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Table of Contents

| | |
|--|----------|
| Forward | 2 |
| Negative concord in multiple negative constituent configurations in Ukrainian: A minimalist approach Svitlana FILONIK | 3 – 23 |
| A cross-generational investigation of voice quality in women Sarah GREER and Stephen J. WINTERS | 24 – 48 |
| The distribution and use of <i>aahk</i> - modality in Kainai Blackfoot Blake LEWIS | 49 – 63 |
| Learning questions in an L2: Koreans learning English question intonation Danica MACDONALD | 64 – 80 |
| A comparison of Japanese and Blackfoot final vowel devoicing Rosalind ST. GODDARD | 81 – 96 |
| The distribution of Irish locatives (<i>seo, sin, siúd</i>): DP, AP, or other? Joseph W. WINDSOR | 97 – 116 |

Forward

The Calgary Working Papers in Linguistics (CWPL: [k^wup!]) represents current ongoing research in any area of linguistics associated with the University of Calgary. Work presented in this journal often raises as many questions as it answers, but is indicative of the progress being made by researchers at any level in our program – from our undergraduate students, graduate students, post-docs, and faculty.

Articles which have been received are reviewed by a minimum of two editors who select the articles for publication based on completeness, the questions asked, and on the criterion that the article is representative of work-in-progress. As such, many of the articles in this journal may offer a conclusion based on the specific research question undertaken at the time, but will conclude with directions for future research; asking questions which need to be further studied; or, hypothesizing what the ramifications the current analysis has for theory which still needs to be extended to other languages for cross-linguistic support. Because the articles published here are part of on-going projects (many of which are various theses in progress), it is worthwhile to note that the arguments put forward in these articles are representative of the thinking of the author at the time it was written, and may since have changed as new evidence has been found. For these reasons, we encourage you, the reader, to contact the authors if you are working on something similar and ask questions about their research, whether it has taken new turns, if there are any new developments, or to offer suggestions on where to go from here or how to investigate some of the questions that they pose for future research.

Negative Concord in multiple negative constituent configurations in Ukrainian: A minimalist approach

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Abstract

This study provides a minimalist account of derivation and interpretation of Ukrainian multiple negative constituent configurations, which have a Negative Concord (NC) reading. I argue that negative constituents, i.e., *n*-words, are Negative Quantifiers rather than Negative Polarity mechanisms, and provide an analysis of the mechanisms for checking their uninterpretable [NEG] features against the interpretable [NEG] features of the negative particle in structures with different word order. This analysis led me to the conclusion that both the operations Move/Move F and the operation Attract can adequately account for the considered Ukrainian data, while fitting into the economical mechanism of the Minimalist Program. However, I relied on the analysis of feature checking via the operations Move/Move F in the course of my further discussion on two approaches to interpretation of multiple negative constituents in NC languages. In this discussion, I used Ukrainian data to argue for the approach proposed by Brown (1999), which relies on the notions of indefinites as variables, feature deletion, copies, and reconstruction, as opposed to the approach proposed by Haegeman & Zanuttini (1991) and Haegeman (1995), which relies on the notion of Negative Absorption. Finally, I discovered that while differing in many respects from some NC languages, like Italian and West Flemish, Ukrainian NC configurations are derived and interpreted in the same way as those in other Slavic languages, namely Russian and Serbian/Croatian.

1. Introduction

The aim of this paper is to analyse Ukrainian data exhibiting Negative Concord (NC) in the framework of the Minimalist Program and argue for the previous analysis of NC provided by Brown (1995) for Russian. In order to achieve this aim I will fulfill the following tasks: (i) discuss the alternative approaches to treatment of *n*-words (as Negative Polarity Items, on the one hand, and as Negative Quantifiers, on the other hand) and provide evidence from Ukrainian in favour of one of the approaches (treatment of *n*-words as Negative Quantifiers); (ii) investigate which of the two alternative approaches to feature checking (the operation Agree or the operations Move/Move F) can better account for the derivation of Ukrainian NC structures which demonstrate different word order patterns; and (iii) discuss the alternative approaches to interpretation of Ukrainian constructions exhibiting NC (one based on the notion of Negative Absorption and another one based on the notions of indefinites as variables, as well as notions of feature deletion, copies, and reconstruction) and argue for one of these approaches. Ultimately, I argue that *n*-words are Negative Quantifiers, not NPIs. The above mentioned tasks will be accomplished, respectively, in sections 2, 3 and 4 of this paper. A summary of the most important conclusions will be provided in section 5. Where necessary, I will make references to other languages, such as Italian, Russian, Serbian/Croatian, and West Flemish to support some of the proposed arguments or clarify some notions.

To my knowledge, the foremost work on negation in Slavic languages has focused on Serbian/Croatian (Progovac 1994) and Russian (Brown 1999). Therefore, the analysis of another representative of a Slavic language family – Ukrainian – from the perspective of the Minimalist Program is a valuable contribution to the current discussion of NC.

2. Nature of *n*-words in Ukrainian

In Ukrainian, multiple occurrences of negative constituents in a clause express a single negation, i.e. Ukrainian exhibits Negative Concord, as shown in 1¹.

(1) *Vona nikomu ničoho *(ne) rozpovidaje.*

She no-who no-what not tell.

‘She does not tell anyone anything.’

This phenomenon is also observed in a number of other Slavic languages (cp. with Russian in 2 and Serbian/Croatian in 3).

(2) *Ja nigde *(ne) rabotaju.*

I no-where not work.

‘I do not work anywhere.’

(3) *Marija *(ne) voli ni(t)ko-ga.*

Mary not loves no-who.

‘Mary does not love anyone.’

(Progovac 1994:3)

In this paper, I use the working definition for negative constituents, or *n*-words, suggested by Giannakidou (2006:328) in 4.

¹ The Ukrainian examples provided in this paper are mine.

(4) *N*-word:

An expression α is an *n*-word iff:

- a. α can be used in structures containing sentential negation or another α -expression yielding a reading equivalent to one logical negation; and
- b. α can provide a negative fragment answer.

In the case of Ukrainian, Russian and Serbian/Croatian, *can* in definition 4 can be substituted by *must*, i.e., in these languages *n*-words are strong, since they must be licensed by a clausemate negation, represented by an overt negative clitic *ne*, which is the head of NegP, as demonstrated in 1 for Ukrainian, 2 for Russian and 3 for Serbian/Croatian.

Ukrainian *n*-words do not occur in non-negative polarity environments, as shown in 5 for a Yes/No question. The sentence in 5 will be grammatical with overt clausemate sentential negation represented by *ne*, and then it only has the reading of a presumptively negative question: 'Did no one knock?'

(5) **Nixto stukav?*

No-who knocked?

'Has anyone knocked?'

All Ukrainian *n*-words are morphologically negative: they have the prefix *ni*-. This can be explained by the fact that negative constituents in Ukrainian are formed by adding the negative prefix *ni*- to a *wh*-element, as demonstrated in 6.

- (6)
- a. *ni*- + *xto* 'who' → *nixto* 'no one';
 - b. *ni*- + *de* 'where' → *nide* 'nowhere';
 - c. *ni*- + *koly* 'when' → *nikoly* 'never'.

In the literature, there has been an interesting debate regarding the status of *n*-words: they have been argued to be Negative Polarity Items, or NPIs, (Ladusaw 1980, Progovac 1994, Giannakidou 2006) or Negative Quantifiers, or NQs, (Haegeman & Zanuttini 1991, Haegeman 1995, Brown 1999). Moreover, due to the fact that negative constituents often exhibit the behaviour of both NPIs and NQs, they have also been characterized as underspecified in Van der Wouden & Zwarts (1993), i.e. it has been acknowledged that *n*-words may be ambiguous between negative and non-negative meanings. In this paper, however, I will focus on differences between the treatment of negative constituents as NPIs and NQs and attempt to provide evidence for each of these approaches below.

NPIs require some triggering environment in order to occur. According to Brown (1999), a canonical NPI licenser is clausemate negation for certain types of NPIs known as strict NPIs, i.e., English *any*-pronouns, as shown in 7. Here, the NPI *anything* is licensed by the negative particle *not*. However, certain (non-strict) NPIs can occur in other polarity environments as well, including superordinate negation, Yes/No questions, conditionals or adversative predicates, i.e., the Italian negative constituent *nessuno* in 8. Here, *nessuno* does not occur in negative polarity environment, but is licensed by the Yes/No operator. As shown in 5 above, this is not true for Ukrainian, i.e., the Yes/No operator does not license Ukrainian *n*-words.

(7) *I do not see anything.*

(8) *Ha telefonato nessuno?*

Has called no one
'Has anyone called?'

(Brown 1999:21)

Negative Quantifiers, on the other hand, are considered to be inherently negative, having independent negative force and expressing negation without any other overt negative element present. Typical NQ behaviour is seen in certain configurations with sentential negation, as shown in 9, or elliptically, as an answer to a question, as in 10, both with an English no-NQ.

(9) *I have said **nothing**.*

(Brown 1999:22)

(10) *'Who did you see?' 'No one.'*

(Brown 1999:23)

Another piece of evidence in support of treating *n*-words as NQs comes from West Flemish. Brown cites Haegeman & Zanuttini (1996) and provides the example in 11, where the negative constituent negates a clause of its own.

(11) *da Valère niemand kent*

that Valère nobody knows
'that Valère doesn't know anybody'

(Brown 1999:23)

In this paper, I will follow Haegeman & Zanuttini (1991; 1996), Haegeman (1995), Haegeman & Zanuttini (1996) and Brown (1999) assuming that *n*-words are NQs. Below I provide the evidence from Ukrainian to show that in certain contexts *n*-words behave like NQs. First, Ukrainian *n*-words can carry negative force on their own when used in elliptical expressions, as in 12.

(12) *'Komu ty rozpoviv?' 'Nikomu.'*

whom you told no-whom
'Who did you tell?' 'No one.'

Second, according to Brown (1999), NQs can be modified by certain adverbs, such as *almost*, but NPIs cannot. In Ukrainian, the *n*-word *ničoho* 'nothing' can be modified by *majže* 'almost', as demonstrated in 13.

- (13) *Ja ne jila majže ničoho.*
I not ate almost no-what.
'I ate almost nothing.'

In this section, I have provided some description of *n*-words and their properties in Ukrainian, as well as explained the differences in treating negative constituents as, on the one hand, NPIs or, on the other hand, NQs. Since negative constituents often exhibit the behaviour of both NPIs and Negative Quantifiers, it is difficult to support only one side in the ongoing debate regarding the status of *n*-words. However, taking into account the data considered, I argue that Ukrainian *n*-words are NQs.

3. Feature checking in Ukrainian NC structures

According to Brown (1999), in certain languages that exhibit NC, every *n*-word has an uninterpretable [NEG] feature, while the negative particle, which presents the sentence negation, has an interpretable [NEG] feature. I assume that Ukrainian is one of those languages. In order for a derivation to converge, it must meet the condition of Full Interpretation. This principle states that no uninterpretable feature can remain at the point where derivation enters the semantic component. Such features must be erased by the checking operation against the matching interpretable features. In this section, I will analyse feature checking in Ukrainian NC constructions, which display different word order, by means of two alternative mechanisms: the operations Move/Move F and the operation Agree.

The Ukrainian NC constructions that will be considered below demonstrate the following word order: an object/objects represented by an *n*-word/*n*-words preceding the main verb (as in 14), following it (as in 15) or both preceding and following the main verb (as in 16 or 17).

- (14) *Ja nikomu ničoho ne rozpovidala.*
I no-who no-what not told.
'I have not told anyone anything.'
- (15) *Ja ne rozpovidala nikomu ničoho.* (emphatic)
I not told no-who no-what.
'I have not told anyone anything.'
- (16) *Ja nikomu ne rozpovidala ničoho.* (emphatic)
I no-who not told no-what.
'I have not told anyone anything.'
- (17) *Ja ničoho ne rozpovidala nikomu.* (emphatic)
I no-what not told no-who.
'I have not told anyone anything.'

Importantly, the NC reading of Ukrainian sentences is not affected by word order permutations. However, the examples in 15–17 differ from that in 14 in that they are

emphatic, since the object/objects following the main verb is/are emphasized in Ukrainian. Thus, if one was to render Ukrainian examples in 15–17 into English, they would have to emphasize respectively *nikomu ničoho* in 15, *ničoho* in 16 and *nikomu* in 17 with the help of intonation. Such emphatic constructions are mostly used in colloquial speech and are aimed at stressing the importance of the emphasized object.

3.1. Structure of Ukrainian NegP and its place in a sentence structure

I assume, following Brown (1999), that sentential negation requires a negative phrase (NegP) as an independent functional category. As it has been stated above in this paper, empirical evidence suggests that Ukrainian requires the head of NegP to be overt (the negative particle *ne* as a proclitic on the verb), as *n*-words cannot be licensed without it.

According to Brown (1999), it is the negative particle which is the scope-bearing item and which assigns the negative force to the sentences. Negation is expressed by an abstract interpretable feature in the sublabel of Neg⁰, which being overtly realized as *ne* constitutes the Negation Phrase, as shown in 18.

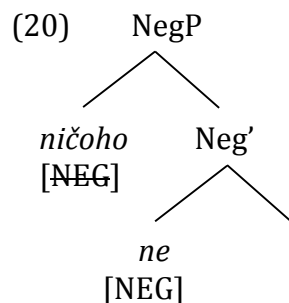
(18) Structure of NegP



(Brown 1999:26)

The Spec position will be created only when it is necessary to host some overtly raised element that contains a feature relevant for checking in its sublabel, such as the feature [NEG] of the *n*-words, as demonstrated in 20 for the Ukrainian example in 19.

- (19) *Ja ničoho ne xoču.*
 I no-what not want.
 'I don't want anything.'



Progovac (1994) observes that in Serbian/Croatian the negative particle *ne*, which expresses negation in a sentence, cliticizes to the left of the first finite verb form, whether it is an auxiliary or a main verb. This is demonstrated by the grammatical sentences in 21 and 22, in which the negative particle precedes, respectively, an auxiliary and a main verb, as well as by the ungrammatical examples in 23 and 24, in which *ne* cliticizes to the right of the finite verb form.

- (21) *Milan neće pobeći.*
 Milan not-will run-away
 'Milan will not run away.'

(Progovac 1994:34)

- (22) *Milan ne poznaje Mariju.*
 Milan not knows Mary
 'Milan does not know Mary.'

(Progovac 1994:35)

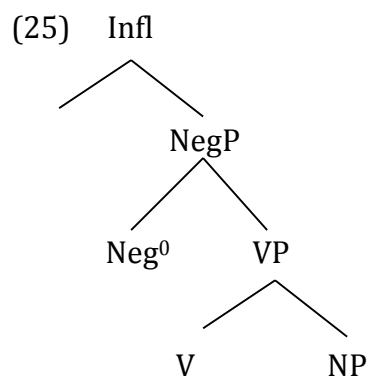
- (23) **Milan će ne pobeći.*

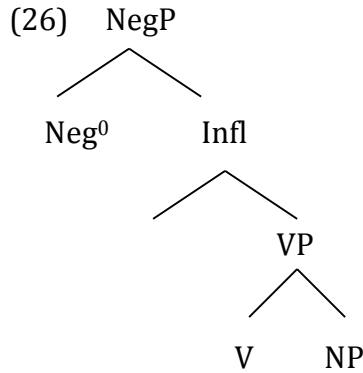
(Progovac 1994:34)

- (24) **Milan poznaje ne Mariju.*

(Progovac 1994:35)

Progovac (1994) concludes: the data in 21–24 suggest that, at least at S-Structure, negation in Serbian/Croatian is either in Infl or above Infl. In the former case, one could assume that it originates in a NegP below Infl (as shown, for example, in 25), and then moves with the verb to Infl. In the latter case, a NegP would be generated above Infl (as shown, for example, in 26).





The Serbian/Croatian data in 21–24 can be paralleled by Ukrainian examples in 27–30 below. This gives me the grounds to assume that syntactic structures including Ukrainian NegPs are the same as the ones shown to be adequate for Serbian/Croatian in 25 and 26.

(27) Ivan ne bude bihty.
 Ivan not will run
 ‘Ivan will not run.’

(28) *Ivan bude ne bihty

(29) Ivan ne znaje Halju.
 Ivan not knows Halja
 ‘Ivan does not know Halja.’

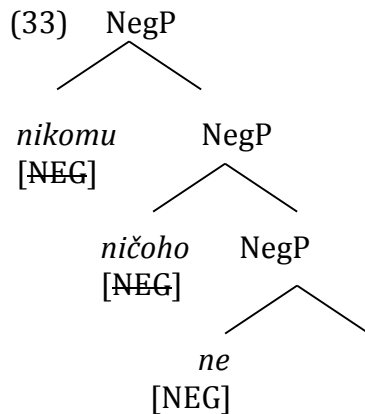
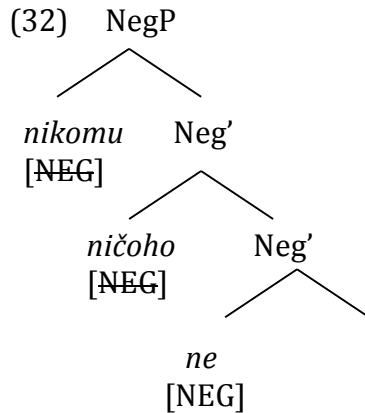
(30) *Ivan znaje ne Halju.

3.2. Feature checking via Move/Move F in Ukrainian Object–Verb, Verb–Object and Object–Verb–Object NC configurations

The [NEG] features in Ukrainian examples with multiple negative constituents can be checked in the following ways: (i) the [NEG] feature of the negative constituent raises to [SpecNegP] to check itself against the [NEG] feature of the Neg⁰ and pied-pipes the negative constituent, so that it undergoes overt movement, (ii) the negative constituent with its [NEG] feature raises to adjoin to NegP, which results in a two-segment NegP being created, and (iii) the *n*-word remains *in situ*, so that only its uninterpretable [NEG] feature raises to adjoin to a head X⁰, and a new zero-level maximal projection is created. These alternatives are demonstrated in the following analysis of double-object constructions demonstrating different word order patterns in 31, 34, and 36 with their syntactic trees represented respectively in 32–33, 35, and 37.

(31) *Ja nikomu ničoho ne rozpovidala.*
 I no-who no-what not told.
 ‘I have not told anyone anything.’

In 32, the feature checking becomes possible due to creation of Spec positions that are occupied by the *n*-words *ničoho* and *nikomu* as they raise to create checking configurations with the negative head *ne*, which has the appropriate interpretable [NEG] feature. However, 33 demonstrates an alternative syntactic tree for 31, in which the feature checking is possible due to adjunction to NegP. In this case, the *n*-words *ničoho* and *nikomu* raise to adjoin to the maximal projections NegP, as a result of which two-segment NegP projections are created.



Now let us consider an example in 34, where the *n*-words remain *in situ*.

- (34) *Ja ne rozpovidala nikomu ničoho.* (emphatic)
 I not told no-who no-what.
 'I have not told anyone anything.'

(38) **Agree**

An interpretable feature F on a syntactic object Y is checked when Y is in a c-command relation with another syntactic object Z which bears a matching feature F.

(Adger 2003:134)

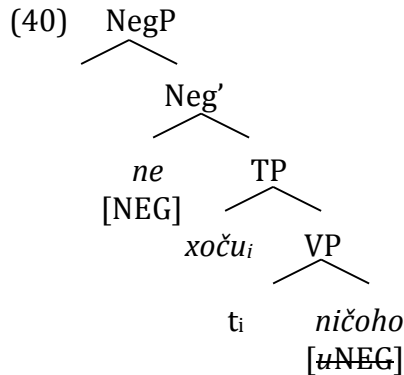
Under this approach, locality and Last Resort conditions on feature movement are appropriately translated as requirements on the matching relation between a probe (a head with uninterpretable features) and a goal (an element with matching interpretable features). A given probe examines its c-command domain in search of a goal in order to have its uninterpretable features deleted for LF purposes and specified for morphological purposes. A goal is accessible to a given probe only if there is no intervening element with the relevant set of features, i.e. the relativised minimality holds.

To illustrate how this operation works, let us consider the Ukrainian example in 39 with its syntactic tree in 40, in which the object follows the verb.

(39) *Ja ne xoču ničoho.* (emphatic)

I not want no-what.

'I do not want anything.'



Here, the *n*-word *ničoho* has an uninterpretable feature [*u*NEG], while the negative particle *ne* has an interpretable feature [NEG]. The *n*-word with its [*u*NEG] probes its c-command domain in search of a suitable goal and finds it in the Neg⁰ (represented by the particle *ne* with its [NEG]). Importantly, it is local, i.e. there is no intervening element with a [NEG] feature. Upon matching through Agree, the [*u*NEG] feature of the *n*-word is checked and deleted.

Sentences like the one in 41, which presuppose multiple [NEG] feature checking, seem to pose a problem for the operation Agree. In this case, for example, the goal *ne* (represented as X in 42) is inaccessible to the probe *ničoho* (Z in 42) because of the intervening probe *nikomu* (Y in 42), which possesses the relevant uninterpretable feature [*u*NEG]. This configuration, violating relativized minimality, is schematically presented in 42. What is more, we can assume that once the probe enters into an Agree relation with the goal, the goal becomes inactive, and therefore unable to subsequently check features of another probe.

(41) *Ja ne rozpovidala nikomu ničoho.* (emphatic)
 I not told no-who no-what.
 'I have not told anyone anything.'

(42) X ... Y ... Z
 [NEG] [*u*NEG] [*u*NEG]

However, [NEG] feature checking in 41 can be accounted for if we assume the theory of Multiple Agree proposed by Hiraiwa (2000) in 43. The cases discussed by Hiraiwa (2000) involve a single probe and multiple goals, however, Citko (2011) suggests and proves that the opposite is also possible: that Agree between two probes and one goal should also be allowed.

(43) Multiple Agree

Multiple Agree (multiple feature checking) with a single probe is a single simultaneous syntactic operation; Agree applies to all the matched goals at the same derivational point derivationally simultaneously.

(Hiraiwa 2000:69)

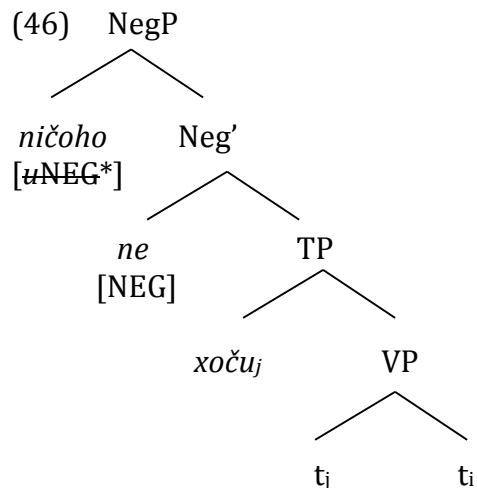
Likewise, according to Citko (2011), Multiple Agree with a single goal is a single simultaneous syntactic operation and Agree applies to all the matched probes at the same derivational point derivationally simultaneously. Thus in 41, the probes *nikomu* and *ničoho* agree with the goal *ne* simultaneously, in a single syntactic operation. Therefore, the goal is active and accessible to both probes.

Now let us consider examples in which overt movement of an *n*-word takes place. In this case, we need to take into account not only interpretability of features, but also their strength. The most obvious property of strength is that it triggers movement operations to take place. In the schematic derivations below, feature strength is represented as an asterisk after the uninterpretable feature:

(44) a. $X[*uF^**] \dots Y[F] \rightarrow X[*\cancel{uF^*}] Y[F]_i \dots t_i*$
 b. $X[F] \dots Y[*uF^**] \rightarrow X[F] Y[*\cancel{uF^*}]_i \dots t_i*$

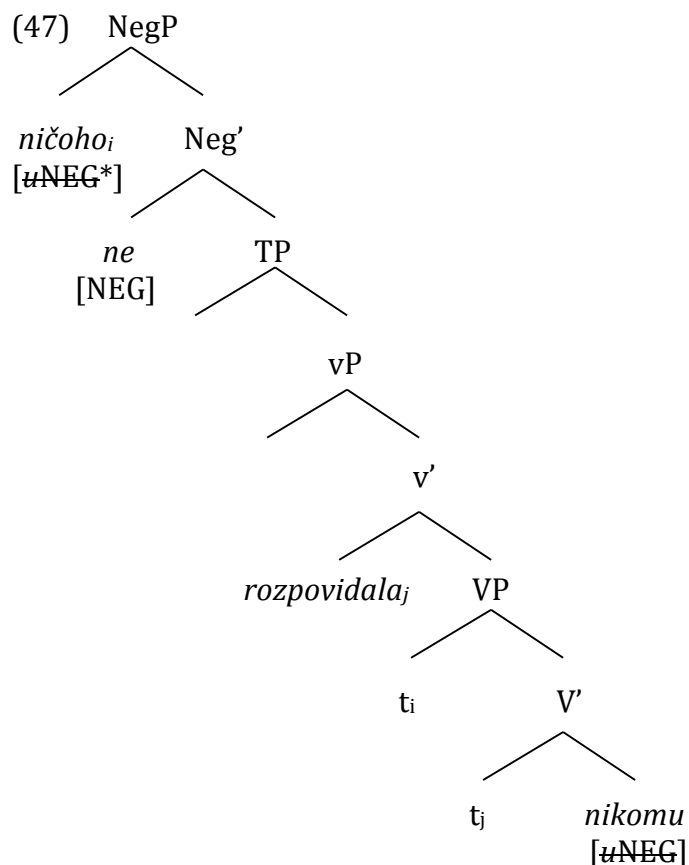
The Ukrainian example in 45 illustrates the scheme in 44b. Here, *ne* and *ničoho* are heads with matching features [NEG]. The operation Agree takes place between the [NEG] features, since the feature on *ničoho* is uninterpretable and needs to be checked. Moreover, [NEG] on *ničoho* is strong, which means that the checking has to take place locally, rather than at a distance. This triggers the operation Move, which then places *ne* and *ničoho* in a local relation, leaving behind the trace *ničoho*. As a result, the syntactic structure in 46 is derived.

