberg vs. Esaias Tegnér, Erik Johan Stagnelius and Johan Ludvig Runeberg

[x | x]	[ˈhalsˌband] ‘necklace’, [ˈurˌsprung] ‘origin’,
[x | ..]	[ˈmorgonen] ‘the morning’, [ˈspiran av] ‘spire of’
[x | .]	[ˈredan] ‘already’, [ˈinnan-] ‘inside’
[. | ..]	[som på sin] ‘who in his’
[. | .]	[ˈoch i] ‘and in’, [ˈmen i] ‘but in’
[x | x .]	[ˈhänˌryckning] ‘rapture’, [ˈångˌbåten] ‘the steam boat’
[x | . x]	[ˈpredikˌstol] ‘pulpit’, [ˈgästaˌbud] ‘feast’
[x | xx]	[ˈLundˌström ˈlägg] ‘(name) put’

A metrical position equals a prosodic foot in Swedish. Stressed syllables are obligatorily bimoraic (by generalized Stress-to-Weight/Prokosch’s Law), while unstressed syllables are all monomoraic, whether open or closed (Kager’s law; Kager 1989, Golston 1998, Riad 2014). There is more to say about foot

[14] It is at this level of prominence that the tonal distinction between accents 1 and 2 is expressed. The lexical contrast is unimportant for metrical purposes. Both big and small accents instantiate higher prominence than stress, which is culminative in the minimal prosodic word (Myrberg & Riad 2015).

[15] ‘Now it is spring! Break out the windows like the wave broke the ice.’, ‘… I still keep a bouquet for the steamship restaurant hostess.’

structure in Swedish phonology, obviously, but for now this will do as an approximation of where the weight constraint connects with the language. It is possible that the weight constraint is to some extent a conscious or learned transposition of the classical condition on weight in dactylic meter. Stressed syllables in Swedish are then equated with H syllables of Greek and Latin, and unstressed syllables with L syllables. But in addition, all authors admit single unstressed syllables in both positions. Thus, the general trend is for a metrical position to contain no more than what corresponds to a foot in Swedish.

It is the constraint FOOTBINARITY which controls the size of positions. While all poets mentioned admit unary feet, Strindberg also admits overweight in the righthand position. The most common situation for this kind of overweight is where there is a stress clash leading to reduction of the second stress syllable, i.e. in compounds like *ˈångˌbåten* ‘the steam boat’, *ˈfullˌmånen* ‘full moon’ (directly under the line in (16)). It is possible that the reduced stress passes for stressless, for Strindberg. But it is also possible that it is the privileged accent alignment constraint that forces the violation of the size constraint on the righthand metrical position.

For the other authors, left-alignment of accent remains prevalent, but not such that the constraint on weight is violated. The next couple of examples illustrate how the meter comes out when the weight condition is mandated and what happens when in conflict with left-alignment of accent. These are the opening lines of *Wladimir the great* by Erik Johan Stagnelius (1817).

(17) Stagnelius’s hexameter[16]

```
(                             x )(               x   )IntPh
(         x      )(           x )( x       )(    x   )PrPh
(T* )(   (T*     )( t*     )( T*)( T*)(T*  )(   (T*  )PrWd
 Över de västliga klippornas topp fullmånen sig höjde,
[T*     ][T*     ][ t*     ][ T*     ][T*      ][T*  ]PrWd
[                ][        ][                  ][    ]PrPh
[                          ][                        ]IntPh

(                   x )(                              x   )IntPh
(x       )(x     )( x )(        x    )(    x      )(  x   )PrPh
(T*)( t* )(T*    )( T*)(       (T*   )(    T*     )(  T*  )PrWd
log bland silvrade moln och beglänste med darrande strålar
[T*      ][T*    ][ T*        ][T*       ][T*     ][  T*  ]PrWd
[                ][           ][                  ][      ]PrPh
[                             ][                          ]IntPh
```

In the compound *ˈfullˌmånen* ‘the full moon’ in line 1, the big accent on the second compound element is left-aligned in the meter, while the first big accent isn’t. Yet the first big accent is the primary prominence in regular prosody and the one which is obligatorily tonally marked.[17] A test for the difference between the approaches to dactylic hexameter in Swedish is rhythmic recitation (cf. in nursery rhymes). Strindberg’s approach admits such a reading where the first position of each verse foot is emphasized. For the other authors, such a reading leads to ungrammatical pronunciation of compounds like *ˈfullˌmånen* (as *ˌ*fullˈmånen*).

The examples above illustrate how a linguistic constraint can be selected for metrical control, instantiating general improvement in a particular respect. To get this result, we need a mechanism that privileges individual constraints for the purpose of meter, and makes them relevant in the metrical tree. The general result is that grammar is brought into direct use in meter. While it may be possible for meters to be in part controlled by artificial or paraphonological generalizations – those are empirical issues – the general approach significantly reduces the distance between language and meter compared to UGM.