(45) *Ja ničoho ne xoču.*
 I no-what not want.
 'I don't want anything.'



On the other hand, in examples that do not involve overt movement of the *n*-word, like in 39 above, the [NEG] feature of the negative constituent is weak. As a result, operation Move does not take place in such instances. The meaning of the sentence in 39 differs from the one in 45 in that it is emphatic. Thus, I can conclude that the weak feature of the *n*-word in NC sentences in Ukrainian influences the reading of a sentence, making it emphatic.

Finally, I will analyse a double object NC construction in (47) below.



In 47, the direct object precedes the verb, while the indirect object follows it. Here, the *n*-word *nikomu* with its weak [*u*NEG], after probing its c-command domain in search of a suitable goal, finds the goal in the Neg⁰, represented by the particle *ne*. Upon matching through Agree, the [*u*NEG] feature of the *n*-word is deleted. At the same time, in the same syntactic operation, the probe *ničoho*, which has a strong [*u*NEG] feature, examines its c-command in search of a goal and finally moves to be checked locally against the matching [NEG] feature of *ne*. The [*u*NEG] of *ničoho* is deleted after checking.

To conclude this section, it should be mentioned that both Move/Move F and Agree operations discussed here account for the Ukrainian data. Moreover, they both are suitable for the economical mechanism of the Minimalist Program. However, in order to argue for Brown's analysis of Russian multiple negative constituents' interpretation, which is partly based on operations Move/Move F and on which I will focus in the following section, I will support the former account (the one relying on operations Move/Move F). Importantly, the analyses outlined above can be employed when analysing Russian data as well as Ukrainian, since I have not identified any structural differences in multiple negative constituent constructions between these two languages.

4. Interpretation of Multiple Negative Constituents in Ukrainian

As it has been mentioned above, multiple occurrences of negative constituents in a clause express a single negation in Ukrainian. There are two approaches to interpretation of multiple negative constituents in NC languages: one relying on the notion of Negative Absorption (discussed by Haegeman & Zanuttini (1991) and Haegeman (1995)) and another one – relying on the notions of feature deletion, copies and reconstruction (discussed by Heim (1988) and Brown (1999)). These approaches will be analysed below.

4.1. Negative Absorption Approach

According to Haegeman & Zanuttini (1991) and Haegeman (1995) in order to ensure that multiple instances of *n*-words in a single clause express only one instance of negation once they have risen to satisfy the Neg-Criterion², they must undergo the process known as 'negative absorption'. Giannakidou (2006) explains that negative absorption allows any number of *n*-words and the sentential negation (SN) to merge into one semantic negation, as shown in 48. Here, multiple negative quantifiers amalgamate into a single negative quantifier.

(48) Negative absorption rule:

$$[\forall x \neg] [\forall y \neg] [\forall z \neg] \rightarrow [\forall x, y, z] \neg$$

(Giannakidou 2006:334)

This, according to Haegeman (1995) and Zanuttini (1991), accounts for why multiple instances of *n*-words in NC languages do not give rise to a reading of Double Negation (DN), where each negative constituent is interpreted as independently negative.

² Haegeman & Zanuttini (1991:244) define Neg-Criterion as a condition, according to which (a) each NegX⁰ must be in a Head-Spec relation with a negative operator; and (b) each negative operator must be in a Spec-Head relation with a NegX⁰.

However, in the literature, the notion of negative absorption has been deemed highly questionable. For example, Brown (1999), taking into account the postulation of negative absorption on par with *wh*-absorption, presumes that Hornstein's (1995) claim that *wh*-absorption is superfluous, and therefore incompatible with the Minimalist program, can be extended to negative absorption. One of the ways in which negative absorption is superfluous, according to Brown (1999), is that it must take place only after negative constituents have risen to [Spec, NegP] in order for the presence of multiple *n*-words to be construed as a single instance of negation. However, the presence of [Spec, NegP] is not obligatory, according to the Minimalist program. Giannakidou (1998, 2006) and Acquaviva (1997) also dismiss negative absorption, but for another reason: they reject the assumption that NC and multiple *wh*-dependencies are instances of the same phenomenon, stating that in fact there are significant asymmetries between the two and, as a result, it is inappropriate to introduce the notion of negative absorption as a parallel to *wh*-absorption. Giannakidou (2006) adds that by invoking the special rule of negative absorption, whose role appears to be particular to NC, one only further establishes the anomalous character of NC, rather than accounting for it using a mechanism for which there is independent evidence in the grammar. Furthermore, according to Ladusaw (1992), the notion of absorption also causes problems for compositional semantics, which, however, is beyond the scope of this paper.

4.2. Minimalist Approach by Brown (1999)

Brown (1999) dispenses with the need for negative absorption by proposing a minimalist analysis that exploits the notion of indefinites as variables developed by Heim (1988) and the notion of feature deletion and traces as copies put forth by Chomsky (1995). In this section, I will support Brown's analysis with the help of Ukrainian data.

Following Heim (1988), Brown (1999) proposes that each *n*-word is semantically composed of a feature [NEG] taking scope over a non-specific indefinite whose semantic content is determined by the XP denotation of its *wh*-stem. For example, *nixto* 'none' is semantically equivalent to [NOT an *x*, *x* a person] (see 49 for more examples of semantic structure of Ukrainian *n*-words).

(49) Semantic structure of Ukrainian *n*-words

| # | N-word | Semantic structure |
|----|--------------------------------------|--------------------|
| 1. | <i>nixto</i> no-who 'none' | [NEG] [x a PERSON] |
| 2. | <i>niščo</i> no-what 'nothing' | [NEG] [x a THING] |
| 3. | <i>nide</i> no-where 'nowhere' | [NEG] [x a PLACE] |
| 4. | <i>nikoly</i> no-when 'never' | [NEG] [x a TIME] |

| | | |
|----|---------------------------------------|-----------------|
| 5. | <i>nijak</i> no-how 'in no way' | [NEG] [x a WAY] |
|----|---------------------------------------|-----------------|

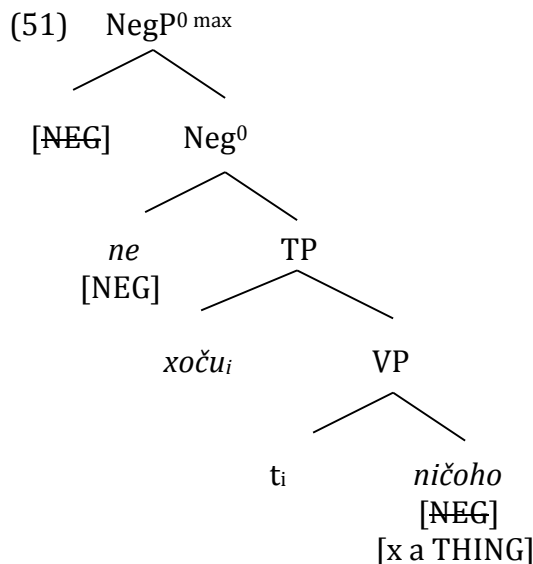
As discussed in section 3, Brown (1999) suggests that in the process of a derivation containing instances of multiple negation, either the entire negative constituent raises to check the [NEG] feature, or the abstract feature [NEG] covertly raises to adjoin to the head of NegP for checking. Once checked, the [NEG] feature is deleted. Brown (1999) proceeds with her analysis by stating that once the [NEG] feature of the *n*-word has been deleted, the still present [NEG] feature of Neg⁰ is interpreted as negative closure of events, i.e. the sentential negation, and the *n*-words are interpreted as indefinites in the domain of existential closure, i.e. the VP.

I have schematically represented this procedure by providing the syntactic tree in 51 for the Ukrainian example in 50. Here, *ničoho* 'nothing' remains *in situ* at Spell-Out, and only its abstract feature [NEG] raises covertly to adjoin to Neg⁰ to be checked against its interpretable [NEG] feature. Once the uninterpretable [NEG] feature is checked, it is deleted (the [NEG] feature of the lower copy is also deleted, since it is not needed there for checking purposes). This leaves the *wh*-stem *in situ* representing the non-specific indefinite: [x a THING]. The negative closure of events in this sentence is induced by the still present [NEG] feature of Neg⁰. The syntactic structure in 51 can be represented by the logical formula paraphrased in 52.

(50) *Ja ne xoču ničoho.*

I not want no-what.

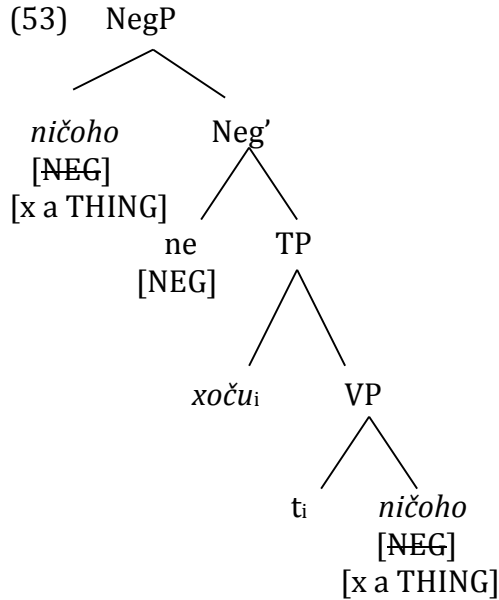
'I do not want anything.'



In example 51, there is no event of wanting, such that there is a thing *x* and I want *x*.

The Ukrainian example in 52, unlike one in 50, involves an overt movement of a negative constituent. As demonstrated in the syntactic tree in 53, the *n*-word *ničoho* raises to [Spec, NegP] and leaves behind a copy in its base-generated position.

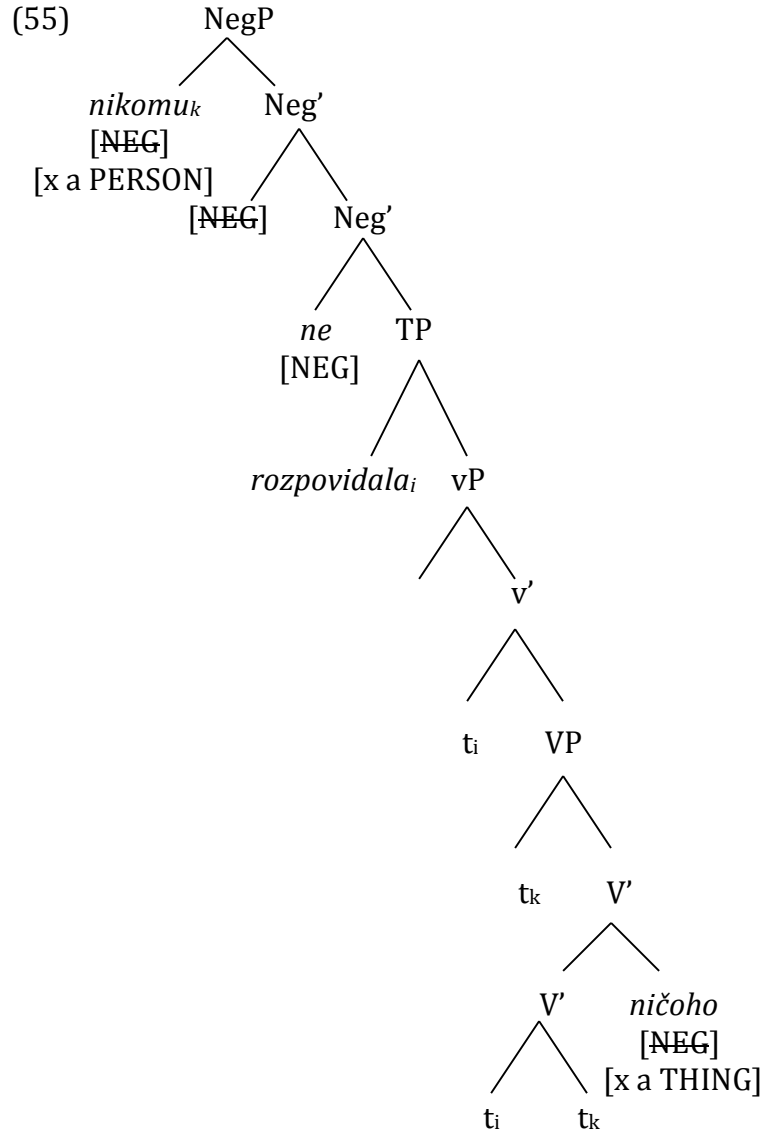
- (52) *Ja ničoho ne xoču.*
 I no-what not want.
 'I do not want anything.'



Both copies at some pre-deletion point in the derivation have the following semantic structure: [NEG] [x a THING]. The [NEG] feature of the lower copy deletes, since it is not required there for checking purposes. The higher [NEG] feature then checks itself against the interpretable [NEG] feature of the Neg⁰ and is itself deleted. The lower copy, as an indefinite, represents a variable bound by existential closure (here, [x a THING]). Brown (1999) notes that it can also be viewed as a type of post-Spell-Out reconstruction. The *n*-word raises to have its uninterpretable [NEG] feature checked in a Spec-head relation with the [NEG] feature of the Neg⁰, but the remaining indefinite is a variable that needs to be bound. Therefore, the moved constituent is forced by LF interpretability to reconstruct to its base-generated position inside the VP and receive the proper existential interpretation.

In a similar way, multiple *n*-words can raise overtly or remain *in situ*. In any case, their [NEG] features are checked and deleted, and their copies *in situ* are interpreted as indefinites in the domain of existential closure. Let us consider the double-object construction in 54, in which the objects are represented by *n*-words. As shown in 55, in this case the direct object *ničoho* remains *in situ*, only its [NEG] feature raising to be checked, while the indirect object *nikomu* raises overtly to [Spec, NegP]. Once the uninterpretable feature [NEG] of the *n*-word *ničoho* has been checked, it is deleted, leaving the *wh*-stem *in situ* representing the non-specific indefinite: [x a THING]. At the same time, after the uninterpretable [NEG] feature of the raised *nikomu* is checked, it deletes, and its lower copy, whose [NEG] feature had also been deleted, represents a variable bound by existential closure: [x a PERSON]. The negative closure of events in this sentence is induced by the still present [NEG] feature of Neg⁰.

- (54) *Ja nikomu ne rozpovidala ničoho.* (emphatic)
 I no-who NEG told no-what.
 'I have not told anyone anything.'



By making use of feature deletion and traces as copies, one dispenses with the need for negative absorption. The feature *[NEG]* of an *n*-word is deleted for independent reasons, leaving no superfluous *[NEG]* features, while reconstruction back to its VP internal position allows the lower copy to be interpreted as an existential. The string of existential quantifiers in instances of multiple negative constituents with the overt negative head *ne* receives the reading of a single negation in NC languages. One particular advantage of this approach introduced by Brown (1999) is that it accounts for the data, unifying the intuitions of negative absorption with the economical mechanism for feature deletion in the Minimalist program.

5. Conclusion

In this paper, I contributed some insights into the current discussion on negation by analysing Ukrainian data that exhibits the Negative Concord (the phenomenon of multiple negative constituents expressing only one instance of negation). I believe that my findings and conclusions can provide valuable evidence in support of some of the previous analyses and counter-evidence against the others.

Firstly, after the discussion on the nature of Ukrainian *n*-words and approaches regarding their status, I concluded that they are Negative Quantifiers rather than Negative Polarity Items, i.e. that *n*-words in Ukrainian are inherently negative, interpreted universally, having independent negative force and capable of expressing negation without an overt trigger. However, it should be acknowledged that negative constituents may be ambiguous between negative and non-negative meanings and they often exhibit the behaviour of both NPIs and NQs.

Secondly, I discussed the derivation of Negative Concord sentences in Ukrainian from the perspective of two alternative approaches to feature checking (the operation Agree and the operation Move/Move F). Attention has been paid both to sentences in which features of the *n*-words underwent movement, and those in which the negative constituents themselves underwent overt movement, as well as to both single- and double-object constructions. In the course of the analysis, I discovered that both approaches can adequately account for the considered Ukrainian data and fit into the economical mechanism of the Minimalist Program.

Thirdly, I analysed two approaches to interpretation of multiple negative constituents in NC languages: one relies on the notion of Negative Absorption, while another one relies on the notions of indefinites as variables, feature deletion, copies and reconstruction. In the course of this discussion I used Ukrainian data to argue for the latter approach, i.e. the analysis of NC interpretation provided by Brown (1999). I concluded that the approach which I supported is more capable of satisfying the requirements of the Minimalist Program, as it accounts for all the data without using any superfluous stipulations of the alternative approach.

Finally, by comparing the interpretation of sentences with multiple negations in Ukrainian to those in other languages, I discovered that in the context of Negative Concord reading Ukrainian shares many properties with other Slavic languages, namely Russian and Serbian/Croatian. On the other hand, it differs in many respects from other NC languages, like Italian and West Flemish.

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A cross-generational investigation of voice quality in women

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Abstract

This research investigates the use of creaky voice by university-aged women and their mothers in order to answer three main questions: i. is there a specific phonetic environment where this voice quality is more likely to occur, ii. do young women use this voice quality more frequently than older women?, and iii. is creaky voice a register marker? Five mother-daughter pairs were used to help control for social and geographical dialect variation. Participants engaged in five tasks designed to compare the speech patterns of university-aged women and their mothers in different registers. A difference is hypothesized to be found in, both, the use of creaky voice cross-generationally, and between registers. Each participant read i. the Rainbow Passage, ii. a set of Harvard Sentences, and iii. a word list. These tasks were designed to provide an idea of the distribution of creaky voice in a formal discourse situation. Tasks iv. and v. are conversation tasks consisting of: a spot-the-differences picture task, and a route finding map task. These conversation tasks simulate a less formal discourse context. Annotations of the recordings were made which marked both the syllabic context in which creaky voice was produced and the length of time it was sustained at each occurrence. Using these annotations, global measurements of the usage of creaky voice were taken for each participant and compared across generations, registers and phonetic environments.

1. Introduction

This paper investigates the use of creaky voice by women in contemporary English. Typically, creaky voice quality has been associated with the diagnosis of voice disorders by speech language pathologists, yet recent studies have shown its increased use as part of an entire vocal range available to any speaker (Wolk *et al.* 2011, Gottliebson *et al.* 2006). In fact, creaky voice is such a normal voicing type that, in some tone languages (i.e., Hausa), it is used as a distinguishing feature between sounds (Ladefoged *et al.* 2010). Therefore, considering its popular manifestation among speakers of languages which do not use it to distinguish between phonemic categories, such as English, its use as a diagnostic tool among speech pathologists may be inappropriate.

Eckert (2004) conducted a socio-linguistic study investigating the use of certain characteristics present in the conversations of adolescents, such as the lexical item 'like' coupled with rising intonation, and the syntactic constructions 'I'm like...' and 'I'm all...'. It was shown that these items and constructions are "not just a random insertion," but a systematic addition that "serves to help organize the discourse" (Eckert 2004:7). Eckert (2004:6) also explains that these neologisms are tied to social identity. Not only is it interesting to consider the possibility that an increase in the popular usage of creaky voice can be likened to the use of the aforementioned constructions, it is important. Just as Eckert's (2004) study showed the correlation between identity and specific syntactic constructions, voice quality has likewise been correlated with socio-linguistic tendencies related to class (Laver 1980, Esling 1978, Trudgill 1974). Esling (1978) found that creaky voice was used more prevalently among those with higher social status in Edinburgh as opposed to the whispery or harsh voicing used among those with lower status. Beyond being a social marker, Laver (1980:1) describes an individual's voice as "an audible index of his identity, personality and mood." Divorcing speech acts from the discourse situations in which they occur, or the intonation and voice qualities with which they are produced, robs the researcher of a myriad of information that is contained within these extra-linguistic cues. However, these so-called extra-linguistic factors can be subtle hints at deeper issues and insights into the way we function as human beings within society. Despite the evidence for the importance of voice quality to one's identity, both socially and individually, very little work has been done on the use of different voice qualities used in dialogue.

This study looks at the usage of a specific voice quality, creaky voice, cross-generationally by mother-daughter pairs. The primary purpose of this study is to ascertain whether there is a difference in the usage of creaky voice both (i) between generations and (ii) between registers. The term *register* is generally used to refer to a variety of language that is interlocutor and context-dependent, such as that used in an informal discourse context versus a formal discourse context. For example, a student may use slang with other students, but then choose a less vernacular vocabulary when speaking to a professor (Platt & Platt 1975, Gregory & Carroll 1978). This is the definition assumed for this study. The secondary purpose of this study is to test whether there is a specific phonetic environment in which creaky voice is more likely to occur. For example, creaky voice is expected to be found in vowel articulation, but is it more likely to occur with liquids and glides than with nasals, or vice versa, and in which syllable position?

The remainder of this section serves to achieve three goals: To give a brief overview of the anatomy of the larynx; to outline the mechanics of voicing; and to describe the different voice qualities with which this study is concerned.

1.1 The Mechanics of Voicing

The airflow expelled from the lungs is essential to phonation. The pressure with which air is expelled from the lungs, in combination with the position of the vocal folds, also affects the manner in which the vocal folds vibrate and, thus, the resulting voice quality. There are a number of theories about vocal fold vibration such as: vibrating string theory, neurochordal theory, aerodynamic theory, myoelastic theory, muco-viscose, and flow-separation theories (Reetz & Jongman 2009).

A cycle of phonation, according to the aerodynamic and myoelastic theories, can be explained as follows: The first step in a single cycle of voicing is for the lateral cricoarytenoid muscles to tense causing the arytenoids to tilt down and inward, positioning the vocal folds for phonation (see Reetz & Jongman 2009: chapter 5 for an overview of the aforementioned theories). Airflow from the lungs forces the lower end of the vocal folds to open first and then, when the upper end of the vocal folds open, the *Bernoulli effect* kicks in. The Bernoulli effect emerges when a stream of particles flows through a narrow constriction. Within the constriction, the velocity of the air increases, which causes a drop in air pressure. This is important in phonation because the decrease in air pressure within the vocal folds, which form the constriction, creates a suction effect which pulls the vocal folds back together again. It is at this time, when the vocal folds come together, that the acoustic magic of phonation occurs (Reetz & Jongman 2009, Laver 1980). When the lower end of the folds are fully adducted, the upper end quickly follows suit. This closure allows for a build up of sub-glottal pressure and the cycle repeats itself (Reetz & Jongman 2009, Laver 1980).

It is this process, involving the position of the vocal folds and the air stream from the lungs, which allows for the occurrence of phonation. So then, what is the difference between a baby's cry and the singing of an aria? The answer lies in the setting of parameters. As mentioned above, when one of these parameters changes, the result is a change in phonation, or voice quality.

1.2 Voice Qualities and Their Characteristics

There are many voice qualities and a number of factors contribute to the differences in their production. These factors include: i. *sub-glottal pressure*, ii. *medial compression*, iii. *adductive tension*, and iv. *longitudinal tension*. This sub-section begins by defining these factors and then briefly describes the differences in pressure, compression and tension that are characteristic of three distinct voice qualities: breathy, modal and creaky.

As mentioned in the previous section, sub-glottal pressure, factor one, refers to the air pressure below the vocal folds in the sub-glottal system (the lungs). Medial compression, factor two, describes "the compressional pressure on the vocal processes of the arytenoid cartilages achieved by constriction of the lateral cricoarytenoid muscles and reinforced by tension in the lateral parts of the thyroarytenoid muscles" (Laver 1980:108). In other words, medial compression refers to how tightly the vocal folds are pressed together. The vocal folds themselves have some form of medial compression inherent in

their musculature. Medial compression can be adjusted through the tensing of the thyroarytenoids, which move the arytenoid cartilages toward the thyroid, and the lateral cricoarytenoids, which cause adduction of the vocal folds (Laver 1980). Factor three, adductive tension, refers to how tightly the arytenoid cartilages are pressed together. Though the action of pressing the arytenoid cartilages together does bring the posterior end of the vocal folds together, adductive tension should not be confused with medial compression. This distinction is important because the arytenoid cartilages can remain open even when there is high medial compression on the vocal folds. For this reason, the section of the vocal folds attached to, and adducted by the arytenoid cartilages can be referred to as the *cartilaginous glottis* and the length of the folds, that run from the arytenoid cartilages to the thyroid cartilage can be referred to as the *ligamental glottis* (Laver 1980:107-108). Together, they make up the *full glottis* (Laver 1980:110). Adductive tension is increased by tensing the lateral cricoarytenoids and the transverse arytenoid muscles (Laver 1980). Longitudinal tension, factor four, is considered high when the vocal folds are stretched and low when they are relatively slack. The main factors in determining longitudinal tension are the vocalis muscles, the cricoid and thyroid cartilages, and the cricothyroid muscles (Laver 1980).

Modal voice, sometimes referred to as a “neutral mode of phonation” is characterized by regular vibration along all or most of the vocal folds (Laver 1980:110). There is low longitudinal tension, meaning the folds are shorter and thicker for the production of this type of phonation, and the other three factors, adductive tension, medial compression, and airflow, are all moderate. An increase in longitudinal tension in modal voice corresponds to an increase in pitch.

Breathy voice is produced with partial adduction along most or all of the length of the vocal folds (Reetz & Jongman 2009, Laver 1980). This means that adductive tension and medial compression are both low for this phonation type. Breathy voice, as its name suggests, has high airflow and the longitudinal tension can vary to adjust the pitch.

Creaky voice is characterized by irregular vibration of the vocal folds and occurs at the lower end of the F0 range. The irregularity in the vibration is caused by a combination of low sub-glottal pressure, high adductive tension along the cartilaginous glottis, and low longitudinal tension at the anterior end of the folds with high medial compression along the ligamental glottis (Ladefoged & Johnson 2010, Reetz & Jongman 2009, Laver 1980).

2. Methodology

As mentioned in the previous section, this study asks three questions: i. is there a cross-generational difference in the use of creaky voice among women; ii. is there a register difference in the use of creaky voice among women; and, iii. is there a phonetic environment in which creaky voice is more likely to occur? To address these questions, five mother-daughter pairs were audio-recorded while performing a series of reading and conversation tasks. The difference in task (reading versus conversation) is meant to represent a register change – formal versus informal, respectively. Cross-generational and cross-register differences are both expected. Based on pilot data and researcher observations, with respect to research question i., it is hypothesized that daughters will produce more creaky voice than their mothers. Regarding research question ii., it is

expected that both generations will produce more creaky voice in the informal discourse context.³ Question iii. is being explored for information purposes.

2.1 Participants

Participants for this study were female students from the University of Calgary and their mothers. A total of five mother-daughter pairs were used in this study. Each participant was paid \$20 for their participation. One mother reported a mild stutter, but no other hearing or speech impairments were reported. The reported stutter did not hinder the participant's production during any of the tasks. Ages ranged from 50 - 60 for mothers, with a mean age of 55, and 18 - 36 for daughters, with a mean age of 26. Four of the five daughters were from Alberta originally. The fifth daughter was originally from Ontario. Two of the mothers were from Alberta, two from Ontario and one from Michigan. The reported minimum length of time any one participant had lived in Calgary was four years. None of the participants were smokers. Four of the mother-daughter pairs were biologically related and one was adoptive. The purpose of choosing mother-daughter pairs for this study was to help control for dialect and socio-economic differences. This also allowed for the most direct comparison across generations.

2.2 Materials

Five tasks were used in this study – three reading tasks and two conversation tasks. The reading tasks were meant to simulate a formal discourse environment and the conversation tasks were meant to simulate an informal discourse environment. Each participant read the Rainbow Passage,⁴ a set of Harvard Sentences and a word list and then participated in a picture task (spot the differences) and a map task. For this study, the third set of Harvard Sentences was chosen at random. Both the Rainbow Passage and the Harvard Sentences are phonetically balanced standard readings which are designed to test the production of connected speech. These readings are used in a number of production and comprehension tests such as speech evaluations, studying accents, speech exercises and testing language recognition software. The word list was a set of 44 monosyllabic words with no consonant clusters, such as: *rhyme* and *yak*. The word list was compiled to further test whether there is a phonetic environment in which creaky voice is more likely to occur.

2.3 Procedures

All tasks were performed in a sound attenuated booth with the experimenter present, so as to monitor the decibel (dB) level of the recordings. The reading tasks were performed separately, with only one participant present in the booth at a time, and the conversation tasks were performed with both members of the mother-daughter pairs. That is to say, the conversation occurred between the mother-daughter pairs, and not the participants and the experimenter. For the reading tasks, participants sat facing a Mac computer screen which displayed the reading tasks using a timed PowerPoint presentation. Participants spoke into a microphone which was mounted on a stand with a pop filter in front of the microphone. After reading the Rainbow Passage, participants pressed the *enter* key once on

³ These phenomena have been part of popular discussion, but have not yet made it into the literature.

⁴ See Appendix A-E for more information about the materials.

the Mac keyboard to advance to the next slide and to start the timed presentation of the Harvard Sentences and the word list. The PowerPoint slides were set to advance at 5 second intervals for the Harvard Sentences and 3 second intervals for the word list. A timed presentation was used to help minimize list intonation and background noise, which was exhibited with the use of paper copies of the material in the pilot study.

After both participants had separately completed the reading tasks, they were both asked to enter the booth for their participation in the conversation tasks. The mother-daughter pairs sat facing each other and spoke directly into their own designated Shure SM-48 microphones, which were mounted on stands with pop filters in front of them. The microphones fed into a Computerized Speech Lab (CSL) model 4500 box for analog-to-digital conversion. Conversations were recorded in stereo using Adobe Audition and saved as .wav files for analysis.

For the picture task, each participant was presented with an image that varied in 10 different aspects. Participants were asked to use verbal skills only to locate the differences in the pictures and not to look at each other's image. They were asked to locate five of the 10 differences before finishing the task as some of the differences were too subtle to find in this manner. The purpose of not allowing the participants to see one another's image was to insure that conversation would be used to perform the task in lieu of pointing and the use of deictics, which can minimize the amount of conversation used.

For the map task, participants were given the same map, one with a route and one without. The person who received the map with the route was asked to give the other participant directions from point A to point B. Each participant took a turn being the 'navigator' with a different map. Again, participants were asked not to look at each other's image, but to use verbal skills to complete the task.

2.4 Analysis

The data collected were analyzed using Praat (Boersma & Weenink 2010). Annotations of all sound files were made using the following tiers: words, creaky, breathy, and modal. This was done so as to transcribe when each voice quality occurred. Since this study focuses on the usage of creaky voice, the creaky tier encoded further syllabic information such as onset (O), nucleus (N), coda (C), syllable boundary (.), and word boundary (#) to mark where this phonation type was occurring within the word. For example, the word 'phonation' has three syllables which orthographically correspond to '#pho.na.tion#'. Figure 1 below shows an example of the annotation used in this study.

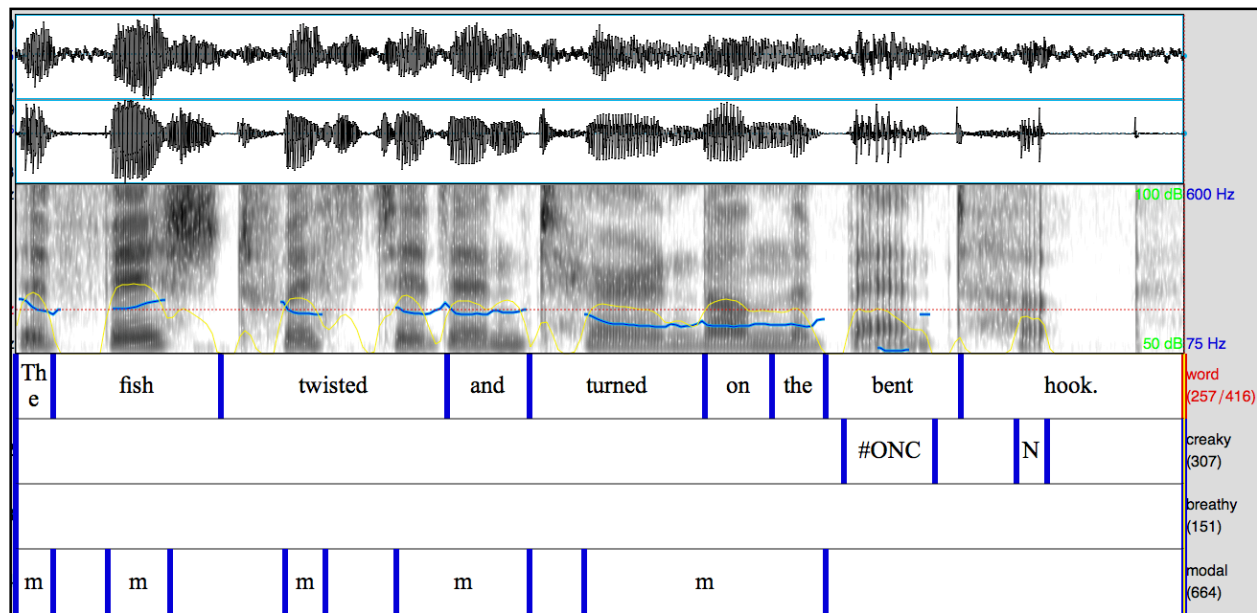


Figure 1: Notation example of Harvard Sentence, Set no. 3, sentence no. 2. This figure shows the annotation of the four tiers (words, creaky, breathy, and modal), the syllable position and phonation type.

For ease of analysis, any voice quality observed in the data that fell outside of one of the previously described voice qualities (creaky, breathy, modal), was grouped under either modal or breathy. For example, tense (or pressed) voice, any cracks, squeaks or inconsistencies that were clearly not creaky were classified as modal and marked with an 'm' inside the tier. Phrase final devoicing was classified as breathy with a 'b' inside the tier.⁵

A script was run that took global measurements of each voice quality used. That is to say, since all voiced segments were marked as one of the previously mentioned voice qualities (creaky, breathy, modal), this script measured the percentage of all voicing that was creaky, breathy, or modal. This allowed for the cross-generational and register comparison of the use of creaky voice. This same script also compiled statistics on the syllable position and segment type in which creaky voice occurred. This allowed for the analysis of the phonetic environment in which creaky voice was produced.

1. Results

3.1 Cross-Generational & Cross-Register Data

The global measurements of voice quality gave total percentages of each phonation type used during the tasks. Though the sample size was not large enough to run a sufficiently powerful statistical analysis, findings from the voice quality analysis revealed that the daughters produced 7% more creaky voice than the mothers overall. A slight register difference was found for the mothers' data in which the participants produced 2% more creaky voice overall during the conversation tasks (informal register). The data for the daughters shows a 4% cross-register difference. See Figures 2 and 3:

⁵ See Appendix F.

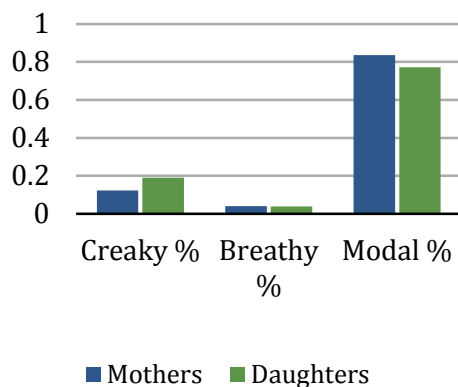
Voice Quality Comparison

Figure 2: A voice quality comparison which shows the percentage of voice qualities used in all tasks by all participants. Mothers: 12%, 4% and 84%. Daughters: 19%, 4%, 77%.

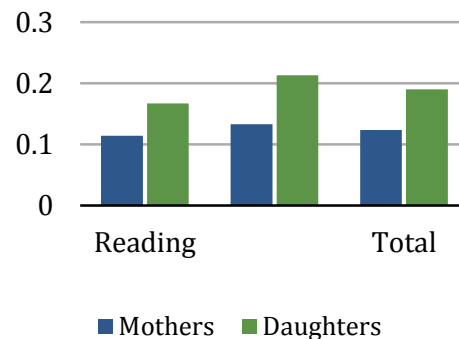
Creaky Register Comparison

Figure 3: A register comparison between tasks which shows the percentage of creaky voice used in each task by all mothers and daughters. 11%, 13%, 12%. Daughters: 17%, 21%, 19%.

Figure 3 also indicates that daughters produced 6% more creaky voice in reading tasks (formal register) and 8% more in conversation tasks (informal register) than the mothers.

Within each of the mother-daughter pairs, there was quite a lot of variation in the production of creaky voice. Figures 4-6 summarize this data:

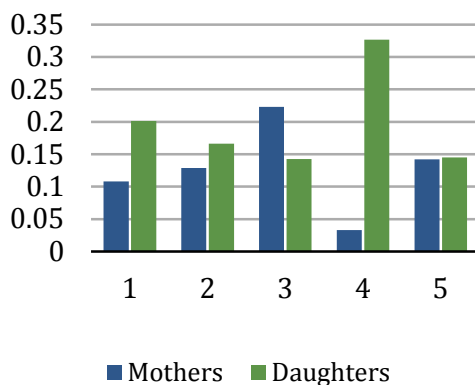
Pairs - Creaky Total

Figure 4: A mother-daughter pair comparison which shows the percentage of creaky voice used in all tasks by each mother and daughter. (1): 11%, 20%. (2): 13%, 17%. (3): 22%, 12%. (4): 3%, 32%. (5): 14%, 15%.

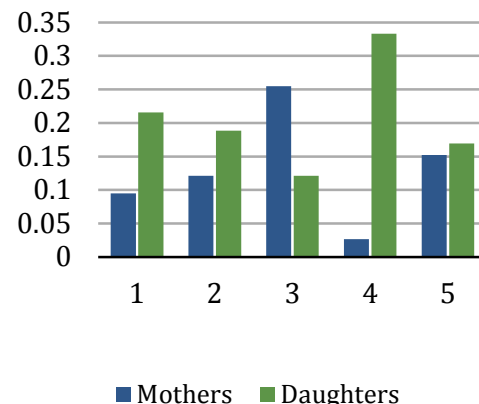
Pairs - Conversation Tasks

Figure 5: A mother-daughter pair comparison of conversation tasks which shows the percentage of creaky voice used in conversation tasks by each mother and daughter. (1): 10%, 22%. (2): 12%, 19%. (3): 25%, 12%. (4): 3%, 33%. (5): 15%, 7%.

Pairs - Reading Tasks

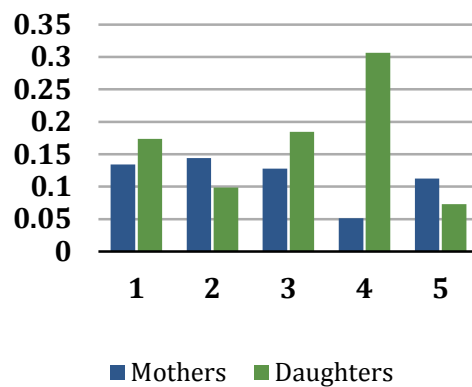


Figure 6: A mother-daughter pair comparison of reading tasks which shows the percentage of creaky voice used in reading tasks by each mother and daughter. (1): 13%, 17%. (2): 14%, 10%. (3): 12%, 18%. (4): 5%, 31%. (5): 11%, 7%.

It is interesting to note that the mothers in mother-daughter pairs 2 and 5 exhibited more creaky phonation during the reading tasks (formal discourse context) than their daughters. Also, the mother in mother-daughter pair 3 produced double the amount of creaky phonation during the conversation tasks (informal discourse context). A couple of possible points of interest from the participant questionnaires are listed here⁶: the mother from pair 3, who produced far more creaky voice than her daughter during the conversation tasks, was from Michigan; pair 4, which exhibited the greatest cross-generational difference in the use of creaky voice, was the oldest pair of the subject pool (the daughter was 36 and the mother was 60 years of age); and the mother from pair 5, which exhibited almost equal amounts of creaky voice cross-generationally, was the only mother who spoke two languages (English and French).

3.2 Syllable Position & Segmental Data

The number of occurrences of each syllable position was totaled (onset, nucleus, and coda) and then compared with the number of occurrences in which creaky voice was produced in each syllable position. Results for syllable position revealed a 6% increase in the use of creaky voice from onset position to coda position for both mothers and daughters with a 3% cross-generational difference between mothers and daughters in both onset and coda position. See Figure 7:

⁶ See Appendix G.

Creaky Syllable Position Comparison

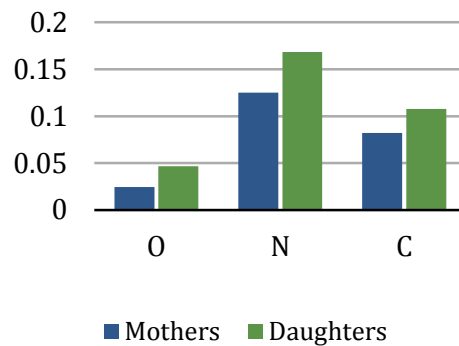


Figure 7: A syllable position comparison which shows the percentage of creaky voice used in onset (O), nucleus (N) and coda (C) positions by both mothers and daughters. (O): 2%, 5%. (N): 13%, 17%. (C): 8%, 11%.

Figures 8-12 summarize the segment data which indicate where creaky voice was produced. With respect to Figure 8, % *Creaky Stops*, a stop was included in the creaky voice portion of the annotations if creakiness was clearly heard in the formant transitions leading into or out of the stop consonant. This provides information about the immediate environment in which creaky voice took place. So, for example, in Figure 8 it can be seen that both mothers and daughters produced creaky voice before or after a [t] more frequently than any other stop consonant (7% for mothers and 8% for daughters).

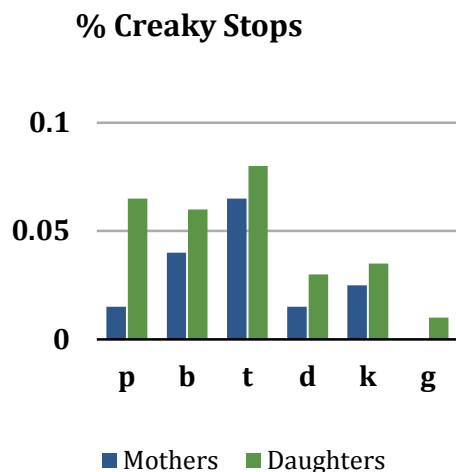


Figure 8: A segment comparison which shows the percentage of creaky voice used immediately before or after a stop consonant. [p]: 2%, 7%. [b]: 4%, 6%. [t]: 7%, 8%. [d]: 2%, 3%. [k]: 3%, 4%. [g]: 0%, 1%.

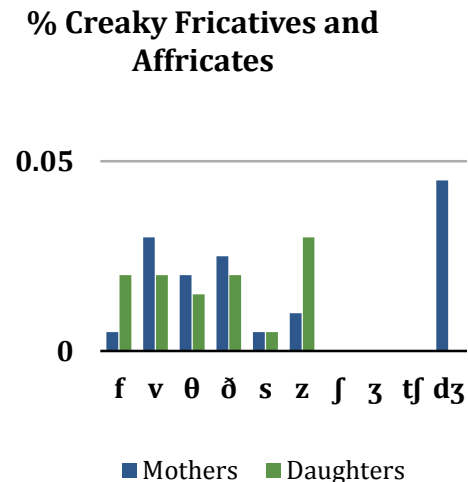


Figure 9: A segment comparison which shows the percentage of creaky voice used immediately or after fricatives and affricates. [f]: 1%, 2%. [v]: 3%, 2%. [θ]: 2%, 2%. [ð]: 3%, 2%. [s]: 1%, 1%. [z]: 1%, 3%. [ʃ]: 0%, 0%. [ʒ]: 0%, 0%. [tʃ]: 0%, 0%. [dʒ]: 5%, 0%.

Creaky voice was produced more frequently immediately before or after [p,b,t] by daughters (an average of 7% of the time) than [d, k, g] (an average of 2% of the time). Mothers produced creaky voice an average of 4% of the time before or after [p, b, t] and an average of 1% of the time before or after [d, k, g]. Both mothers and daughters produced creaky voice more frequently in the immediate environment of [t], 7% and 8% respectively. Both mothers and daughters produced the least amount of creaky voice in the immediate environment of [g], 0% and 1% respectively.

Figure 9 shows the percentage of creaky voice produced in the immediate environment of fricatives and affricates. The data shows a steady low usage of creaky voice in these environments for both mothers and daughters which range from 0-3% for fricatives. Neither mothers nor daughters produced creaky voice immediately before or after [ʃ] or [ʒ]. As Figure 9 indicates, daughters did not seem to use affricates as a 'creakable' environment, while mothers produced creaky voice only immediately before or after the voiced affricate [dʒ] 5% of the time.

Figure 10 shows the use of creaky voice during nasal consonants. Both mothers and daughters produced the most creak while articulating the alveolar [n], 11% and 14% respectively. Daughters produced creak 13% of the time with both [m] and [ŋ], while mothers produced the least amount of creak with [m] at 5%.

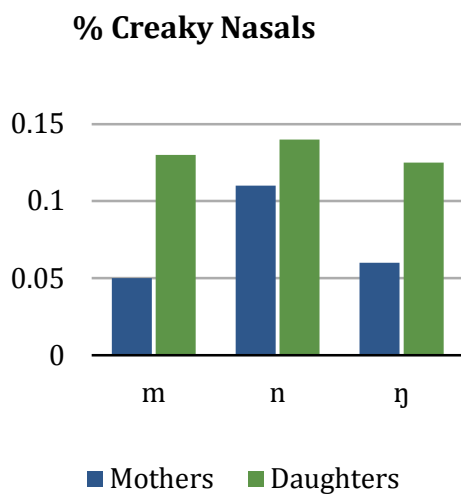


Figure 10 (left): A segment comparison which shows the percentage of creaky voice used during the articulation of nasal consonants. [m]: 5%, 13%. [n]: 11%, 14%. [ŋ]: 6%, 13%.

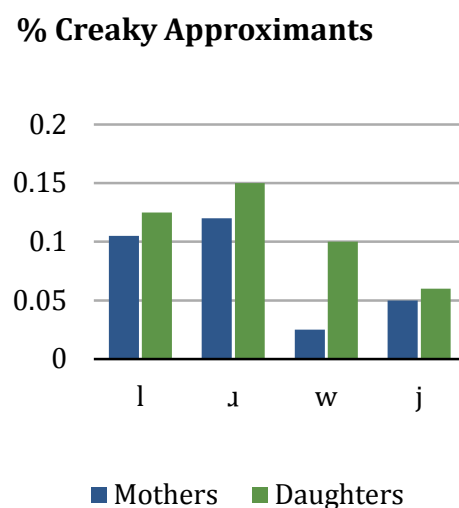


Figure 11 (right): A segment comparison which shows the percentage of creaky voice used during the articulation of approximants. [l]: 11%, 13%. [ɹ]: 12%, 15%. [w]: 3%, 10%. [j]: 5%, 6%.

Approximants are considered in Figure 11. The data shows a greater use of creaky voice during articulation of liquids for both mothers and daughters than for glides with [ɹ] showing the highest usage of creaky voice at 12% for mothers and 15% for daughters.

A comparison of low and high vowels is shown in Figure 12. Mothers produced creaky voice 6% more frequently in low vowels than in high vowels. Daughters produced creaky voice 9% more frequently in low vowels than in high vowels.

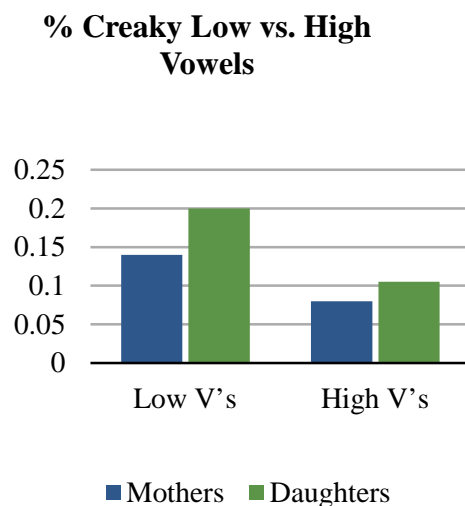


Figure 12 (left) : A segment comparison which shows the percentage of creaky voice used during the articulation of low vs. high vowels. Low V's: 14%, 20%. High V's: 8%, 11%.

4. Discussion

The data indicates support for the two hypotheses that i. university-aged women produce more creaky voice than their mothers and ii. women produce more creaky voice in an informal discourse environment than in a formal discourse environment. Here, it was found that daughters produced creaky voice 7% more frequently than mothers overall with variation within each mother-daughter pair. The results presented in Figures 4-6, which show the mother-daughter pair data, indicates that the oldest pair (pair 4) showed the greatest cross-generational difference in the use of creaky voice. One thing to consider here is the possibility that further investigations into this topic may be better served by choosing an older subject pool. With respect to the anomaly in pair 3, where the mother produced double the amount of creaky voice in the conversation tasks (informal discourse context), it would be interesting to see if Americans are more likely to exhibit this phenomenon within an older cross-generational subject pool.

The syllable position and segment data show a tendency for creaky voice to be produced more often in coda position than in onset position. In terms of the nucleus, which is where creaky voice is expected to occur, it seems there is a 'preferred' natural class among vowels where creaky voice is more likely to occur. The data showed a 6% and 9% increase for mothers and daughters respectively in the production of creaky voice during low vowels compared to high vowels. Further investigation needs to be done on this matter, but I speculate that tongue position may have a large role to play in this difference (Honda 2004).

This factor may also explain the differences found in the data for approximants. [w] and [j] correspond to the high vowels [u] and [i] respectively, which may account for the lower rate with which creaky voice was produced during their articulation in comparison with the liquids [ɹ] and [l]. That is to say, [ɹ] and [l] have been found to exhibit a more similar tongue root position to that of low vowels than high vowels (Gick *et al.* 2002). More research needs to be done on this matter to ascertain the physiological correlation between

tongue root retraction and creaky voice. For instance, does the retraction of the tongue root put muscular demands on the larynx that induces this phonation type?