Another thing to consider is the variation of what is traditionally called the same meter. The Swedish example suggests that ‘same’ here refers to number of verse feet and, to some extent, the left-alignment big accents. The metrical control of the meter is exerted by different constraints of grammar, a fact that rather speaks for quite different meters.

[16] ‘Over the crest of the westerly rocks the full moon came up, smiled among silvered clouds and shone with trembling rays.’
[17] When a compound appears with a small accent it is on the first tone bearing unit (stress).

7 Matching or not

In our analysis, meters come from the same place as prosodic morphemes. The larger size of meters compared to the more familiar prosodic morphemes has to do with level of the prosodic hierarchy. Prosodic morphemes are drawn from the lower categories, and meters are drawn from higher categories of the prosodic hierarchy. There is no difference in principle. Prosodic units the size of meters are not useful in morphological processes in language. It would not make much sense for reduplication or nicknames to be intonation phrases.[18] But intonation phrases are useful for the purposes of producing meter, which is simultaneous with the regular prosodic structure, and where units are the size of clauses and sentences. In this respect, meter resembles secret languages like the ones we have looked at in Tashlhiyt. The prosodic structure employed doesn't mean anything much beyond 'secret language' or 'language game'. Also, unlike most well-known cases of prosodic morphology, secret languages repeat the same prosodic structure word after word, but with new content. That is a similarity with stichic meters. Meters naturally come with more structure than familiar prosodic morphemes, because of layering. But, again, this is not a difference in principle with regard to familiar prosodic morphemes, which may also contain prosodic structure at more than one level (cf. *Bosse* in (4)). To make the point that meters and prosodic morphemes are the same type of object, we have argued that the two trees that most scholars assume for verse (regular prosody and meter) also exist in familiar cases of prosodic morphology. Difference in size, different syllabification demands, and discontinuity of the prosodic morpheme in secret languages are all arguments for this.

What about matching? UGM assumes that properties in the meter and properties in the regular prosodic structure are matched in specified ways. The classic UGM constraint on iambic pentameter mandates that stressed syllables of polysyllabic words can't occur in metrical weak positions (Kiparsky 1977). Thus, the two trees look at each other, and to express such an analysis formally, one needs constraints specifically dedicated to meter. In PM, by contrast, there is no matching between the meter and the regular prosodic structure, and meter is captured by regular linguistic constraints. We would predict that matching should not be found in ordinary cases of prosodic morphology, either, but the point would need to be further argued.[19]

If the two structures don't look at each other, as we assume, it means that each structure looks separately at the string of words. In view of that, incongruities between the trees are expected. The most obvious case is difference in size, leading to extrametricality (or catalexis) in meter, and to the obvious contrasts that make prosodic morphemes noticeable (cf. (3)). That brings meter more clearly into the purview of language where there are other instances of separate structures being compatible with the same string, as pointed out to me by Chris Golston. For instance, different syntactic structures may be compatible with the same string of words yielding different interpretations, as an integral part of some jokes.[20]

Thus, a good line of verse is compatible with two prosodic structures at the same time. One is the regular prosody for which grammar is employed in familiar ways. The other is the meter and its properties. There are a number of issues to work out, obviously. One is how to derive the falling or rising character of some meters, without appeal to a predefined rhythmic structure (Golston & Riad 1998). Another is to work out a technical solution to the notion of 'privileged constraint' and to study more verse systems in order to understand just how linguistic grammar can be involved in meter. Meter as well as (other) prosodic morphemes evade much of the grammar in characteristic ways. The presence of markedness is relatively straightforwardly accounted for by lexical specification, but enhanced unmarkedness of the particular kind that we try to capture with the notion of 'privileged constraint' does not have an obvious solution. It might seem like a reranking of constraints should do the job, as assumed in Golston & Riad (2000). However, that would amount to proposing a different grammar for meter, rather than engaging a subset of the linguistic

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[18] So-called contrastive focus reduplication in English may be large, but not larger than an XP, and it is not phonologically controlled (Ghomeshi, Jackendoff, Rosen & Russel 2004). Examples are OVER-THE-HILL-over-the-hill and LIVING-TOGETHER-living-together.

[19] The place to falsify such a claim would be potential instances of root-and-pattern formations, where a prosodic morpheme were differently aligned in words according to the position of stress in the base, without changing the prosodic structure of the base.

[20] – I'm not saying a word without my lawyer present.
– You are the lawyer.
– Exactly, so where is my present?

grammar for meter. If the linguistic grammar stays in place we should stand a better chance of understanding, ideally predicting, what constraints should work well for enhancement or distinctive violation, respectively, in a given language.

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