This same factor, tongue position, could also explain the differences with respect to the data for stops. The velar environment [k, g] exhibited the lowest percentage of creaky voice. The tongue position for these consonants could be likened to that of high vowels. However, this poses a potential problem for the nasal stop data in which [ŋ] had a high percentage of creaky voice production. Before and after [t] was found to be the most creaked environment for stops. In English, allophonic variation is found with alveolar and glottal stops, which may partially account for this phenomenon. For example, [t] can be produced as [ʔ] before a syllabic [ŋ] as in the lexical item 'button' in RP (Received Pronunciation) (Ladefoged & Johnson 2010). It could also be argued that glottalization could co-occur with unreleased [t̚] in word final position. So, for example, the word 'spot', when produced as [spat̚] with an unreleased final [t̚], could also be undergoing glottalization at the same time as the final stop closure as in [spat̚ʔ]. If this is the case, this glottalization would account for the fact that [t] had the highest amount of creaky voice occurring before and after it. More investigation needs to be done here with respect to creaky phonation in the immediate environment of stop consonants.

5. Conclusion

There are many future directions in which this research could go. It would be interesting to see if there is a greater cross-generational difference among a slightly older subject pool. Further research could investigate the potential of this phenomenon being tied to Feminism and social identity. Female gender roles have changed and this change could not have occurred without a shift in the female identity (MacIvor 2003). If females are characteristically producing a different voice quality, one that is on the low end of their vocal range as creaky voice is, it could be a reflection of the female attempt to fit into a masculine society (MacIvor 2003). Further consideration can be made for cultures in which the Feminist movement has not taken hold to the same extent to which it has in first world countries. How would the use of creaky voice manifest itself among women of other languages whose cultures are primarily patriarchal?

As was evidenced by the data, a slight register difference was found. Future research could also investigate whether the amount of creaky phonation that is produced during discourse is interlocutor dependent. For instance, would a woman be more apt to increase her production of creaky voice when speaking to a male professor than a female one? What about a well dressed male stranger vs. a poorly dressed one? Would voice quality imitation or accommodation come into play more with an attractive conversation partner than with an unattractive one?

The mother in pair 5, who produced an almost equal amount of creaky voice as her daughter, was the only mother who spoke two languages. It would be interesting to investigate whether bilinguals exhibit more or less creaky voice than monolinguals. Or if there is a correlation between the amount of creaky voice produced and the native-language a woman speaks. For instance, would Francophones be more or less apt to produce creaky voice than Anglophones?

A phonetic environment in which creaky phonation was used more frequently was observed. This was found to be in coda position (vs. onset position), in the alveolar place of articulation for stops and nasals, in liquids (vs. glides) and in low vowels (vs. high vowels). A further look into the physiological reasons for the variation in creaky production among segments also needs to take place. Also, investigation into the glottalization of [t] could shed light on its effect on the voice quality of surrounding segments.

In sum, this study investigated the usage of creaky voice across generations and registers among women. Evidence was found to support the cross-generational variation hypothesis in which daughters produced more creaky voice than mothers. A slight register difference was also found in which creaky voice was produced more frequently in an informal discourse situation. This evidence supports the idea that voice quality is not merely an extra-linguistic factor that has little or no bearing on the way language is used. On the contrary, phonation patterns seem to be a very real part of the ebb and flow of human social interaction and communication.

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Appendix A: Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch, with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow. Throughout the centuries men have explained the rainbow in various ways. Some have accepted it as a miracle without physical explanation. The Greeks used to imagine that it was a sign from the gods to foretell war or heavy rain. The Norsemen considered the rainbow as a bridge over which the gods passed from earth to their home in the sky. Other men have tried to explain the phenomenon physically. Aristotle thought that the rainbow was caused by reflection of the sun's rays by the rain. Since then, physicists have found that it is not reflection, but refraction by the raindrops, which causes the rainbow. Many complicated ideas about the rainbow have been formed. The difference in the rainbow depends considerably upon the size of the water drops, where the width of the colored band increases as the size of the drops increase. The actual primary rainbow observed is said to be the effect of superposition of a number of bows. If the red of the second bow falls upon the green of the first, the result is to give a bow with abnormally wide yellow band, since red and green lights when mixed form yellow. This is a very common type of bow, one showing mainly red and yellow, with little or no green or blue.

Appendix B: Harvard Sentences (Set no. 3)

1. The small pup gnawed a hole in the sock.
2. The fish twisted and turned on the bent hook.
3. Press the pants and sew a button on the vest.
4. The swan dive was far short of perfect.
5. The beauty of the view stunned the young boy.
6. Two blue fish swam in the tank.
7. Her purse was full of useless trash.
8. The colt reared and threw the tall rider.
9. It snowed, rained, and hailed the same morning.
10. Read verse out loud for pleasure.

Appendix C: Word List

The following is the word list compiled. The only simple onset not used was the labio-velar glide [w].

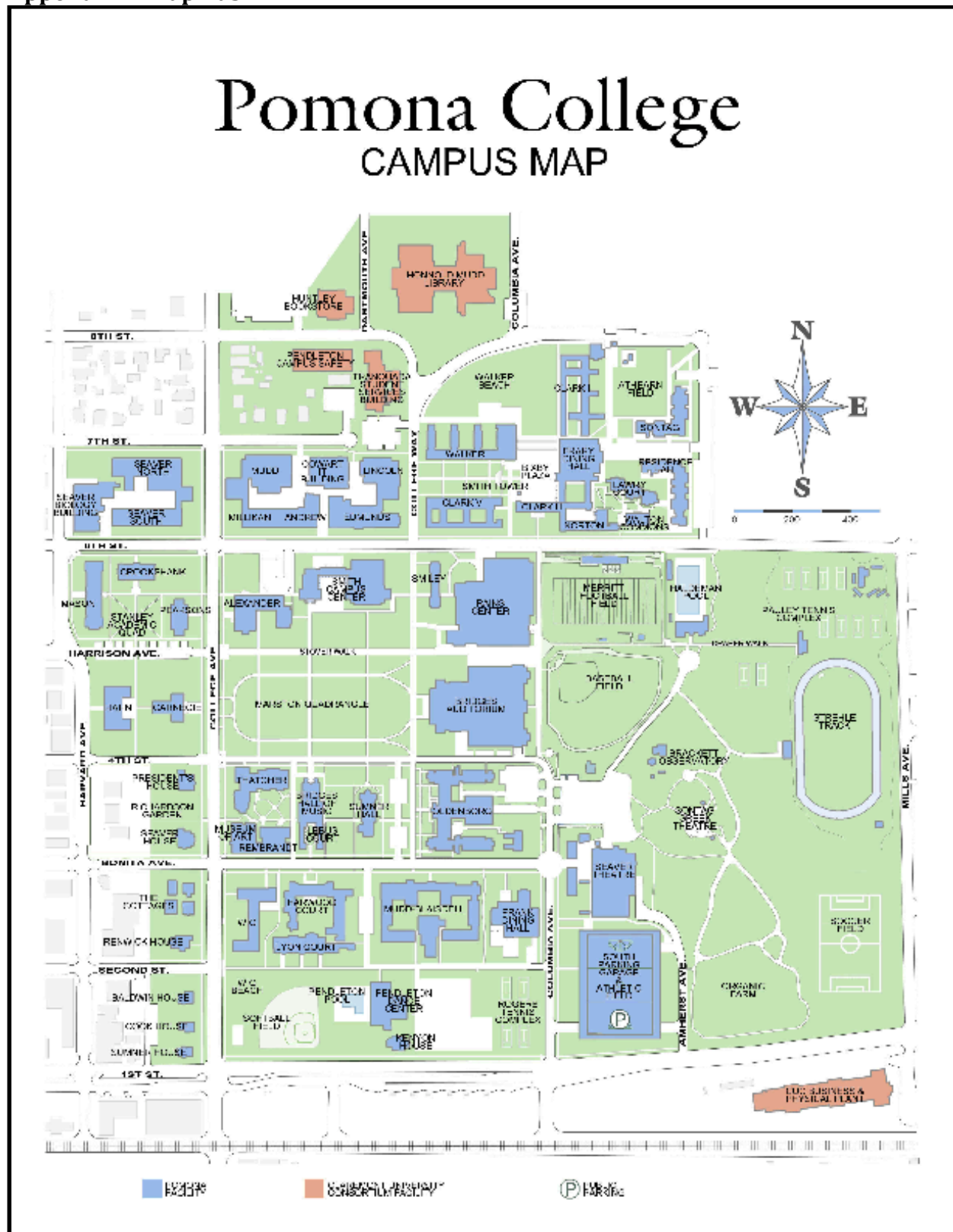
| Onset | Lexeme | Nucleus |
|------------|--------|-----------|
| Stops | | |
| [p] | pave | [eɪ] |
| | puck | [ʌ] |
| [b] | badge | [æ] |
| | boil | [oɪ] |
| [t] | tout | [aʊ] |
| | tone | [oʊ] |
| [d] | dowse | [oʊ]/[aʊ] |
| | dice | [aɪ]/[əɪ] |
| [k] | coin | [oɪ] |
| | core | [ɔ] |
| [g] | goose | [u] |
| | gull | [ʌ] |
| [ʔ] / null | own | [oʊ] |
| | out | [aʊ]/[əʊ] |
| Fricatives | | |
| [f] | fair | [eɪ] |
| | foot | [ʊ] |
| [v] | void | [oɪ] |
| | vain | [eɪ] |
| [θ] | thumb | [ʌ] |
| | thin | [ɪ] |
| [ð] | these | [i] |
| | then | [eɪ] |
| [s] | sauce | [ɑ] |
| | sob | [ɑ] |
| [z] | zeal | [i] |
| | zip | [ɪ] |
| [ʃ] | should | [o] |
| | shoot | [u] |
| [ʒ] | - | - |
| | - | - |
| [h] | hood | [ʊ] |
| | house | [aʊ]/[əʊ] |
| Affricates | | |
| [tʃ] | cheek | [i] |
| | choke | [oʊ] |
| [dʒ] | gem | [eɪ] |
| | gym | [ɪ] |
| Nasals | | |
| [m] | mauve | [oʊ]/[ɑ] |

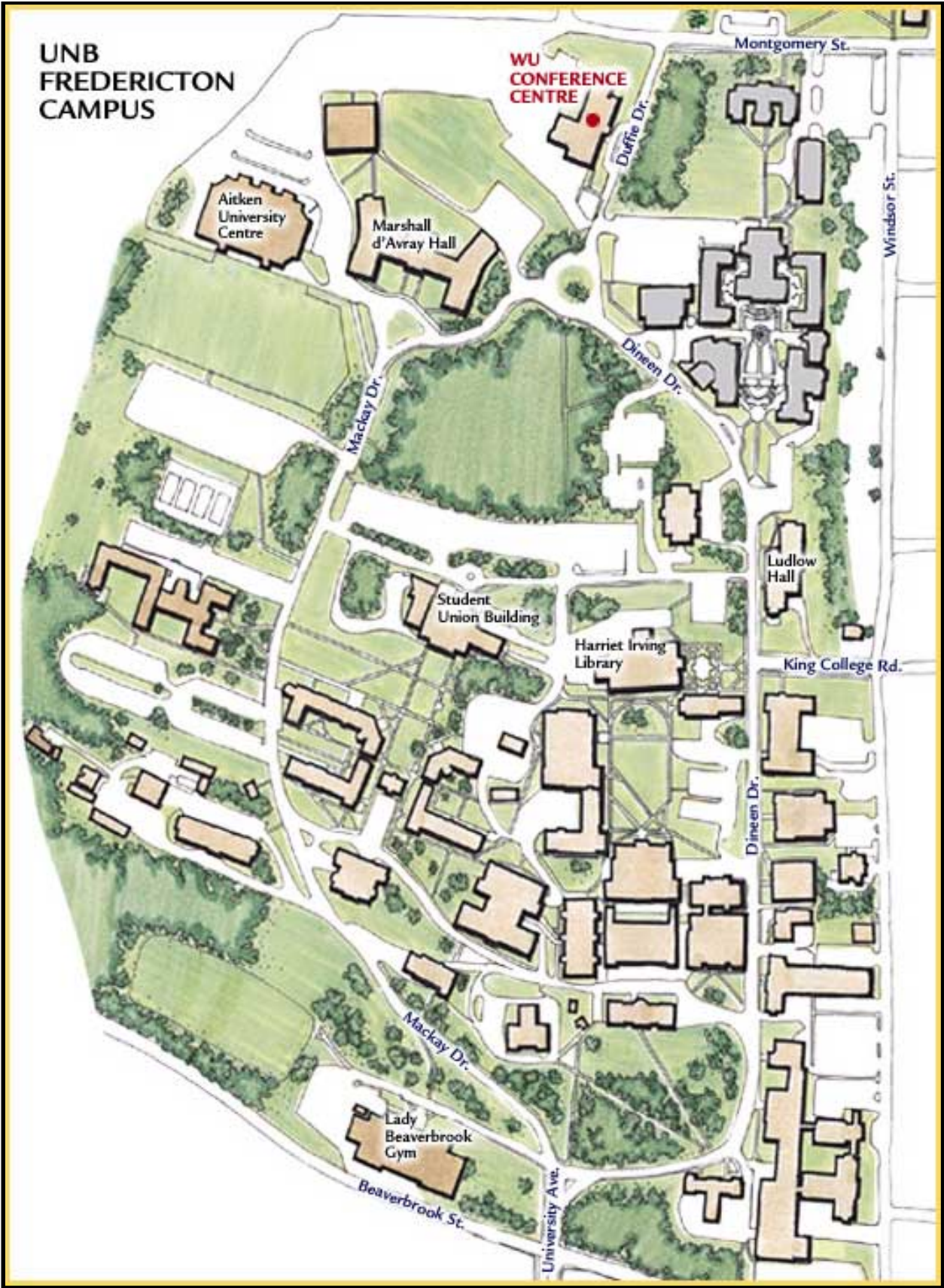
| Onset | Lexeme | Nucleus |
|---------|--------|-----------|
| | mop | [a] |
| [n] | need | [i] |
| | night | [aɪ]/[əɪ] |
| [ŋ] | - | - |
| | - | - |
| Glides | | |
| [j] | yore | [ɔ] |
| | yak | [æ] |
| Liquids | | |
| [l] | lore | [ɔ] |
| | lush | [ʌ] |
| [r] | rot | [ɑ] |
| | rhyme | [aɪ] |

Appendix D: Picture Task



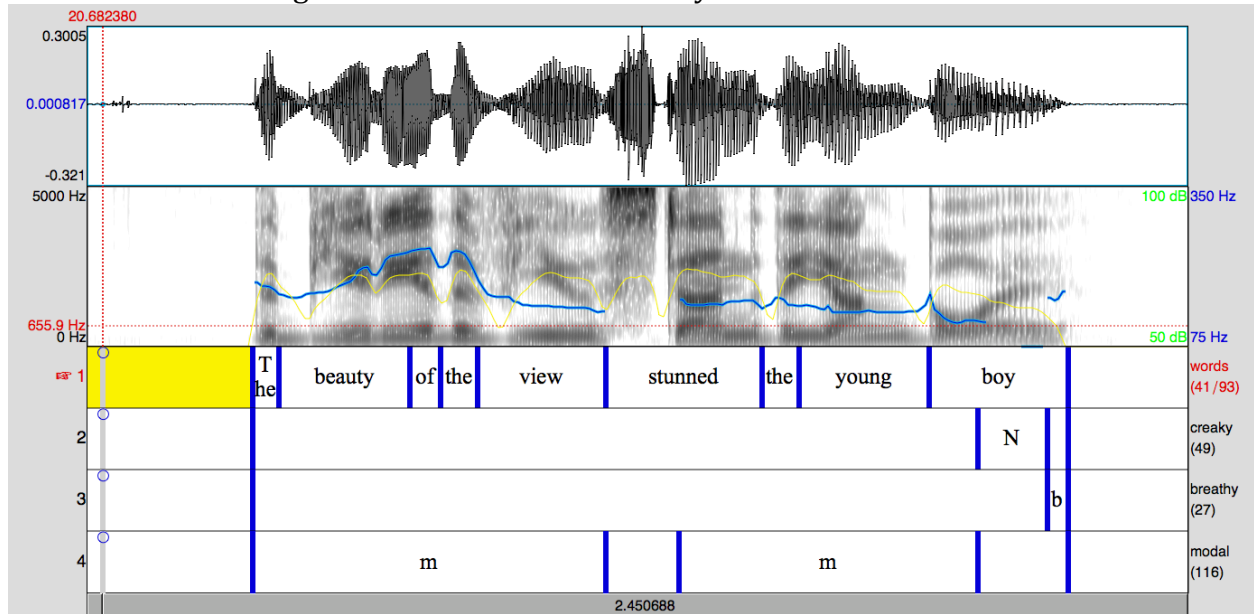
Appendix E: Map Task



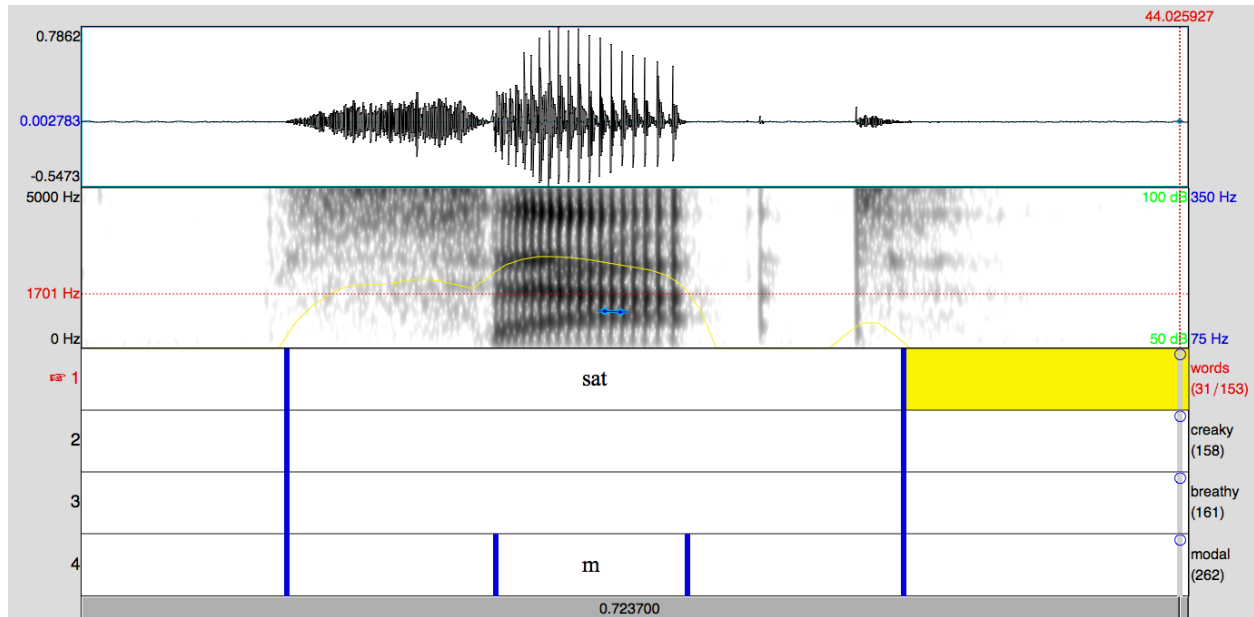


Appendix F: Other Phonation Types

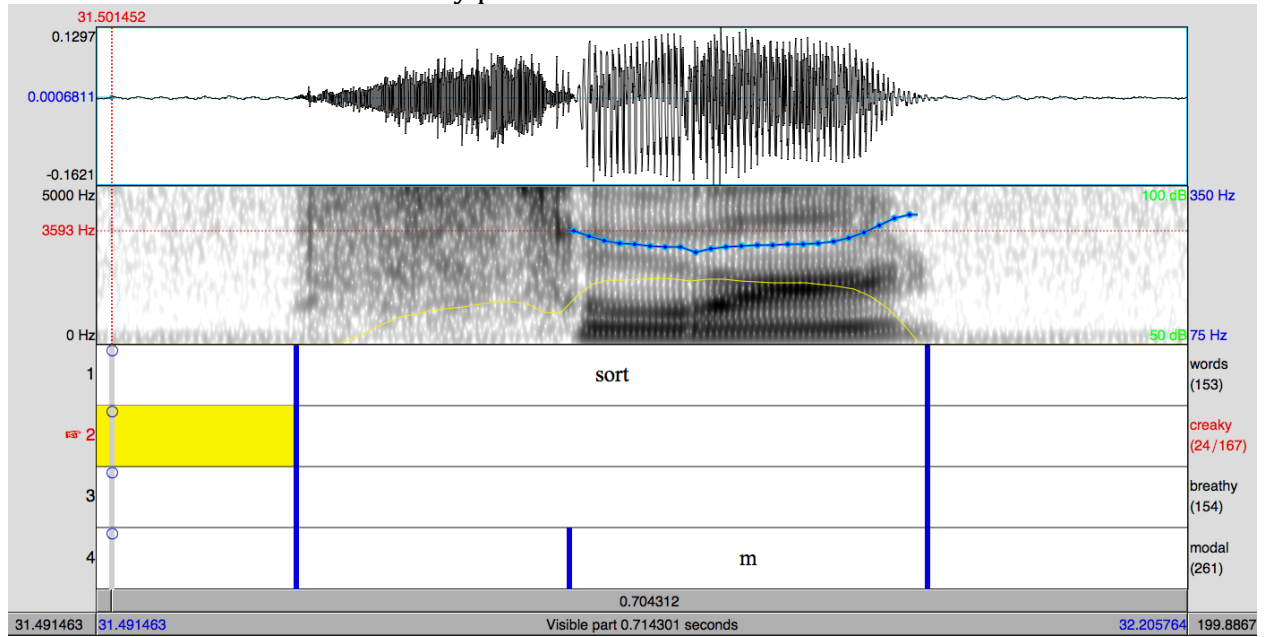
Phrase final devoicing was marked as *b* for ‘breathy’:



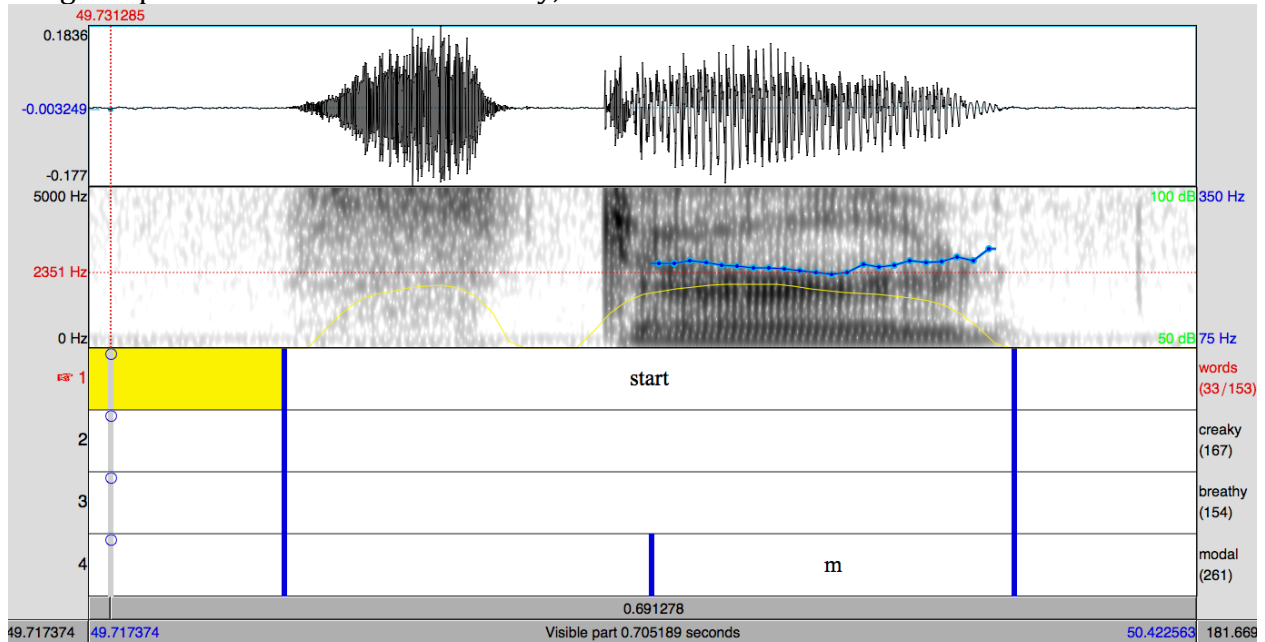
Pressed voice was labelled as *m* for ‘modal’:



Cracks were not treated as creaky phonation:



Irregular phonation that was not creaky, was marked as modal:



Appendix G: Participant Questionnaire Data

D1 = Daughter of mother-daughter pair 1, D2 = Daughter of mother-daughter pair 2...

M1 = Mother of mother-daughter pair 1, M2 = Mother of mother-daughter pair 2...

| | D1 | D2 | D3 | D4 | D5 |
|-----------------------------------|--------------------------|-------------|-------------------|------------------------------------|--|
| Age | 25 | 23 | 18 | 36 | 30 |
| From | Calgary | Calgary | Windsor | Edmonton | Calgary |
| Calgary | 25 | 23 | 5 | 16 | 20 |
| Languages | English, French | English | English | English, French | English |
| Smoker | No | No | No | No | No |
| Smoked | N/A | N/A | N/A | N/A | N/A |
| Occupation | Law Student | Student | Student | Graduate Student | Business Analyst |
| Education | BA - IR | High School | High School | BA - Honours French | Career College - Office Administration |
| Musical | flute, guitar | No | No | No | No |
| Speech/Hearing Impairments | No | No | No | No | No |
| Biological/Adoptive | Biological | Biological | Biological | Adoptive | Biological |
| | M1 | M2 | M3 | M4 | M5 |
| Age | 55 | 54 | 54 | 60 | 50 |
| From | Ontario | Calgary | Detroit | Edmonton | Ottawa |
| Calgary | 27 | 54 | 4 | 55 | 20 |
| Languages | English | English | English | English | English, French |
| Smoker | No | No | No | No | No |
| Smoked | N/A | N/A | N/A | N/A | N/A |
| Occupation | Retired Farmer | Teacher | Admin | Teacher | HR |
| Education | MEd - Reading & Language | MEd | Associates Degree | BEEd - Elem. Physical Ed, Dip. ECE | BA - Admin., Organizations |
| Musical | No | No | No | No | flute |
| Speech/Hearing Impairments | No | No | No | No | Yes - mild stutter |
| Biological/Adoptive | Biological | Biological | Biological | Adoptive | Biological |

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The Distribution and Use of *aahk*- Modality in Kainai Blackfoot

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Abstract

This study investigates the distribution and use of modality in Kainai Blackfoot in the presence of the morpheme *aahk*-. By using utterance in context tasks and judgement tasks, I elicited data from three native speakers. This study is limited to combinations of strong and weak modals of the epistemic and deontic type.

Modality that uses *aahk*- in Kainai Blackfoot consists of the combination of the morpheme *aahk*- and a second (optional) morpheme, which join as a single lexical item based on negation use and surface order. Kainai Blackfoot makes a four-way modal distinction. One distinction is between strong and weak modals and a second is made between epistemic and deontic type modals. However, the weak modals have a level of overlap and can be ambiguous.

1. Introduction

Kainai Blackfoot makes formal distinctions based on modal strength (necessity vs. possibility) and type (epistemic vs. deontic). One way that this is expressed is based on *aahk-* and its following morpheme. Frantz & Russell (2009) define the affix *aahk-* as “might/non-factive,” and Marshall (2012) references it as epistemic necessity. My data suggests that *aahk-* only expresses an epistemic possibility interpretation and I posit that Kainai Blackfoot makes a four-way modal distinction with regards to all four possibilities in its use of *aahk-* with a following morpheme within: necessity, possibility, epistemic, and deontic modality. However, epistemic possibility and deontic possibility have some overlap and can be ambiguous. By means of eliciting context sentences and judgement tasks from native speakers I will show that in Kainai Blackfoot *aahk-* makes a strong vs. weak distinction, as well as an epistemic vs. deontic type distinction. The breakdown of this paper is as follows. Section 2 discusses some background information about Kainai Blackfoot and the methodology used in this study. Section 3 shows my analysis of the data in the various contexts. Section 4 discusses judgement task sentences and the analysis of *aahk-*. Section 5 briefly compares Blackfoot modality with other languages. Section 6 concludes and provides direction for future research. The goal of this paper is to provide a description of the distribution and use of *aahk-* in Kainai Blackfoot, and to offer an analysis that gives some insight on its semantic content, which can lay the groundwork for the formal semantics of the *aahk-* morpheme.

2. Background information

2.1 Kainai Blackfoot⁷

Blackfoot is an endangered polysynthetic Algonquian language spoken in Alberta and Montana. According to Ethnologue,⁸ there are approximately 3,350 (2011 census) speakers of Blackfoot across 4 dialects. The Blackfoot data in this paper was collected in my fieldwork from three Kainai (Blood Tribe) consultants. It is important to note that this paper only focuses on Kainai Blackfoot, since other dialects of Blackfoot seem to convey modality differently (cp. Siksika *na* ‘epistemic modal marker’ Bliss & Ritter 2007).

2.2 Transcriptions

I use, where possible, the orthography developed by Donald Frantz (1978). The transcriptions use a four-line gloss made up of the pronunciation, a morpheme breakdown (based on Frantz (2009) and Frantz and Russell (1995)), a morpheme gloss, and the translation, followed by any notes including the context.

2.3 Technical details

The sessions were recorded on a Zoom H4n digital stereo recorder. I used the internal stereo microphones (set to 90 degree range for maximum isolation), the recording level was at 90 and the windsock was on the microphones. The recorder was on the field box on a table in the centre-front of the room; in the sessions the media podium and the lights

⁷ I would like to thank Issapoikoan, Ainootaa, and Ahstanskiaki for consulting with me and graciously providing the data used in this paper.

⁸ <http://www.ethnologue.com/language/bla>, Accessed March 31, 2013.

unfortunately had a buzz that could not be turned off, but it was far enough away that the noise floor was not too high.⁹

2.4 Methodology

Because this study is focused on whether Kainai Blackfoot makes some type of lexical distinction between modal strength and type, the majority of the elicited data is what Muehlbauer (2008) referred to as utterance-in-context tasks. These tasks primarily consisted of describing a situation to the consultants, presenting a sentence in English, and asking for a translation. Then the context was altered and the same English sentence was presented for translation. When modal strength was being tested in the altered context, then a word like *might* was replaced with a word such as *must*. For clarity, the contexts of each piece of data will be given when it is first introduced. An additional method of eliciting utterance-in-context was by using storyboard slides downloaded from Totem Field Storyboards (TFS Working Group 2011a, 2011b). This data was elicited by showing various images while reading a story, where the English text was not shown to the consultant. After a few read-throughs, I asked the consultant to use the pictures and to re-tell the story to me in Blackfoot. This was followed by a second (slide-by-slide) translation of the story to verify modal use. A third type of elicitation was via judgement tasks (Muehlbauer 2008). This task was accomplished in two different ways. First, by asking the consultants to re-translate their previously elicited data or to translate each other's data and then ask for the context that is required to understand the sentence. I also tried to see if certain sentences could be used in other situations. Secondly, I attempted to construct sentences where the order of certain morphemes were altered in order to examine modal surface order. This study will be limited to strong and weak epistemic and deontic modality. It is important to note that Blackfoot contains other morphemes that can express different modal types and strengths such as *noohk-* 'an opposition in truth values' (cp. Louie 2011), however, this study was limited only to morphemes that combine with *aahk-*.

2.5 Complications

As far as I can tell, no systematic work has yet been done on the modality of *aahk-*. This means the bulk of this research is entirely reliant on the data from my consultants. Secondly, possibly due to a failure to communicate the context on my part, certain judgement tasks provided inconclusive results from the speakers. This included certain negation constructions as well as quantifier scoping. For instance, the consultants asserted that there was no difference between the Blackfoot forms for 'every dog cannot kill a cat' and 'not every dog can kill a cat', and it was unclear whether this was because the two different contexts were not properly communicated, or whether the Blackfoot form truly had ambiguous scope. It was also difficult to tell whether the morpheme pairs should be glossed as a single item or not. Although I believe that the modals combining with *aahk-* form a single semantic item, I will gloss the data with the morphemes broken into separate parts for morphological reasons, and to be consistent with Frantz and Russell (1995). There was also a fair amount of elision in Issapoikoan's and, at times Ainootaa's, speech, making it entirely possible that *ohkott-* 'able' (a morpheme paired with *aahk-* in the data

⁹ The technical details were obtained through p.c. from Karsten Koch (2013).

presented below) should be read as *ohk-*, which Marshall (2012) references as a weak necessity modal. However, since the possible contrast is currently unclear, I will maintain *ohkott-* in the glosses and analysis.¹⁰

3. The distribution of *aahk-* in utterance-in-context tasks

3.1 *Aahk-* and its surrounding environment in specific contexts

The *aahk-* morpheme can either appear alone with the verb stem or followed by *ohkott-* (able), *oma-* (yet), or *sstsina-* (need) (Frantz and Russell 2009), as seen in table 1.

| Blackfoot | Possibility | Necessity |
|-----------|----------------------------------|--------------------------------|
| Epistemic | <i>aahk-</i> + (<i>ohkott</i>) | <i>aahk-</i> + <i>oma-</i> |
| Deontic | <i>aahk-</i> + <i>ohkott</i> | <i>aahk-</i> + <i>sstsina-</i> |

Table 1: Morphological realization of Blackfoot modality

The choice of the (optional) following morpheme is context dependent. Although there are other degrees of modal strength, in some languages, such as weak necessity (cp. *should* in English (Matthewson 2013)), I only elicited modal strength using the contexts of being either weak (possibility) or strong (necessity). The question of whether Blackfoot makes intermediate strength distinctions is left for future research. I define the epistemic type of modality as information where the speaker states their judgement with regards to the factual content of a proposition or context (Palmer 2001:8). I define the deontic type of modality as being based on law, permission, or obligation, which conforms to Nauze's (2009) proposal, who suggested a narrower scope of deontic modality. This degree of lexical distinction in type and strength is not the same in all languages, as will be discussed in section 5. I will now cover the modal contexts of possibility and necessity with regards to epistemic and deontic modality.

3.1 *Epistemic Possibility*

In a context where epistemic possibility is used, Kainai Blackfoot can either use *aahk-* alone or it can be followed by *ohkott-*.¹¹ When *aahk-* is used alone with the verb stem, I refer to this as a default use, since it is not affected by another modal. According to my consultants, there is no difference between *aahk-* and *aahp-*. I treat the variations as allomorphs of the same morpheme. The reason for the *aahk-* / *aahp-* alternation is unclear and no mention of *aahp-* is made by Franz & Russell (1995). For the purposes of this study, I will use *aahk-* as the basic form.

¹⁰ Any errors in the glosses are due to my own error and are not the fault of the consultants.

¹¹ I suspect that *ohkott-* is translated as 'able' in specific contexts, such as in certain epistemic possibility constructions, but a requirement in deontic possibility constructions. However, the exact usage of *ohkott-* is unclear at this time and requires further study.

- (1) maahpohtsissitapii ni soopatsis
 m-**aahk**-ohtsissitapii-(wa) ni soopatsis
 3SG-aahk-use-3SG¹² DEM chair

‘he might use the chair’

[Note: Denoting epistemic possibility.]

[Context: Two friends play a prank on someone and lock him in a room. The room has a chair inside and the locked door is made of glass. When the two friends are talking about how he will get out, the second friend, knowing that the person locked in the room is likely to use the chair, says “he might use the chair.”]

As shown in 1, *aahk*- can be used without any other morpheme between it and the verb stem. It is also acceptable to have *ohkott*- between *aahk*- and the verb stem, as seen in 2.

- (2) na imitaa aahkohtahkomimmii ni poosi¹³
 na imitaa-(wa) **aahk-ohkott**-(w)aakomimm-ii-(wa) ni poos-i
 DEM dog-3SG aahk-able-love-DIR-3SG DEM cat-4SG

‘the dog could love the cat / the dog could have loved the cat’

[Note: Denoting epistemic possibility.]

[Context: For the past week or so a man’s dog started being nice to the man’s cat, the dog even started sleeping beside the cat. Although the man is not certain, he still says to someone “the dog could love the cat.”]

The appearance of *aahk*- in an epistemic possibility reading was also evident in storyboard elicitations, as shown in 3.

- (3) saa maatsskini na poosa mahksskina
 saa maat-sskini na poos-a m-**aahk**-sskini-(wa)
 no NEG-know DEM cat-3SG 3-aahk-know-3SG

“I don’t know where your mother is... but maybe the cat knows”

[Note: Denoting epistemic possibility.]

[Context: A mouse is going around asking different animals if they saw his mother, a raven being uncertain says “I don’t know where your mother is... but maybe the cat knows.”]

(Context from TFS Working Group 2011b)

¹² Abbreviations used in this paper:

1 = 1st Person

2 = 2nd Person

3 = 3rd Person

4 = Obviative

SG = singular

DEM = Demonstrative

DIR = Direct Theme

PERF = Perfective Aspect

¹³ It is important to note that the surface forms do not always map 1-to-1 with the proposed morpheme breakdown. This may be due to allomorphy, dialectal variation, or perhaps there are other morphemes involved. The reasons are currently unclear and required further study.

3.2 Epistemic Necessity

In a context where epistemic necessity is elicited, Kainai Blackfoot always uses *aahk-* followed by *oma-* ‘yet’, as depicted in 4.

- (4) a. na imitaa aahkomwaakomimmii ni poosi
 na imitaa-(wa) **aahk-oma-**(w)aakomimm-ii-(wa) ni poos-i
 DEM dog-3SG aahk-yet-love-DIR-3SG DEM cat-4SG
 ‘the dog must love the cat’

[Note: Denoting epistemic necessity.]

[Context: For the past week or so a man’s dog started being nice to the man’s cat, the dog even started sleeping beside the cat. The man being absolutely sure of the dog’s feelings, due to his knowledge of the dog’s habits, says to someone “the dog must love the cat.”]

- b. aahkomwahtsissitapii ni soopatsis
 aahk-oma-ohtsissitapii-(wa) ni sooppatsis
 aahk-yet-use-3SG DEM chair
 ‘he must have used the chair’

[Note: Denoting epistemic necessity.]

[Context: Two friends play a prank on someone and lock him in a room. The room has a chair inside and the locked door is made of glass. When the two friends return they find the man gone, the glass door broken, and the chair in the hallway. One friend says to the other “he must have used the chair.”]

(5) Shows *aahk-oma-* in the presence of a perfective morpheme for surface order relations, which will be discussed further in section 4.

- (5) na imitaa (m)aahkomikaai’nitsii ni poosi
 na imitaa-(wa) m-**aahk-oma-**lkaa-i’nit-ii-(wa) ni poos-i
 DEM dog-3SG 3-aahk-yet-PERF-kill-DIR-3SG DEM cat-4SG
 ‘the dog must have killed the cat’

[Note: Denoting epistemic necessity. Also, Ainootaa, but not Issapoikoan, added a *m-* to the verb.]

[Context: The dog and cat have been fighting for a long time. At one point the dog comes into the room where the owner and house guest are at and the dog’s face is covered in blood. In a panic the owner says “the dog must have killed the cat.”]

3.3 Deontic Possibility

Similar to epistemic possibility, deontic possibility uses *aahk-* followed by *ohkott-*. However, unlike epistemic possibility, it does not appear without the second modal morpheme. This suggests that *aahk-* may have a default epistemic possibility reading and it is strengthened or altered in type based on the modal that follows it. Nonetheless, when *aahk-* is followed by *ohkott-* it is ambiguous in modal type, since it can be used both

epistemically and deontically, suggesting that Kainai Blackfoot does not always make a clear modal type distinction between weak modals. The example in 6 shows both modal types, where *ahkohtsi'nitsii* denotes the deontic possibility reading. *Maahkti'kainyop* could denote a deontic possibility reading, since it is permissible by law, however, based on the regularity of the morphology I suspect that *maahkti'kainyop* is epistemic possibility and the utterance is based on the speaker's knowledge of the law. But it is also possible that only the main clause requires the second morpheme.

- (6) na imitaa aahkohtsi'nitsii ni poosi (maahkti'kainyop)
 na imitaa-(wa) **aahk-ohkott**-i'nit-ii-(wa) ni poos-i (m-**aahk**-iti'kainyop)
 DEM dog-3SG aahk-able-kill-DIR-3SG DEM cat-4SG (3-aahk-law(?))
 'the dog can kill the cat - it's possible under law'
 [Note: Denoting deontic possibility.]
 [Context: The cat killed the dog's brother, in a world where the dog is legally allowed to exact vengeance. Someone then says "the dog can kill the cat."]
 [The last word was added as an afterthought, meaning he is allowed under law. Possibly related to *iiyikoyaapiikoan* - lawyer.¹⁴]

7(a-b) Shows that the modal interpretations are not affected by person. 7a shows a modal with a 2SG subject and 7b shows a 1SG subject, and in both cases *aahk-ohkott* expresses deontic possibility.

- (7) a. kiaahkohkottamitapoo
 kit-**aahk-ohkott**-am-itapoo
 2SG-aahk-able-there-go
 'you can go there'
 [Note: Denoting deontic possibility, permission.]
 [Context: There is restricted access to a building, but someone in authority gives permission by saying "you can go there."]
- b. taahkotakomimmaa na imitaa
 t-**aahk-ohkott**-(w)aakomimm-ma na imitaa-(wa)
 1-aahk-able-love-3SG DEM dog.3SG
 'I can love the dog'
 [Note: Denoting deontic possibility, permission.]
 [Context: An owner just bought a dog and since it is now his he says "I can love the dog."]

3.4 Deontic Necessity

Similar to epistemic necessity, deontic necessity requires *aahk-* to be followed by a mandatory second morpheme, *sstsina-* 'need,' as in 8. Unlike the expression of possibility, the expression of necessity shows a clear distinction between epistemic and deontic readings, since there is no ambiguous overlap.

¹⁴ See Frantz & Russell (1995).

- (8) a. na imitaa aahksstsinaii'nitsii ni poosi
 na imitaa-(wa) **aahk-sstsina-i'**nit-ii-(wa) ni poos-i
 DEM dog-3SG aahk-need-kill-DIR-3SG DEM cat-4SG
 'the dog must kill the cat'
 [Note: Denoting deontic necessity, obligation.]
 [Context: A cat is going to take over the world. To stop the cat a decree was made that "the dog must kill the cat."]
- b. na imitaa aahkstsinaikomimmii ni poosi
 na imitaa-(wa) **aahk-sstsina-(w)a**akomimm-ii-(wa) ni poos-i
 DEM dog-3SG aahk-need-love-DIR-3SG DEM cat-4SG
 'the dog must love the cat'
 [Note: Denoting deontic necessity, obligation - in a world required by law.]
 [Context: A law is passed where dogs that do not love cats are killed. Therefore, someone says "the dog must love the cat."]

The example in 9 shows that these modal contrasts are not limited to stative verbs or animate nouns.

- (9) aistsiskakaikyop aahksstsinaiistiini omi pokon
 ais-tsiskakaikyop-(wa) **aahk-sstsina-iksiini-(ma)** omi pokon-(yi)
 ??¹⁵-bat(baseball)-3SG aahk-need-touch-3 DEM ball-4SG
 'the (baseball) bat must hit the ball'
 [Note: Denoting deontic necessity.]
 [Context: By law to save his own life the baseball player must hit the ball, so someone says "the bat must hit the ball."]

3.5 Weather constructions

Weather constructions in Blackfoot are more ambiguous. Originally my consultants provided 10a when I offered the sentence "it might have rained". Because they used *oma-* I inquired as to the difference between 10a and 10b. When the two were compared the consultants agreed that 10a was a stronger statement than 10b.

¹⁵ The meaning of this morpheme is currently unclear. It looks like it might be a nominalization based on a verb form or (less-likely) a DEM.

- (10) a. aahkomsootaa
aahk-oma-sootaa
 aahk-yet-rain
 'it might/must have rained'
 [Note: Denoting epistemic possibility/necessity. Considered stronger than aahk-sootaa.]¹⁶
 [Context: Two people walk outside and see that the ground is wet and there are dark clouds in the sky. One says to the other "it might/must have rained."]
- b. aahksootaa
aahk-sootaa
 aahk-rain
 'it might rain'
 [Note: Denoting epistemic possibility.]
 [Context: Two people walk outside and see a dark sky. One says to the other "it might rain."]

4. Analysis and Judgement Tasks

This section consists of an analysis of the data from section 3 and combines it with judgement task data in order to better understand the surface order and morpho-syntactic relations of *aahk*-.

4.1 A four-way Distribution

Based on the above data in section 3, Kainai Blackfoot makes a definite strong/weak distinction. Weak modals use *aahk*- followed by (optionally for epistemic) the morpheme *ohkott*-. Weak modals can be ambiguous in modal type, since epistemic possibility can be expressed by *aahk-ohkott*-, just as deontic possibility requires. Strong modals do make a clear type distinction. Strong epistemic modality is expressed by *aahk-oma*-, while strong deontic modality is expressed by *aahk-sstsina*-. Therefore Blackfoot makes a four-way distinction in its modal use of *aahk*-, with a degree of overlap on the weak end of the spectrum.¹⁷

4.2 Double Modals in Kainai?

It would seem that modality using *aahk*- in Kainai Blackfoot is usually a combination of two morphemes. One possibility could be that Kainai Blackfoot is a double modal language similar to the 'might could' constructions of Southern United States English with two separate syntactic heads (Lewis 2012). However, with the occasional exception of *ohkott*- in certain contexts, my consultants always parsed and translated the sentences as a single unit. In fact, one of the consultants found the English translation of *aahk-sstsina*- as 'might-need' odd. Moreover the weak strength of the *aahk*- modal is completely lost in necessity constructions. For this analysis I suggest that Kainai Blackfoot modals form a combined

¹⁶ The difference between 10a and 10b may also be due to tense interpretations. However, this will be left to future study.

¹⁷ For an alternate view of *aahk*- as a strong epistemic modal see Marshall (2012).

semantic unit, which is in line with Di Paolo (1989), who argued that double modals constitute single lexical items. However, further testing is required to confirm whether Blackfoot is actually a double modal language.

4.3 Judgement Tasks, Negation and Surface Order

In addition to the utterance-in-context tasks, I presented various sentences to my consultants to judge their grammaticality. These judgement tasks were intended to identify any morpho-syntactic hierarchy. Previously shown in 5 (repeated here as 11a), modal morphemes precede the perfective aspect morpheme. The data in 11(b-c) shows that *aahk-* must always precede the second modal morpheme, which either suggests that the modals act as a single morpho-syntactic unit or that they have a strict morphological ordering.

- (11) a. na imitaa aahmohkomikaai'nitsii ni poosi
 na imitaa-(wa) (m)**aahk-oma**-lkaa-i'nit-ii-(wa) ni poos-i
 DEM dog-3SG (3)-aahk-yet-PERF-kill-DIR-3SG DEM cat-4SG
 'the dog must have killed the cat'
- b. * na imitaa ohkottaahkomimmii ni poosi
 na imitaa-(wa) **ohkott-aahk**-(w)aakomimm-ii-(wa) ni poos-i
 DEM dog-3SG able-aahk-love-DIR-3SG DEM cat-4SG
 'the dog could love the cat'
 [Note: Cannot reverse *aahk-* and *ohkott-*.]
- c. * na imitaa sstsinaahksii'nitsii ni poosi
 na imitaa-(wa) **sstsina-aahk**-i'nit-ii-(wa) ni poos-i
 DEM dog-3SG need-aahk-kill-DIR-3SG DEM cat-4SG
 'the dog must kill the cat'
 [Note: Cannot reverse *aahk-* and *sstsina-*.]

Additionally, the data in 12 shows that various negation morphemes can either precede or follow the modal pairs, but cannot appear between them. Blackfoot uses various negation morphemes, the choice of which is based on the morpho-syntactic structure.¹⁸

- (12) a. na imitaa maanaahkomwaahkominnii ni poosi
 na imitaa-(wa) **maat-aahk-oma**-(w)aakomimm-ii-(wa) ni poos-i
 DEM dog-3SG NEG-aahk-yet-love-DIR-3SG DEM cat-4SG
 'the dog must not love the cat'
 [Note: Denoting epistemic necessity. Inverse scope.]
 [Context: In a world where dogs never love cats, someone says "the dog must not love the cat."]

¹⁸ The difference in the negation morphemes is based on Frantz (2009:82-84), who claims that *maat-* is used only if no other prefix except person precedes it. Furthermore, he claims that negation can occur after *aahk-* in the form *sta'*. My consultants pronounce this other negation morpheme as *sa'*, but I maintain *sta'* for clarity.

- There are other occurrences where negation appears after a modal as Frantz (2009:82-84) suggests, but there seems to be a preference for using *maat-* for negation among my consultants (for a detailed account of single modals with negation see Marshall 2012). Interestingly, the negation *sta'*- appears not just after *aahk-* as Franz suggests (2009) but when two modal elements are present it appears after them both 12b. As 12c shows, I was not able to elicit negation between the modals. This might be due to the morpho-syntactic structure or because they act as a single lexical item. Based on the data from 11 and 12, it would seem that verbal morphology is expressed in the order shown in 13.

4.4 The Structure of aahk-

(14) I' (Adapted from Louie 2011:114)



5. Comparing Blackfoot Modality

The contrasts in the expression of modality in Blackfoot are not unexpected in language. This section shows various modal contrasts in St'át'incets, English, and Gitksan. This section is not intended to be a comprehensive comparison. It will only reference the general distinctions in possibility, necessity, epistemic, and deontic modality.

St'át'incets (Lillooet Salish) only makes a modal type contrast but not a strength distinction. As seen in table 2, [ka] is used for deontic modality and [k'a] is used for epistemic modality (Matthewson 2005). I have shaded identical forms the same shade for clarity.

| St'át'incets | Possibility | Necessity |
|--------------|-------------|-----------|
| Epistemic | k'a | k'a |
| Deontic | ka | ka |

Table 2: Morphological realization of St'át'incets modality

English is the opposite to St'át'incets. There is no distinction in any modal type, only in modal strength (Palmer 1990). If 15 were uttered it could be used for either the epistemic or deontic context. This is further illustrated in table 3.

- (15) 'John must be at home'
 Context 1: John light's are on and there is movement in the house (epistemic)
 Context 2: John is under house arrest (deontic)

| English | Possibility | Necessity |
|-----------|-------------|-----------|
| Epistemic | can | must |
| Deontic | can | must |

Table 3: Morphological realization of English modality

Interestingly, Gitksan (a Tsimshianic language) is the most similar to Blackfoot using a three-way modal contrast (Matthewson 2013). However, the inherent ambiguity is not within strength (possibility) modals, but within modal type, and also unlike Blackfoot, the ambiguity is complete. The modal *ima('a)* has no strength distinction, as shown in table 4.

| Gitksan | Possibility | Necessity |
|-----------|-------------|-----------|
| Epistemic | anook | sgi |
| Deontic | ima('a) | ima('a) |

Table 4: Morphological realization of Gitksan modality

Based on the various modal data above, a four-way contrast should not be unexpected. Each of languages discussed here handles the strength versus type contrast in a different way. Blackfoot demonstrates the most complex modal system of the languages discussed, as shown in table 1 (repeated below).

| Blackfoot | Possibility | Necessity |
|-----------|------------------|------------------|
| Epistemic | aahk- + (ohkott) | aahk- + oma- |
| Deontic | aahk- + ohkott | aahk- + sstsina- |

Table 1: Morphological realization of Blackfoot modality

Based on the four-way distinction, Blackfoot is not as context dependent as the other languages mentioned, since the context is realized lexically and not pragmatically.

6. Conclusion

Kainai Blackfoot does make distinctions in modal strength and type. It makes a four-way modal contrast between possibility, necessity, epistemic, and deontic modality, which can all be expressed with the morpheme *aahk-* combined with a possible secondary morpheme. The *aahk-* morpheme, when it surfaces alone, has a default epistemic possibility interpretation, but when combined with a second modal the strength and type of the modal can be altered. The first contrast is between strong and weak modals. The second is between the type of modals, distinguishing epistemic and deontic modality. The epistemic and deontic possibility constructions can share the *aahk-ohkott-* from, which can be ambiguous. The modals are found between I' and vP, which I base on their surface order with respect to the data, negation, and judgement tasks. The four-way contrast in modality suggests that Blackfoot does not rely on context to express modality, but does so lexically.

It is my hope that this study has laid the foundation for more in depth studies. In future studies I intend to investigate other types and strengths of modality (including intermediate levels), and also compare modals other than *aahk-*. I would also like to examine how temporal semantics relates to the modals, as well as the interaction of negation and scope. Importantly, the question of whether or not Blackfoot modals combine to form a single lexical item, remains to be seen and requires more research. Blackfoot has a very rich modal system and much can be learnt from further study.

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Learning questions in an L2: Koreans learning English question intonation

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Abstract

Remnants of a speaker's first language (L1) are often present on features of their second language (L2). This paper investigates how native speakers of Korean acquire English intonational patterns on *wh*-questions and *yes/no* questions. English and Korean intonational structures differ on numerous levels. In addition to different intonational structures, English and Korean also differ as to how they distinguish between *yes/no* and *wh*-questions. In Korean, *yes/no* and *wh*-questions are syntactically the same. The only way in which they differ is in their intonational phrasing. In English, *yes/no* and *wh*-questions differ in multiple ways: choice of lexical item, syntactically, and intonationally.

I will present preliminary experimental data from native speakers of Korean who are at various stages of acquiring English. I will also compare the intonational patterns to those of native English speakers and Korean L1 speakers. My preliminary results show that two of the native Korean participants do not seem to be aware of English intonational patterns, while the third (more advanced) speaker shows native-like intonational patterns in some English questions.

1. Introduction

Remnants of speakers' first language (L1) are often present on both the segmental and supra-segmental (prosodic) features of their second language (L2). Numerous studies focus on the L2 acquisition of segmental features (Flege 1987; 1995, among others), but few studies focus on the L2 acquisition of prosody (but see Ueyama & Jun 1985). This topic is interesting because to date there has not been a large amount of research done on the L2 acquisition of Intonational patterns, yet this remains an area of acquisition which poses problems for most (if not all) second language learners. As Cruz-Ferreira (1989:24) points out, intonation is "the last stronghold of a foreign accent in speaking any L2" asserting that the observation is true "even of speakers who otherwise have perfect or near-perfect command of the phonetics of the L2."

In this paper I address at how native speakers of Korean acquire English Intonational patterns on two types of questions: *wh*-questions and *yes/no* questions. The analysis presented in this paper is based on a pilot experimental research study which looks at native speakers of Korean who are at varying stages of acquiring English. The specific research questions that I address in this paper are the following:

- i. Does the L1 intonation system affect L2 intonation patterns?
- ii. If the L1 intonation system does affect L2 intonation patterns, to what extent?
- iii. Does a higher level of proficiency in the second language improve L2 intonation?

1.1 Overview of the Paper

Section 2 overviews the English and Korean intonational models which I adopt for this paper. Section 3 addresses the intonational structures of *yes/no* and *wh*-questions in both English and Korean. In Section 4, I briefly highlight some theories of second language acquisition and what predictions and hypotheses I can propose for this current study. Section 5 will discuss the experimental design of my study and the analysis of results will be provided in Section 6. The final section, Section 7, will provide a conclusion to my paper as well as a section on directions for future research in this area.

2. Intonational Models

2.1 Intonational Phonology in English

This section focuses on the intonational structure of English which was developed by Beckman & Pierrehumbert (1986). Under this model, intonation contours are analyzed as sequences of high (H) and low (L) tones. These tones are categorized as one of three types: pitch accents, phrasal tones, and boundary tones. The pitch accent (PA) is associated with the stressed syllable of a phrase and this stressed syllable receives pitch prominence. According to Beckman & Pierrehumbert (1986) English has 6 types of PA. These are shown in Table 1 below.

| Pitch Accent | Description |
|--------------|-------------------------------|
| H* | = peak accent; default accent |
| L* | = low accent |
| L*+H | = scooped accent |
| L+H* | = rising peak accent |
| H*+L | = fall from peak accent |
| H+L* | = fall onto a low accent |

Table 1: Six Types of English Pitch Accents. *Source: Pierrehumbert & Hirschberg (1990)*

In addition to PAs, English also has boundary tones which mark the end of an intonational phrase (IP) and phrasal tones which cover the space between the last pitch accent and the boundary tone. In English there are two types of phrasal tones (L-, H-) and two types of boundary tones (L%, H%). In this model (illustrated in Figure 1), the PA, phrasal tone, and boundary tone are hierarchically organized into a type of prosodic hierarchy. IPs must have at least one PA (but they may have more than that). Under this model Phonological Phrases (PPs) can have more than one PA. When this occurs, the last PA is generally the most prominent and is labeled as the nuclear PA.

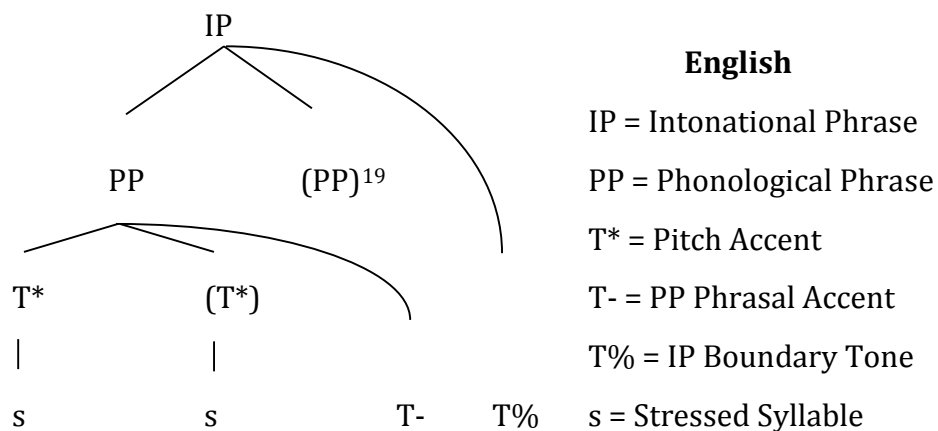


Figure 1: Intonation structure of English

2.2 Intonational Phonology in Korean

This section focuses on the intonational structure of Korean and adopts the model of Korean prosody developed by Jun (1993; 2005) which was built off of the model proposed for English by Beckman & Pierrehumbert (1986).

¹⁹ Brackets denote an optional segment

In this model, Jun proposes two prosodic units which are higher than a phonological word: an accentual phrase (AP) and an IP. According to Jun, an AP can have more than one phonological word and it is marked by a phrase final rising tone (in the Seoul dialect of Korean). An IP can have more than one AP and is marked by a boundary tone and a phrase final lengthening. In the prosodic hierarchy, the AP is higher than a prosodic word and lower than the IP.²⁰ The AP is found where, in many languages, we would find a PP, but these two phrases differ: The accentual phrases' formation is based on the intonational pattern of an utterance rather than on the syntactic structure of a sentence.

The tonal pattern of the Accentual Phrase for the standard Seoul dialect of Korean is L-H-L-H²¹ (Jun 1993; 2005). The first tone is realized on the first syllable of the phrase, followed by the second High tone on the second syllable, the Low tone on the third syllable, and the High tone on the final syllable of the phrase. The Korean Accentual Phrase tones can also change depending on the size of the word (see Figure 2).

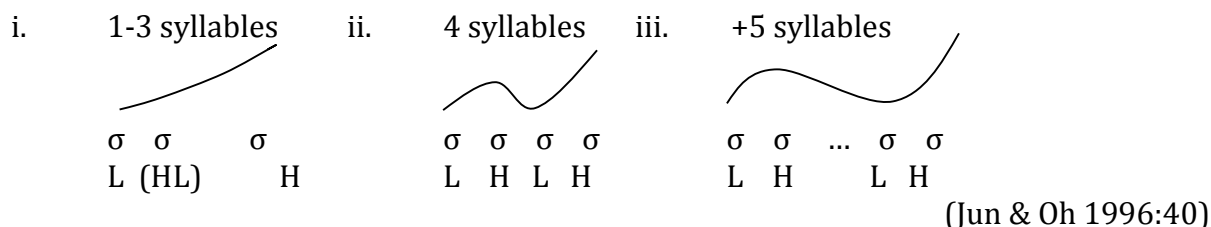


Figure 2: Tonal realizations of an AP in a Seoul dialect of Korean

When an AP is the last AP in an IP then the AP-final H tone is overridden by an IP boundary tone. The intonational structure of Korean is illustrated in Figure 3 below.

²⁰ Jun (1993; 1998) does not propose a PP, but proposes that the AP is found at the same level as the PP would be under the Prosodic Hierarchy Theory developed by Selkirk (1986) and Nespor & Vogel (1986).

²¹ This pattern can change to High-High-Low-High if the phrase initial segment is an aspirated or tense obstruent.

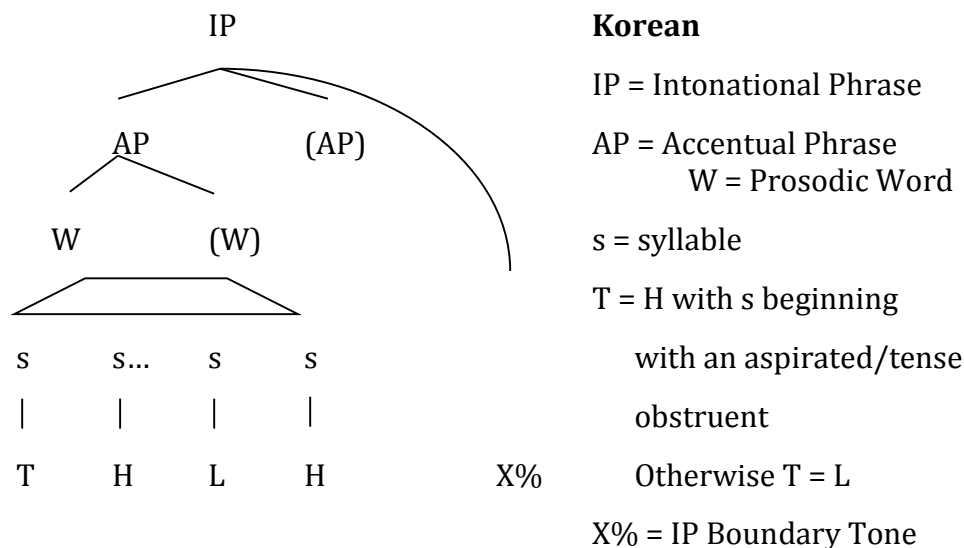


Figure 3: Intonation structure of Korean

2.3 A Comparison of Korean and English Intonation Systems

The English and Korean intonational structures differ on numerous levels. English marks PAs, PPs, and IPs while Korean is a language which has neither lexical stress nor lexical pitch accent (Jun 2003). In Korean, there are no PAs or PPs, rather APs. Therefore, the F0 contour of the English IP is determined by pitch accents which are linked to stressed syllables while in Korean it is determined by a series of AP tones. The Korean AP phrasal tones change depending on the size of the word, but the size of an English word does not influence the English pitch accents. The differences between the Korean and English intonational systems are summarized in Table 2 below.

| English | Korean |
|---|---|
| <ul style="list-style-type: none"> marks Pitch Accents, Phonological Phrases, and Intonational Phrases | <ul style="list-style-type: none"> no Pitch Accents or Phonological Phrases Marks Accentual Phrases, and Intonational Phrases |
| <ul style="list-style-type: none"> F0 contour of the Intonational Phrase is determined by Pitch Accents linked to stressed syllables | <ul style="list-style-type: none"> F0 contour of the Intonational Phrase is determined by a series of Accentual Phrase tones |
| <ul style="list-style-type: none"> size of the word does not influence English Pitch Accents | <ul style="list-style-type: none"> Accentual Phrase tones change depending on the size of the word |

Table 2: Comparison of English and Korean intonation systems

3. Question Formation

In addition to different intonational structures, English and Korean also differ in how they distinguish between *yes/no* and *wh*-questions. This section provides an overview of these

two types of question formation in both English and Korean. Section 3.1 focuses on English question formation and intonation while Section 3.2 highlights Korean question formation and intonational patterns. Section 3.3 provides a comparison of Korean and English question formation and intonation.

3.1 English Question Formation

The two types of questions that I discuss in this paper are *yes/no*-questions and *wh*-questions. *Yes/no*-questions are intended to elicit a response of either *yes* or *no*. They are usually formed by using the word order of verb, subject, object and they have a sentence-final rise in pitch.²² If we look at Figure 4 below, we can see that in the *yes/no*-question “Are we eating anything?” there is a final rising intonation (H-H%) with a low pitch accent on ‘anything’.

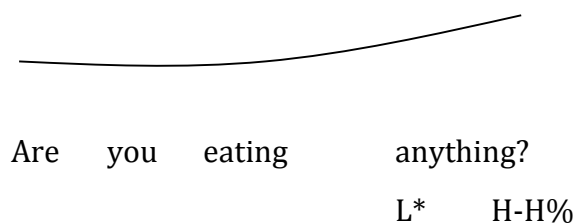


Figure 4: Intonational structure for *yes/no*-question *Are we eating anything?*

Wh-questions (questions that contain words such as *who*, *what*, *when*, *where*, *why*, or *how*) have a different intonational pattern from *yes/no* questions. They generally do not have rising intonation as we saw for *yes/no* questions; instead, they have a main pitch accent on the verb (in my example, *eat* of *EATing*) followed by falling intonation. This is shown in figure 5.

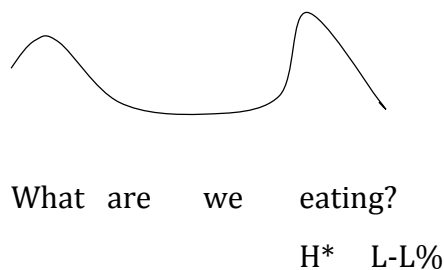


Figure 5: Intonational structure for the *wh*-question “What are we eating?”

²² Couper-Kuhlen (2012) points out that while *yes/no*-questions often have rising intonation and *wh*-questions often have falling intonation there are numerous exceptions (i.e., repeat questions where certain elements are focused for clarification, or tag questions). While I am aware of these types of questions, they are excluded from the data used in this study.

3.2 Korean Question Formation

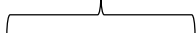

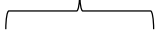
In Korean, *wh*-questions and *yes/no*-questions are syntactically ambiguous, as we see in 1. Syntactically, 1a and 1b have identical surface forms, but 1a has a *yes/no* reading and 1b has a *wh*-question reading. These two syntactically ambiguous readings are disambiguated by use of prosodic features.

- (1) *nuka* *wa-jo*
 who/anyone come-HON.INTER
 a. Is anyone coming? (*yes/no*-question)
 b. Who is coming? (*wh*-question)

(Jun & Oh 1996:60)

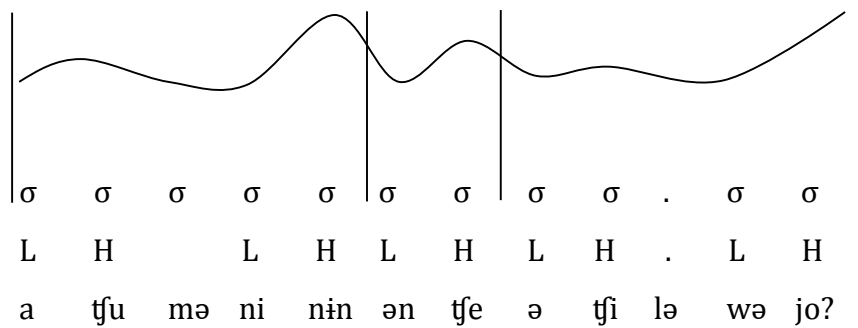
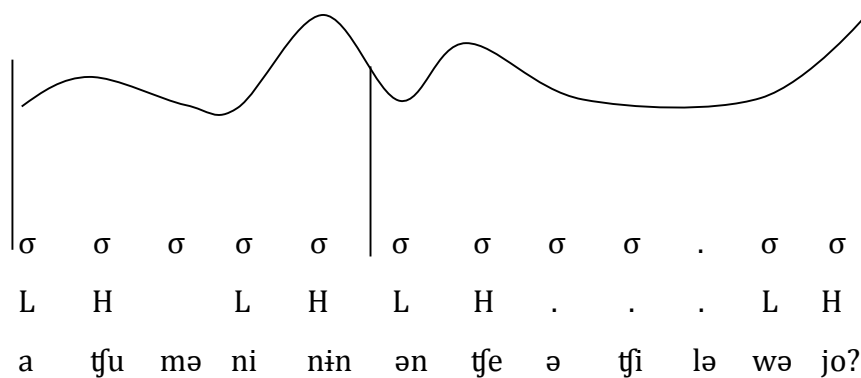
Wh-words have two functions in Korean: Either they serve as a *wh*-pronoun as in a *wh*-question or they function as an indefinite pronoun in a *yes/no*-question. For example, the Korean word *nuka* can either have the interpretation ‘who’ or ‘anyone’. This ambiguity is differentiated by prosodic features such as boundary tones, or high versus low pitch.

In their 1996 study, Jun & Oh (48) show that in their Korean stimuli Korean *yes/no*-questions show three accentual phrases (a pre-*wh*-phrase, the *wh*-word, and the VP) and *wh*-questions show two (a pre-*wh*-phrase, and the *wh*-phrase: *wh*-word and VP). An example with a pre-*wh*-phrase is shown in 2.²³

- | | | |
|---|--|--|
| pre- <i>wh</i> -phrase  | <i>wh</i> -word  | VP  |
| (2) <i>atʃuməni-nin</i> <i>madam-TOP</i> | <i>əntʃe</i> <i>anytime/when</i> | <i>əʃʃiləwə-jo</i> <i>dizzy-HON.INTERR</i> |
| a. Is there any time when you feel dizzy, madam? (<i>yes/no</i> -question) b. When do you feel dizzy, madam? (<i>wh</i> -question) | | |

This sentence is further illustrated in 6a and 6b with a schematic representation of F0 contours of *wh*-phrase is shown for Korean *yes/no* questions (2a) compared to *wh*-questions (2b). The vertical line marks the AP boundary. We can see in 2a that there are three APs: the pre-*wh*-phrase, the *wh*-indefinite, and the verb while in 2b there are only two APs: the pre-*wh*-phrase and the *wh*-phrase.

²³ According to Jun & Oh (1996: 41) an adverbial noun phrase (pre-*wh*-phrase) was added to their stimuli before the *wh*-phrase to see if there is a pitch range difference outside of the *wh*-phrase depending on the question type.

Figure 6a: *Yes/no*-question: 3 Accentual PhrasesFigure 6b: *Wh*-question: 2 Accentual Phrases

(Yun & Oh 1996:48)

3.3 A comparison of Korean and English question formation

Yes/no-questions and *wh*-questions in Korean consist of the same syntactic string on the surface, but can be distinguished by their intonational phrasing. The sentence asks a yes/no-question if the AP boundary is placed after a *wh*-word and a *wh*-question if there is no boundary after the *wh*-word. In English, these two items are distinguished by choice of lexical item, different syntactic structures, as well as by intonational phrasing (although as we saw in Section 3.1, there is a distinct *wh*-question intonational pattern compared to a yes/no-question pattern).

4. Second Language Acquisition of Intonation

To date, not a lot of attention has been paid to the interaction between L1 and L2 acquisition of language intonation, but since numerous studies have been conducted on second-language phonology we can nonetheless make predictions as to what will be acquired by Koreans.

Many L2 studies on the segmental aspect of L2 acquisition show that the phonetic and phonological systems of the L1 interact with the L2 speech production system. Many of

these studies (i.e., Flege 1995, McAllister *et al*, 2002) have also shown that the degree of the interaction between the L1 and the L2 differs depending on the degree of proficiency in the second language. Ueyama & Jun (1998) have also shown that the L1 intonation system can affect L2 intonation patterns with respect to focus intonation. However, not all aspects of the L1 directly shape the L2 acquisition.

4.1 Predictions

Based on previous research, we can predict that the phonetics and phonology of the L1 intonation will interfere with the acquisition of L2 intonation, and that the degree of this interference will probably depend on the degree of proficiency of the participant in the L2.

In this study, I focus on a few specific questions. First, English *wh*- and *yes/no*-questions differ with respect to the rising and falling intonational patterns at the end of the utterance. Jun & Oh (1996) found in their study on Korean *wh*-questions and *yes/no*-questions that the Korean participants used multiple different boundary tones (H%, LH%, HL%, and HLH%) in the same sentences. Their study showed that there was no single boundary tone type which was specific to one type of question. Their Korean participants had preferences for H% or LH% boundary tones for *yes/no*-questions (compared to a H% preference by native English speakers). For Korean *wh*-questions, the most common boundary tone was LH%, while H% and HL% were also used. English native speakers generally have an L% intonation boundary for *wh*-questions. One question that I will be addressing in the acquisition part of the study is whether Koreans are able to use native-English-like intonational patterns for boundary tones.

Another difference between English and Korean is that English has stress on certain words in an utterance (PA), while Korean has APs. For the L2 part of the study I investigate whether Koreans are able to use English-style PAs in their intonation, and I will also examine the Korean L2 data to see whether there are remnants of the Korean L-H-L-H tone pattern that is found in the Korean AP.

The final question which I address in this study is whether the level of English proficiency of participants affects their intonation.

5. Experimental Study

5.1 Subjects

One native female speaker of Canadian English participated as the control group and three Korean native speakers (two female speakers and one male speaker) participated as the experimental group of this pilot study. All Korean native speakers spoke a standard Seoul dialect of Korean. All speakers from the control and experimental groups were in their 20s or early 30s. In order to determine whether there was a developmental path in L2 intonation acquisition, I tested different proficiency levels within the experimental group. To establish their proficiency levels in English, all participants completed a standardized English grammar test (Oxford English Grammar Placement Test). For the native Korean speakers, one participant was considered to have a beginner level of English, one participant had an intermediate level of English, and the final participant had advanced English knowledge. Table 3 provides a summary of the data.

| Participant | Sex | Time in Canada | Test Score |
|------------------|--------|----------------|------------|
| P1: Advanced | Male | 16 months | 80/100 |
| P2: Intermediate | Female | 10 months | 68/100 |
| P3: Beginner | Female | 4 months | 42/100 |

Table 3: Description of each participant with respect to gender, time in Canada, and score on the placement test.

5.2 Stimuli

The stimuli for this experiment were based on the Korean stimuli from Jun & Oh (1996), with some modifications that I made. Four Korean sentences (two sentences containing the *wh*-word ‘what’ *mwə* and two words containing the *wh*-word ‘who’ *nuka*) were selected so that each sentence could be interpreted in 2 ways: as a *wh*-question and as a *yes/no*-question. Following Jun & Oh (1996), each *wh*-word was preceded by the adverbial phrase *onil tʃənjək-e* ‘tonight’. In Korean, the *yes/no* question or the *wh*-question interpretation was triggered by the type of answer to the question. If the answer started with ‘yes’ or ‘no’, then the question should be interpreted as a *yes/no*-question, otherwise the question should be interpreted as a *wh*-question. The same stimuli were also presented in English for the L2 part of the study. 3 and 4 below show sample ‘what’ and ‘who’ questions respectively.

- (3) a. Q: *onil tʃənjək-e mwə məkəjo*
today night-in what eat
What are we eating tonight?
A: *bap mogo*
rice eat
We will eat rice.
- b. Q: *onil tʃənjək-e mwə məkəjo*
today night-in what eat
Are we eating anything tonight?
A: *ne mwə məjəjaʃo*
yes something eat
Yes, we are eating something.
- (4) a. Q: *onil tʃənjək-e nuka wa*
today night-in who come
Who is coming tonight?
A: *nuna wa*
sister come
My sister is coming.

- b. Q: onil tʃənjək-e nuka wa
 today night-in who come
 Is anyone coming tonight?
- A: ne nuka wa
 yes someone come
 Yes, someone is coming.

5.3 Procedure

After completing a brief questionnaire which asked participants questions about their language background, length of time in Canada, and the placement test, participants moved onto the production task. Both the questions and the corresponding responses were written on cue cards and the participants were asked to read the questions and the responses aloud. Both the question and answer were recorded using an Edirol digital recorder.

5.4 Measurements

The recordings were analyzed using the acoustic speech analysis software Praat® (Boersma & Weenink 2010). For the phonological description of the Korean L1 data, the type of pitch accent and phrase boundaries occurring in each utterance was labeled adopting the framework described in Jun (1993; 1998). For the phonological description of English L1 and L2 intonation, the type of pitch accents and phrase boundaries occurring in each utterance was labeled adopting the framework described in Beckman & Pierrehumbert (1986). For the phonetic analysis of intonation, F0 and times from several points (corresponding to the Korean AP boundaries) in each utterance were collected.

6. Results and Discussion

6.1 English L1 Results

I will illustrate the pattern of the results using two sentences with the wh-word *what* and two sentences with the wh-word *who*.²⁴ This section looks at the native English speakers' data.

In the first sentence *What are we eating tonight?* we can see a PA on the word *eating* (on *eat*). This is demonstrated by a maximum pitch of 341Hz, a minimum pitch of 233 Hz and a mean pitch of 286Hz for this word. As we have already observed with wh-questions, there is a falling pitch contour at the end of the question. This is observed in this sentence by a final drop in pitch. The maximum pitch for *tonight* is 247Hz. It has a minimum pitch of 175Hz and a mean pitch of 193Hz. These numbers are considerably lower than what we observed for *eating*. This utterance is shown in below in Figure 7.

²⁴ This data is representative of all the data collected in this study. Due to space limitations, I focus only on a small number of stimuli items.

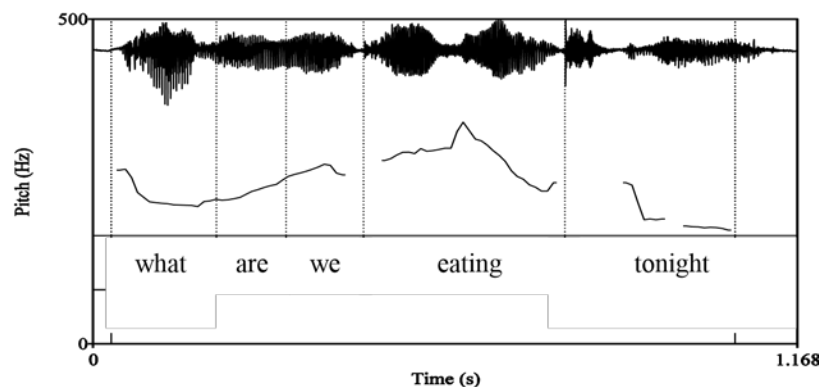


Figure 7: English L1 speaker: *What are we eating tonight?*

In the next *wh*-question *Who is (Who's) coming tonight?* the main stress falls on the *wh*-word *who* and then the pitch falls off for the rest of the utterance. While *who's* has a maximum pitch of 391Hz, a minimum pitch of 334Hz, and a mean pitch of 367Hz, the pitch readings for *coming* and *tonight* are significantly lower. *Tonight* has a maximum, minimum, and mean pitch of 267Hz, 196Hz, and 213Hz respectively (which is similar to the sentence *What are we eating tonight?*).

In the yes/no-question *Are we eating anything tonight?* we see a steady increase in pitch between *eating*, *anything*, and *tonight*. Unlike for the falling *wh*-question, *tonight* in the *yes/no*-question has a maximum pitch of 387Hz, a minimum pitch of 317Hz, and a mean pitch of 337Hz. This question is shown in Figure 8.

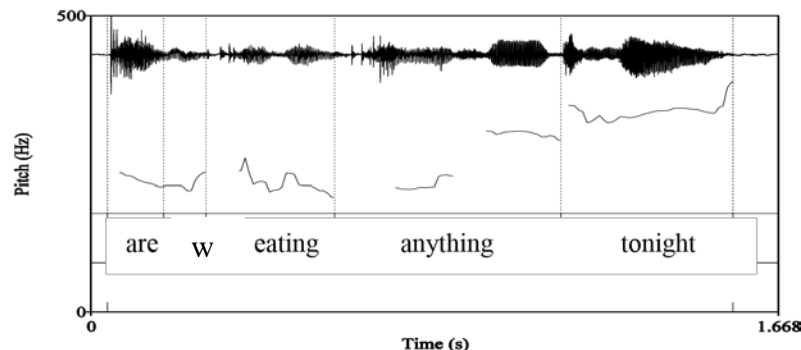


Figure 8: English L1 speaker: *Are we eating anything tonight?*

The final *yes/no*-question that I discuss in this paper is the question *Is anyone coming tonight?*. In this utterance, the pitch is rising steadily (as we saw for the *yes/no*-question in Figure 8). In this question, *anyone* has a mean pitch of 234 Hz, *coming* has a mean pitch of 311 Hz, and *tonight* has a mean pitch of 348 Hz. This is very close to the mean pitch for the word *tonight* in *Are we eating anything tonight?*

As can be seen from the data and figures presented in this section, this data supports falling intonation for *wh*-questions and rising intonation for *yes/no*-questions.

6.2 Korean L1 Results

This section discusses results from the Korean L1 data. The goal here is to see whether the Koreans I tested successfully replicate the study done by Jun & Oh (1996) and I am

specifically interested in investigating what the Koreans are doing with the intonation boundary at the end of the question.

Overall, my study generally replicated the findings of Jun & Oh's (1996) study. Jun & Oh (1996) found that in their study on Korean wh-questions and yes/no-questions, the Korean participants used multiple different boundary tones (H%, LH%, HL%, and HLH%) in the same sentences. Their study showed that there was no single boundary tone type which was specific to one type of question. Their Korean participants had preferences for H% or LH% boundary tones for yes/no-questions. For Korean wh-questions, the most common boundary tone was LH% while H% and HL% were also used.

I analyzed boundary tones across speakers and found that all three of my participants used either an H% or an LH% for all of the Korean sentences. Unlike the findings of Jun & Oh (1996), where some of their participants used HL% and HLH% boundary tones, my participants did not show this variability. Figure 9 shows a sample of P1's (a male speaker) rising (LH%) intonation at the end of the sentence *onil tʃənjək-e nuka wa* 'Who is coming tonight?'. We also see in Figure 9, that the speaker is not marking the wh-question (as in Jun & Oh 1996) with an AP boundary before the wh-word.

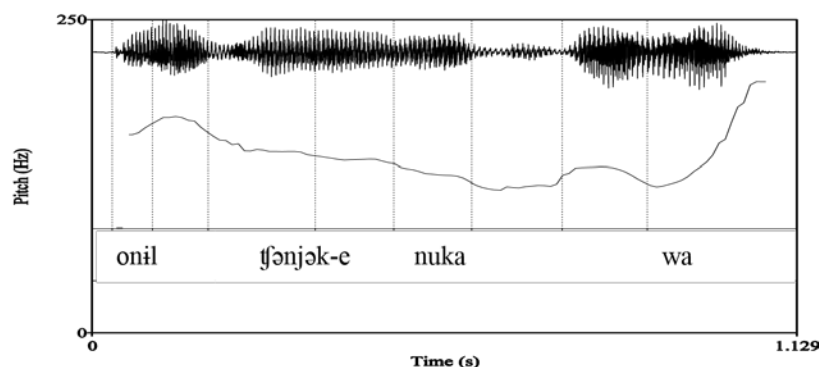


Figure 9: Korean (P1) L1 speaker: *onil tʃənjək-e nuka wa* 'Who is coming tonight?'

For the Korean L1 data, all of the data I collected had a rising H% or LH%. In the following section, we see what the Koreans do in the L2 study with the rising intonation.

6.3 L2 Results: Wh-questions

For the sentence, *What are we eating tonight?* In L1 English, we saw a PA on the word *EATing*) and observed a falling pitch contour at the end of the question. For the L2 learners, P1 was the most native-like in the falling intonation on *tonight*. His maximum pitch for that word was 123Hz, the minimum pitch was 91Hz, and the mean pitch was 107Hz. However, he was not like the native English speaker with respect to placing a PA on *EATing*. Also, unlike the native English speaker, P1 had numerous pitch resets which, in English, could signify a new PP. Perhaps in this case, he is treating the English PP similar to the Korean APs. Also worth mentioning is that this participant put a large pause between *what are we* and *eating tonight*, although he does not do this in his L1. It appears to be an isolated case and this was the first sentence I recorded with him so he may have just been nervous. Figure 10 shows this data. P1 also showed a native-like pattern for the wh-question *Who's*

coming tonight? He placed the main stress on the wh-word *who* and then his pitch fell off for the rest of the utterance, as we saw for the native English speaker.

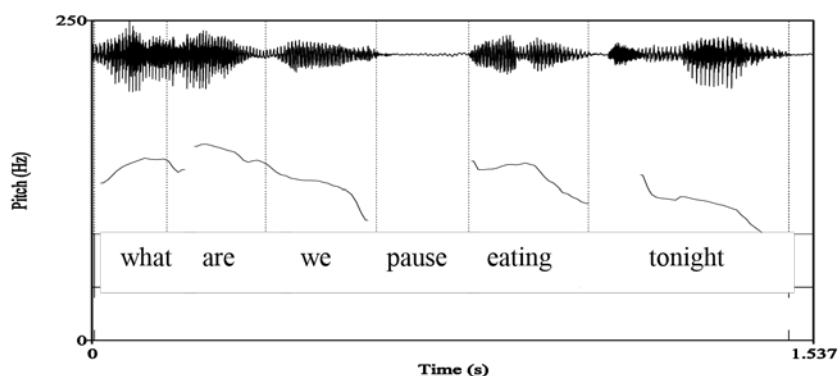


Figure 10: English L2 (P1): *What are we eating tonight?*

Participants 2 and 3 both used similar intonation for wh-questions. They both had a final rising intonational phrase boundary, and for both of these participants, the word *tonight* had very high pitch in the question. The maximum pitch for these two participants was 399Hz (P2) and 398Hz (P3), the minimum pitch was 187Hz (P2) and 182Hz (P3), and the mean pitch was 228Hz (P2) and 318Hz (P3). Clearly this pattern is one which may have transferred from their first language. Participant 3's data is shown in Figure 11.

For the wh-word intonation, these two participants generally differed in their intonation. Here, participant 3 was more native-like. Participant 2 often had a large drop in pitch when she pronounced wh-words.

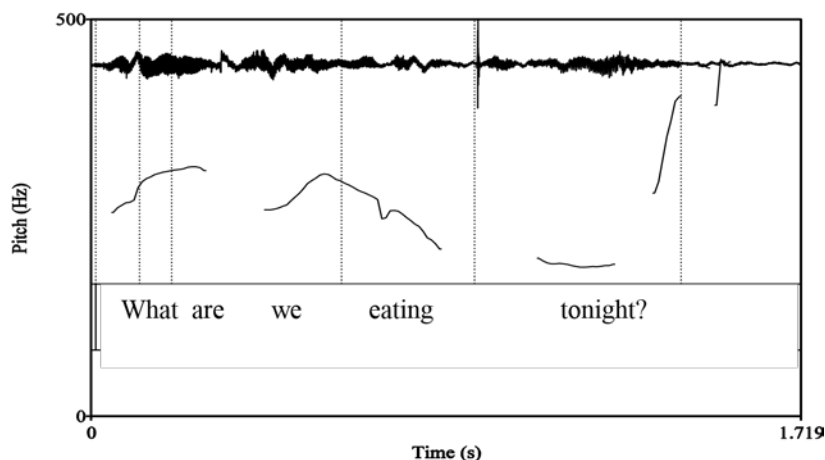


Figure 11: English L2 (P3): *What are we eating tonight?*

6.4 L2 Results: Yes/No-Questions

In English *yes/no*-questions, the pitch rises steadily as the sentence progresses. In all of the Korean data, for all three participants, there is no gradual rise in pitch, but rather a sudden peak at the end of the utterance (as we saw in the Korean data). We also see dephrasing in almost all the Korean L2 data on *yes/no*-questions. There seems to be one pitch accent

early in the question and then a steady decline in the pitch contours until the end of the utterance. This is illustrated in Figure 12.

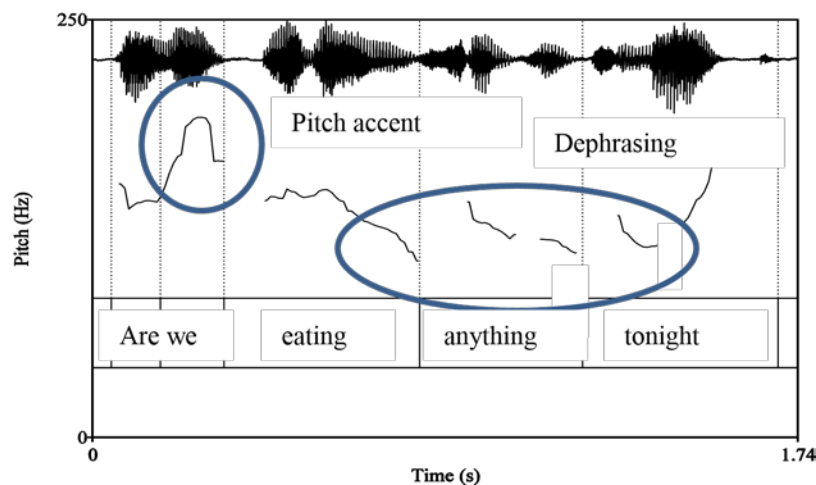


Figure 12: English L2 (P1): *Are we eating anything tonight?*

7. Conclusion

If we return to the questions from the beginning of the paper: Does the L1 intonation system affect L2 intonation patterns? and Does a higher level of proficiency in the second language improve L2 intonation? The answer to the first question is clearly yes. We saw in the data that two of the native Korean speakers participating in this study did not seem to be aware that English wh-questions typically have falling intonation and not rising intonation. In their L1, while whquestions can have either H%, LH%, HL%, or HLH%, all my participants used H% or LH% in their L1. P1, the most advanced learner of English, was the only participant who used falling intonation for these types of questions, so this likely had been acquired from studying English and indicates improvement with greater exposure. Clearly, the native Korean speakers are not performing at a native-like level with respect to prosody and intonation in these sentences.

7.1 Limitations and Directions for Future Research

This study was a pilot study which tested intonational patterns of three native Korean L2 learners of English on a limited set of data. I am currently extending this study to include more participants, as a higher number of participants would enable me to draw more generalizations. I am also including a larger range of levels of proficiency in my study, including near-native speakers who have spent a large amount of time in an English-speaking country.

To get a more accurate view of what second language learners do with intonation, I am working on extending this production task to include a processing and a perception task. This would give us a better idea of not only how L2 learners produce intonation, but also whether they have acquired enough detail about the second language they are learning to be able to perceive and process intonation like native speakers of a language.

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A Comparison of Japanese and Blackfoot Vowel Devoicing

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Abstract

This paper compares and contrasts the factors that contribute to devoicing in Japanese and Blackfoot. Japanese vowel devoicing has received rigorous discussion in linguistic literature. Tsuchida (2001) provides a particularly persuasive argument for Japanese vowel devoicing using the Optimality Theory Framework (Prince and Smolensky 2004); she argues that all Japanese voiceless fricatives are specified for [SG] and devoicing occurs when this [SG] feature is shared within a syllable.

The notion that voiceless vowels carry the feature [SG] can also be extended to instances of Blackfoot vowel devoicing. Blackfoot voiceless vowels generally occur in two contexts: They occur word finally, and word-medially when they are followed by the palatal/dorsal sounds [x]/[ç], which are orthographically represented as <h>. In contrast to Japanese voiceless fricatives, it appears that not all Blackfoot voiceless fricatives distribute the [SG] feature. The Blackfoot palatal fricative [ç] and the dorsal fricative [x] both trigger devoicing, whereas the fricative [s] does not. To explain this patterning of [x] and [ç], Reis Silva (2008) argues that [x] and [ç] are not fricatives, but rather preaspiration ([SG]) specified on certain obstruents.

In this paper, I will discuss the constraints proposed in Tsuchida (2001), and extend/adapt those constraints to Blackfoot word final vowel devoicing. Additionally, In my analysis of Blackfoot word-medial vowel devoicing, I will adopt Reis Silva's (2008) analysis that [x]/[ç] are not fricatives, but preaspiration specified on obstruents. Lastly, I argue that the word-medial vowel devoicing that occurs with [x] and [ç] is phonological rather than phonetic.

1. Introduction¹

Vowel devoicing is a characteristic that is observed in both Japanese and Blackfoot. Japanese vowel devoicing has long been a topic of interest in linguistic literature and there has been considerable discussion devoted to it. One particularly convincing explanation for Japanese vowel devoicing is proposed by Tsuchida (2001), who uses the Optimality Theory framework (Prince and Smolensky 2004) to explain the seemingly random vowel devoicing observed in Japanese. Blackfoot vowel devoicing, on the other hand, has not received as much attention. Though there has been some description and discussion about the conditions that cause vowel devoicing in Blackfoot, there are few papers that provide an explanation using Optimality Theory. This paper will examine the various factors that contribute to vowel devoicing in Japanese and Blackfoot.

Tsuchida (2001) proposes a set of ordered constraints to account for vowel devoicing in Japanese; she suggests that vowels which have the feature [SG]² appear as voiceless and the interaction of multiple constraints account for instances of seemingly random vowel devoicing in Japanese. The idea that voiceless vowels are specified for [SG] can also be extended to Blackfoot vowel devoicing. Blackfoot voiceless vowels occur in two general contexts: They occur word finally, and word-medially when they are followed by the sound that is orthographically represented as <h>. Though [SG] appears to be responsible for triggering voiceless vowels in both Japanese and Blackfoot, the conditions for spreading or sharing of [SG] are quite different in each language. For example, the [SG] feature in Japanese only devoices high vowels such as [i] and [u], whereas the [SG] feature in Blackfoot devoices all vowels.

Tsuchida (2001) argues that all voiceless fricatives exhibit the [SG] feature in Japanese, and the sharing of this [SG] feature causes vowel devoicing. In contrast, it appears that not all Blackfoot fricatives share or spread the [SG] feature. The Blackfoot palatal fricative [ç] and the dorsal fricative [x] both trigger devoicing, whereas the coronal fricative [s] does not. To explain this patterning of [x] and [ç], Reis Silva (2008) theorizes that [x] and [ç] are not fricatives, but rather preaspiration that is specified on certain obstruents; she proposes that there is a three way distinction among Blackfoot obstruents: ‘singleton unaspirate, geminate unaspirate and pre-aspirated’. Additionally, Reis Silva *ibid.* considers the vowel devoicing associated with preaspiration to be phonetic and suggests that the devoicing is simply a ‘gestural overlap’ of the spread-glottis.

Using the Optimality Theory framework, I will examine some of the constraints that may be responsible for vowel devoicing in Blackfoot and Japanese. In Section 2, I will

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² Tsuchida (2001) represents her features using a binary system, so when she discusses the [spread glottis] feature, she represents it as [+s.g.]. I choose not to use this binary representation, and instead, I represent [spread glottis] as a privative feature [SG]. The constraints and diagrams that are cited as ‘adapted from Tsuchida’ are altered to reflect the privative representation of [spread glottis] ([SG]) rather than the binary representation ([+s.g.]).

discuss some of the Japanese vowel devoicing constraints proposed in Tsuchida (2001). In Section 3, I will discuss Blackfoot word final devoicing, and extend/adapt some of Tsuchida's constraints to account for Blackfoot word final devoicing. In Section 4, I will argue that Blackfoot fricatives do not cause vowel devoicing, and I will present Reis Silva's (2008) analysis that [x]/[ç] are not fricatives, but rather preaspiration specified on obstruents; furthermore, I will argue that Blackfoot word-medial vowel devoicing is not phonetic, as Reis Silva *ibid.* suggests, but phonological. Finally, section 4 will conclude this paper.

2. Japanese vowel devoicing

Tsuchida (2001) examines the factors that contribute to the pattern of devoicing that is observed in Standard Japanese and many of the other Japanese dialects. Tsuchida proposes that Japanese vowel devoicing occurs when there is a [SG] feature specified on a vowel; as she recognizes, this proposal strays from the customary view that Japanese devoicing is caused by a distribution of the [-voice] feature. In general, Tsuchida claims that Japanese vowels are more likely to devoice when they appear between two voiceless stops, when they have a voiceless fricative as an onset and when they are word initial. In this section, I will present the some of the Japanese vowel devoicing constraints that Tsuchida proposes.

Tsuchida explains that devoiced vowels are generally marked in most languages. The markedness constraint which forbids [SG] vowels is typically a high ranking constraint, which means that [SG] vowels rarely occur in the phonological output. Tsuchida argues that because Japanese has [SG] vowels, there must be other constraints that outrank the markedness constraints which prohibits vowels from bearing the [SG] feature. The constraints that Tsuchida proposes for [SG] vowels are seen in 1 below:

(1) *NON-HIGHV_[SG] >> *HIGHV_[SG]

where *NON-HIGHV_[SG]: Non-high vowels with [SG] are prohibited

*HIGHV_[SG]: High vowels with [SG] are prohibited

(Adapted from Tsuchida, 2001: 230)

Crucially, Tsuchida (2001) ranks *NON-HIGHV_[SG] as higher than *HIGHV_[SG]. In the framework of Optimality Theory, the optimal form (output) may violate the lowest ranking constraint. Because non-high vowels are never seen to devoice in Japanese, the *NON-HIGHV_[SG] constraint must be undominated (Tsuchida, 2001). Furthermore, because devoiced high vowels are observed in Japanese, the *HIGHV_[SG] constraint receives a low ranking, as this *HIGHV_[SG] feature is violated every time a [SG] vowel occurs (Tsuchida, 2001).

As mentioned earlier, devoiced vowels in Japanese are more likely to occur when they surrounded by voiceless consonants (Tsuchida, 2001); this tendency is captured by the constraint in 2:

(2) *VOICECONTOUR: A sequence of voiceless [voice] voiceless is prohibited.

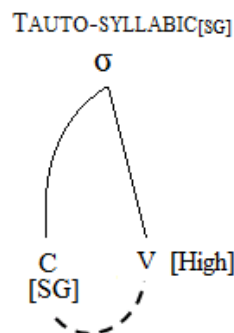
(Adapted from Tsuchida, 2001: 230)

Tsuchida explains that the constraint seen in 2 arises from the difficult articulatory movement of stopping then starting the vocal folds. Crucially, the *VOICECONTOUR constraint,

which causes vowel devoicing, is ranked higher than $*\text{HIGHV}_{[\text{SG}]}$ which prohibits [SG] high vowels (Tsuchida 2001). It may seem like this voiceless [voice] voiceless environment of vowel devoicing is congruent with the traditional analysis that devoiced vowels occur as a result of the assimilation of [-voice]; however, Tsuchida *ibid.* explains that the [SG] is created by a ‘Gen operation’ that is triggered when a vowel is surrounded by two voiceless consonants.

As discussed earlier, Tsuchida (2001) also claims that this [SG] feature is specified on all fricatives. As previously mentioned, in Japanese, vowels also tend to devoice when they follow fricatives (Tsuchida, 2001). According to Tsuchida (2001), Japanese has a constraint that favors sharing of the [SG] feature within a syllable; this constraint is diagrammed in 3 below:

(3)



(Adapted from Tsuchida 2001: 234)

The constraint presented in 3 shows that the [SG] feature of the onset is shared with the high vowel. Because [SG] high vowels are more likely to occur when they have a fricative as an onset, this $\text{TAUTO-SYLLABIC}_{[\text{SG}]}$ constraint also ranks higher than the $*\text{HIGHV}_{[\text{SG}]}$ constraint (Tsuchida, 2001).

Tsuchida (2001) also recognizes that there is a tendency in Japanese to devoicing the word initial vowel, which is described in the constraint seen in 4:

(4) $\text{ANCHORL}(\text{WORD}, [\text{SG}])$: [SG] is associated with the left edge of a word

(Adapted from Tsuchida, 2001: 234)

The constraint in 4 accounts for the preference in Japanese to devoice word initial vowels; the only way this AnchorL constraint can be satisfied is if the word initial vowel is devoiced, otherwise, AnchorL is violated (Tsuchida, 2001).

Furthermore, Japanese is never seen to have two consecutive devoiced vowels in a row. To rule out two consecutive [SG] vowels, Tsuchida *ibid.* evokes the Obligatory Contour Principal (OCP) which prohibits adjacent syllables from having identical features, as seen in 5:

(5) $\text{OCP}_{[\text{SG}]}$: It is prohibited to have two adjacent syllables that bare [SG].

(Tsuchida, 2001)

Tsuchida argues that the constraint shown in 5 is undominated, as adjacent devoiced vowels do not occur in Japanese.

The comparison tableau in 6 is adapted from a tableau presented in Tsuchida (2001). The tableau provides justification for the hierarchy of constraints proposed in Tsuchida *ibid.*:

(6)

| /kʲiʃitsu/ | OCP _[SG] | *VOICE CONTOUR | ANCHORL | TAUTO- SYLLABIC _[SG] | *HIGHV _[SG] |
|--------------------------------|---------------------|-------------------|---------|------------------------------------|------------------------|
| a) [kʲiʃitsu] V. b) [kʲiʃitsu] | a) | | | b) | a) |
| a) [kʲiʃitsu] V. c) [kʲiʃitsu] | | a) | a) | | c) |
| a) [kʲiʃitsu] V. d) [kʲiʃitsu] | | | a) | d) | |

(Adapted from Tsuchida, 2001: 237)

As seen above, form 6a is favored over form 6b because form 6b has two consecutive voiceless vowels, which is in violation of the undominated constraint OCP_[SG]. Form 6a is also preferred over form 6c because form 6c twice violates the *VOICECONTOUR constraint, whereas form 6a violates this constraint only once. Additionally, form 6a is also preferred over form 6c in terms of the ANCHORL constraint because form 6a anchors an [SG] feature to the left edge of the word, whereas form 6c does not.

Furthermore, as seen in row three of the tableau, forms 6a and 6d equally violate the *VOICECONTOUR constraint, as they each have one voiced vowel that is surrounded by voiceless consonants. However, form 6a is ultimately preferred over form 6d because form 6a satisfies the AnchorL constraint by anchoring [SG] to the left edge of the word, whereas form 6d violates this constraint by anchoring the [SG] feature to the rightmost vowel. Additionally, form 6a violates the TAUTO-SYLLABIC_[SG] constraint, whereas form 6d satisfies this constraint; however, because ANCHORL ranks higher than TAUTO-SYLLABIC_[SG], form 6a is still the optimal candidate.

The constraints proposed in Tsuchida (2001) are able to explain what was previously thought to be unpredictable vowel devoicing in Japanese.³ In the next section, I will discuss how some of the constraints proposed in Tsuchida (2001) can be adapted to account for word final vowel devoicing in Blackfoot.

3. Word final vowel devoicing in Blackfoot

I propose that the feature [SG] is also a factor in word final vowel devoicing in Blackfoot. Frantz (2009) notes that word final vowels in Blackfoot are voiceless and have a soft pronunciation. Furthermore, Reis Silva (2008) observes that when the word final vowel is long, the vowel is shortened and when the word final vowel is short it is replaced with aspiration.⁴ However, unlike Japanese, Blackfoot devoicing is not restricted solely to high vowels—both high and non-high vowels can be devoiced, as the data in 7 illustrates:

³ See Tsuchida 2001 for her full explanation of devoicing with words that have more than two devoiceable vowels.

⁴ Frantz and Russell 2009 have a slightly different view of final short and long vowels; they comment that final vowels are voiceless, so there is no contrast between word final short and long vowels in Blackfoot.

- (7) a. [niksisst̥a] ‘my mother’
 b. [niikayaahsinsski] ‘I like to sing’

As discussed in section 1, Tsuchida (2001) proposes that Japanese has two sub-constraints that account for the patterning of [SG] vowels: *NON- HIGHV_[SG] and *HIGHV_[SG]. Because Blackfoot doesn’t have a height restriction on [SG] vowels, I propose that Blackfoot has a more general, low ranking constraint for [SG] vowels, as seen in (8):

- (8) *V_[SG]: Vowels with [SG] are prohibited.

The constraint in 8 is an adaptation of the *NON- HIGHV_[SG] and *HIGHV_[SG] constraints proposed by Tsuchida (2001).

As previously discussed, Tsuchida (2001) proposes that the Japanese [SG] either originates from a fricative, or is generated when a vowel is surrounded by two voiceless consonants; additionally, there is a preference in Japanese to anchor the [SG] feature to the left edge of the word. However, in Blackfoot word final [SG] seems to be something that is associated with the end of a word. Additionally, the word final [SG] doesn’t appear to originate from any of the other features within the word, but simply seems to be added to the final vowel⁵. To account for word final [SG] in Blackfoot, I propose the following constraints in 9:

- (9) ANCHORR(WORD, [SG]): [SG] is associated with the rightmost edge of a word.
 DEP_[SG]: Do not add [SG] in the output that is not present in the base.

The ANCHORR(WORD, [SG]) constraint in 10 is adapted from the Tsuchida (2001) constraint ANCHORL(WORD, [SG]). Importantly, the Blackfoot constraint ANCHORR(WORD, [SG]) must be a higher ranking constraint than *V_[SG] and DEP_[SG] because the [SG] feature is added to the word final vowel in Blackfoot.⁶ The tableau in 10 shows justification for the ordering of the constraints proposed in 8 and 9:

- (10)

| /niksissta/ ‘my mother’ | | ANCHORR(WORD, [SG]) | *V _[SG] | DEP _[SG] |
|-------------------------|-------------------|---------------------|--------------------|---------------------|
| a) [niksisst̥a] | V. b) [niksissta] | a) | b) | b) |

In the tableau in 10, I argue that ANCHORR(WORD, [SG]) ranks higher than *V_[SG] because the optimal form 10a violates *V_[SG] and DEP_[SG], but satisfies ANCHORR(WORD, [SG]).

Word final devoicing is something that is frequently observed in Blackfoot, and it occurs with both lexical words and demonstratives.⁷ Though devoicing does occur with the majority of Blackfoot word final vowels (Frantz, 2009), sometimes demonstratives resist the ANCHORR(WORD, [SG]) constraint. I have not observed enough Blackfoot data in order to confidently offer a proposal about the environments where ANCHORR(WORD, [SG]) is

⁵ Windsor & Cobbler 2013 argue that [SG] occurs at the right edge of prosodic phrase, and not a word.

⁶ [SG] appears to be applied to final consonants as well, though word final consonants are infrequent in Blackfoot, due to fact word final agreement morphemes commonly end in vowels.

⁷ This was my personal observation over multiple elicitation sessions with Blackfoot speakers.

violated; however, Frantz (2009) does comment that a pitch accent can sometimes occur on the final vowel of a demonstrative. Speculatively, Blackfoot may also have a constraint that maintains faithfulness to word final accented vowels. However, the environment of this accenting is not certain, and is beyond scope of this paper, so I will not be discussing it further; though it may be an interesting topic for future research.

This section highlighted the differences between Japanese devoicing and word final devoicing in Blackfoot. However, Blackfoot is also seen to have word-medial vowel devoicing, which again appears to be different than the vowel devoicing in Japanese. Tsuchida (2001) proposes that all Japanese voiceless fricatives have the [SG] feature; however, in Blackfoot, it seems that this [SG] feature may not appear on all fricatives, as [s] is not seen to trigger devoicing. The next section will discuss the difference between Blackfoot and Japanese fricatives, and present Reis Silva's (2008) analysis that [x] and [ç] are actually preaspiration. Furthermore, I will propose some constraints that account for the patterning of [x]/[ç] in Blackfoot.

4. Blackfoot word-medial devoicing and pre-aspiration

As previously discussed, Tsuchida (2001) proposes that all Japanese fricatives are specified for [SG], and vowel devoicing occurs when the [SG] feature is shared within a syllable (Tsuchida, 2001). In contrast with Japanese, the Blackfoot fricative [s] is not seen to cause vowel devoicing; this could mean that either [s] does not have the [SG] feature, or [s] does not share or spread [SG]—in either case the Blackfoot fricative [s] does not cause vowel devoicing.

Word-medial devoicing in Blackfoot is exclusively associated with the feature that is orthographically represented as <h>, and which is phonetically pronounced as [x] or [ç]. The traditional view is that [x] and [ç] are dorsal or palatal fricatives, which take the shape of the preceding vowel (Frantz, 2009). For example, when <h> is preceded by the high, front vowel [i], a palatal fricative [ç] is produced, and when <h> preceded by the high, dorsal [o], the dorsal fricative [x] is produced⁸ (Frantz, 2009); according to this analysis [x] and [ç] are fricatives that assimilate to whatever vowel they follow. However, it is odd that Blackfoot would have one type of fricative that causes vowel devoicing ([x] and [ç]), and one type of fricative that does not ([s]).

To account for the odd patterning of [x] and [ç], Reis Silva (2008) argues that [x] and [ç] are not fricatives. She notes that [x] and [ç] do not have the same characteristics as other Blackfoot obstruents. For example, all other Blackfoot obstruents appear as both long and short, whereas [x]/[ç] only have singleton forms (Reis Silva, 2008). So, instead of analyzing [x] and [ç] as having a fricative feature, Reis Silva (2008) suggests that [x]/[ç] is actually preaspiration [SG] ([^h]) that is associated with the obstruents [p], [t], [k], [s]; she proposes that Blackfoot obstruents have a three way distinction: 'singleton unaspirated, geminate unaspirated, and preaspirated' (Reis Silva, 2008). This proposal that [x]/[ç] is preaspiration from an obstruent, explains why [^h] is always followed by an obstruent (Reis Silva, 2008). Furthermore, as Reis Silva (2008) notes, in general, pre-aspiration is something that is commonly influenced by the place of the preceding vowel, and usually

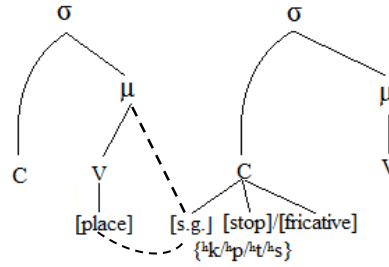
⁸ Please note that the dorsal vowel [a] can also produce [x]. However, some Blackfoot speakers variably produce a uvular fricative [χ]; it may be possible that the retracted tongue root [rtr] specification of [a], gives rise to uvular [χ], whose place of articulation is further back than the high dorsal fricative [x].

involves ‘supralaryngeal constriction’ which causes frication (Reis Silva, 2008). These two common characteristics of pre-aspiration are indeed congruent with the patterning of [h] in Blackfoot.

In my analysis of Blackfoot word-medial vowel devoicing, I will adopt the Reis Silva (2008) proposal that [h] is preaspiration associated with obstruents, and that the frication associated with [h] is the phonetic implementation of preaspiration. However, Reis Silva (2008) suggests that the vowel devoicing caused by [h] is a ‘gestural overlap’ from the preaspiration [SG] feature; I, on the other hand, argue that this devoicing process is phonological.

As previously mentioned, the preaspiration [SG] feature, [h], is always observed to assume the place of articulation of the preceding vowel. To explain this patterning, I propose that the preaspiration feature [h] requires a mora in order to be expressed. I argue that the [SG] feature aligns with the immediately adjacent mora to the left, as expressed in the constraint proposed in 11:

- (11) $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$: Align the right edge of the preaspiration feature [SG] to the right edge of the immediately adjacent, retrograde mora



The diagram in 11 shows that the preaspiration [SG] in the onset of the second syllable, aligns with the mora in the first syllable; furthermore, the [SG] feature assumes the place features of the vowel. This $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ constraint ranks higher than $*V_{[\text{SG}]}$, which is demonstrated in the tableau in 12:

- (12)

| /yáa.ko. ^h too/ ‘arrange’ | | $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ | $*V_{[\text{SG}]}$ |
|--------------------------------------|-------------------------------|---|--------------------|
| a) [yáa.ko. ^h too] V. | b) [yáa.ko. ^h too] | a) | b) |

With the tableau in 12, I argue that $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ ranks higher than $*V_{[\text{SG}]}$. As seen above, candidate 12b is ruled out because it violates the high ranking $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$. Though form 12a violates the lower ranking $*V_{[\text{SG}]}$ constraint, it is ultimately the optimal form because it satisfies the higher ranking $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$.

According to Reis Silva (2008), preaspirated obstruents have a similar distribution to geminates. Like geminates, preaspirated obstruents commonly occur word-medially, as seen with [nə^hpikísi] ‘she might have gone to town’ (Frantz, 1995), and with [naə^hsə]⁹ ‘my

⁹ As a side note, the form [naə^hsə] shows two consecutively devoiced vowels in a row, which means that the Tsuchida’s (2001) $\text{OCP}_{[\text{SG}]}$ constraints is not a factor vowel devoicing in Blackfoot.

grandmother’ (adapted from Reis Silva 2008: 2) ¹⁰. However, I have recently observed that there are some Blackfoot nouns which appear to have plain obstruent onsets, but when a prefix is added, the nouns’ initial consonants surface with preaspiration, as illustrated by the data in 13:

- (13) a. [poosi] ‘a cat’
 [ot] + [poosa] → [ot^hpoosiima] ‘his/her cat’
 (Frantz, 2009)
- b.¹¹ [kiáájoi] ‘a bear’
 [aap] + [kiáájoi] → [aap^hkiáájoi] ‘a white bear’
 [nit] + [kiáájowa] → [nit^hkiáájoma] ‘my bear’

As seen in 13, when /poosi/ ‘a cat’ receives the /ot/ (3SG) prefix, the [p] becomes preaspirated [^hp]. Similarly, when /kiáájoi/ ‘a bear’ takes the /aap/ or /nit/ prefix, the [k] also appears to be preaspirated [^hk]. I argue that [poosi] has the underlying representation /^hpoosi/, and [kiáájoi] has the underlying representation /^hkiáájoi/. The data in 13 show that preaspirated consonants can occur word initially, however, without a mora, this preaspiration cannot be expressed. If the preaspiration [SG] feature did not require a mora, then it would be perfectly fine to express this preaspiration word initially, however, as seen in 13 that is not the case in Blackfoot.

The examples in 13 show that when a morpheme that ends in a consonant (/ot/ /aap/ or /nit/) is prefixed to a word that begins with a preaspirated obstruent, a mora must be epenthesized. To explain this mora epenthesis, I propose the following constraints in 14:

- (14) *PREASP_[SG]C_μ: The preaspiration feature [SG] cannot align with a moraic consonant.
 DEP_{μ(wm)}: Do not insert moras (word-medially)¹² in the output that are not present in the base.

The high ranking *PREASP_[SG]C_μ constraint ensures that preaspiration cannot be expressed on a moraic consonants (or geminate); this constraint is important because Blackfoot is seen go through a process of gemination when two consonants meet at a morpheme boundary. Frantz (2009) describes this gemination process in 15 below:¹³

¹⁰ Reis Silva (2008) also includes ‘my grandmother’ <naahs> in her data; however, her transcription differs slightly as she transcribes the word as [naa^hs] without the final devoiced [a]; however, the Blackfoot speakers with which I consulted concluded that they felt the silently articulated [a] should appear word finally, which is why I included the final devoiced [a] in my transcription.

¹¹ I observed this data during elicitation sessions with Kainai Blackfoot speakers.

¹² The ‘word-medial’ specification may seem odd; however, later I propose a constraint that restricts epenthesis word initially, so, because a mora is epenthesized word-medially with the word [aap^hkiáájoi], it was necessary to specify that this constraint applies specifically to word-medial epenthesis.

¹³ There is some controversy in the literature about whether or not plain coda consonants have a mora (or carry weight by position) in Blackfoot. Donald (2006) argues that plain Blackfoot codas do not have moras, but geminates do, which is the position that I have adopted for my analysis.

- (15) Gemination: $C_1 \rightarrow C_2 / _ + C_2$
 nitánIt + k + wa \rightarrow nitánIkk +wa \rightarrow nitánIkka ‘He told me’

(Frantz 2009)

The gemination rule in 15 illustrates that when two consonants meet, the first consonant assimilates to the second. I recognize that this gemination process that Frantz *ibid.* observes strays from current theories of gemination which suggest that gemination occurs when a coda consonant meets an onsetless syllable: It is theorized that the coda consonant lengthens to simultaneously fill the onset position, and stay faithful to the underlying moraic representation of the coda (Elfner 2006). However, according to Frantz’s observation, in Blackfoot, when two consonants come into contact, the leftmost consonant assimilates the place features of the following adjacent consonant, which results in a geminate.

The process in 15 clearly does not follow the patterning of traditional gemination, and may be better defined as assimilation; however this process does have an impact on my analysis. Crucially, I argue that the process seen in 15 can only occur with plain obstruents and not preaspirated obstruents because preaspiration cannot be expressed on a moraic consonant: I propose that $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ seen in 11, aligns the preaspiration [SG] feature with the neighboring mora to the left, but the constraint $\ast\text{PREASP}[\text{SG}]\text{C}\mu$ prevents the preaspiration from being expressed on a moraic consonant. The epenthesis of a mora between the prefix’s consonant and the noun’s initial preaspirate ensures that the $\text{AlignR}_{\text{Preas}[\text{SG}]}$ constraint is met, and the $\ast\text{Preasp}[\text{SG}]\text{C}\mu$ is not violated. I argue that the constraints listed in 11 and 14 have the hierarchy in 16 below:

- (16) $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu} \gg \ast\text{PREASP}[\text{SG}]\text{C}\mu \gg \text{DEP}\mu_{(\text{wm})}$

The tableau in 17 below shows justification for the hierarchy seen in 16:

(17)

| /aap/ + / ^h kiáájo/ ‘a white bear’ | $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ | $\ast\text{PREASP}[\text{SG}]\text{C}\mu$ | $\text{DEP}\mu_{(\text{wm})}$ |
|---|---|---|-------------------------------|
| a) [aapo ^h kiáájo] V. b) [aakkiáájo] | a) | a) | b) |
| a) [aapo ^h kiáájo] V. c) [aak ^h kiáájo] | | a) | c) |
| a) [aapo ^h kiáájo] V. d) [aap ^h kiáájo] | a) | | d) |

As seen in the first line of the comparison tableau above, form 17a is the optimal candidate because it satisfies $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$, as form 17a has the preaspiration [SG] aligned with the immediately adjacent mora to the left. Form 17b, on the other hand, violates the $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ constraint, as form 17b does not express the preaspiration [SG] at all. Additionally, though form 17a violates $\text{DEP}\mu_{(\text{wm})}$, as it epenthesizes a mora, it is still the optimal form because $\text{DEP}\mu_{(\text{wm})}$ ranks lower than $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$.

Furthermore, as seen in the second line of the tableau above, forms 17a and 17c both satisfy $\text{AlignR}_{\text{Preas}[\text{SG}]}$ because both forms have their preaspiration [SG] aligning with the neighboring moras to the left. However, form 17c has its preaspiration [SG] aligned with a moraic consonant so it violates the $\ast\text{PREASP}[\text{SG}]\text{C}\mu$ constraint. In contrast, form 17a does not violate $\ast\text{PREASP}[\text{SG}]\text{C}\mu$ because form 17a has its preaspiration [SG] aligned with a

vowel, which means that form 17a is preferred over form 17c; this shows that form 17a is the optimal form because form 17c violates the second highest ranking constraint $*\text{PREASP}_{[\text{SG}]\text{C}\mu}$ which prohibits [SG] from being expressed on a moraic consonant. Again, form 17a violates $\text{DEP}_{\mu(\text{wm})}$, however, because $\text{DEP}_{\mu(\text{wm})}$ is ranked lower than $*\text{PREASP}_{[\text{SG}]\text{C}\mu}$, form 17a is still the optimal candidate.

Lastly, as seen in the third row of the tableau above, form 17d violates the $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ constraint, because the preaspiration [SG] in form 17d does not align with a mora. So, form 17a is preferred over form 17d because form 17a satisfies the high ranking $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ constraint, whereas form 17d does not.

As discussed earlier, Blackfoot word initial preaspiration cannot be expressed in the output because preaspiration requires a mora. However, theoretically, a mora could be epenthesized word initially so that [SG] could be expressed; however, this is not observed in Blackfoot. To account for this lack of word initial epenthesis, I propose that Blackfoot has the constraint in 18:

- (18) $\text{DEP}_{\mu\text{WI}}$: Do not insert word initial moras in the output that are not present in the base.

I argue that word initial epenthesis is prevented because $\text{DEP}_{\mu\text{WI}}$ ranks higher than $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$. The tableau in 19 shows justification for the proposal that $\text{DEP}_{\mu\text{WI}}$ ranks higher than $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$:

(19)

| $/^h\text{kiáájoí}/$ 'bear' | | $\text{DEP}_{\mu\text{WI}}$ | $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ |
|-----------------------------|---------------------------------|-----------------------------|---|
| a) $[\text{kiáájoí}]$ V. | b) $[\text{ʔ}^h\text{kiáájoí}]$ | a) | b) |

The tableau above shows that candidate 19b satisfies the $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ constraint, but violates the $\text{DEP}_{\mu\text{WI}}$. Candidate 19a, however, violates $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ but satisfies $\text{DEP}_{\mu\text{WI}}$. Because $\text{DEP}_{\mu\text{WI}}$ has a higher ranking than $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ candidate 19a is the optimal form. The addition of the constraint presented in 19 ensures that vowels are not epenthesized word initially.

The constraints proposed in this section offer an explanation for vowel devoicing associated with preaspiration in Blackfoot. To summarize, the constraints that I have discussed in section 3, have the hierarchy in 20:

- (20) $\text{DEP}_{\mu\text{WI}} \gg \text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu} \gg * \text{PREASP}_{[\text{SG}]\text{C}\mu} \gg \text{DEP}_{\mu(\text{wm})} \gg * \text{V}_{[\text{SG}]}$.

The ordering of the constraints seen in 20 account for the patterning of Blackfoot preaspiration [SG]: The $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ constraint explains why the preaspiration takes on the place features of the preceding vowel, and why the preceding vowel is always devoiced. The $* \text{PREASP}_{[\text{SG}]\text{C}\mu}$ constraint restricts the preaspiration [SG] from surfacing on moraic consonants, and the interaction of $\text{ALIGNR}_{\text{PREASP}[\text{SG}]\mu}$ and $* \text{PREASP}_{[\text{SG}]\text{C}\mu}$ accounts for the epenthesis of a word-medial vowel (the low ranking of $\text{DEP}_{\mu(\text{wm})}$ explains why this word-medial epenthesis surfaces). The high ranking $\text{AlignR}_{\text{Preas}[\text{SG}]\mu}$ explains why preaspiration is not observed word initially, as there is no mora with which the preaspiration [SG] can

align. Finally, the high ranking DEP_{μw} constraint prevents vowel epenthesis from occurring word initially.

5. Summary and Conclusion

This paper presents various constraints that account for vowel devoicing in Japanese and Blackfoot. In Section 2, I examined the constraints proposed in Tsuchida (2001) which explain the many factors that contribute to vowel devoicing in Japanese. In section 3, I compared the word final vowel devoicing in Blackfoot with devoicing in Japanese, and adapted/extended some of the constraints proposed in Tsuchida (2001) to Blackfoot word final vowel devoicing. Finally, in section 4, I contrasted the characteristics of Japanese fricatives with the characteristics of Blackfoot fricatives; additionally, I presented Reis Silva's (2008) analysis that Blackfoot has a three way distinction between singleton unaspirated, geminate unaspirated, and preaspirated obstruents. Furthermore, adopting the Reis Silva (2008) analysis of preaspirated obstruents, I argued that word-medial vowel devoicing is caused by the alignment of the preaspiration [SG] feature with a mora. Lastly, I proposed a set of constraints that account for the patterning of word initial preaspiration in Blackfoot.

Though both languages have vowels that are specified as [SG], Japanese and Blackfoot differ greatly with respect to the constraints that govern the appearance of [SG] vowels. The table in 22 summarizes the factors that contribute to Japanese and Blackfoot vowel devoicing:

(22)

| Language Characteristics | Japanese | Blackfoot |
|---|----------|---------------------|
| Vowels that are specified for [SG] are voiceless. | X | X |
| [SG] originates with an adjacent segment. | X | X word medial |
| [SG] is generated by a voiceless [voice] voiceless sequence. | X | |
| [SG] features is epenthesized | | X word final |
| All voiceless fricatives are specified for [SG]. | X | |
| [SG] can only appear on [high] vowels. | X | |
| [SG] can appear any type of vowel. | | X |
| [SG] is preferentially anchored to the left edge of a word. | X | |
| [SG] anchors to the right edge of the word. | | X word final |
| [SG] aligns with the immediately adjacent, retrograde mora. | | X word medial |
| OCP prevents [SG] from appearing in consecutive adjacent syllables. | X | |

As evident in the table above, Japanese and Blackfoot vowel devoicing, appear to have a few similarities, but generally differ greatly with respect to the factors that constrain the distribution of [SG] on vowels. As seen in 22 above, the [SG] specification on vowels triggers devoicing in both languages; however, in Japanese [SG] comes from or is generated by adjacent voiceless segments. In contrast, Blackfoot [SG] either derives from an adjacent preaspirated obstruent in the case of word-medial devoicing, or may be epenthesized in the case of word final devoicing. Furthermore, as Tsuchida (2001) argues, all Japanese voiceless fricatives are specified for [SG] and are seen to be a primary factor in devoicing, whereas in Blackfoot, it appears that only preaspirated obstruents carry this [SG] specification.

Japanese and Blackfoot also diverge with respect to the type of vowels on which [SG] can appear. In Japanese, only high vowels are observed to carry [SG] features, while Blackfoot allows any manner of vowel to carry the [SG] specification. The positioning of [SG] within a word is also different in Blackfoot and Japanese. As seen in 22 above, Japanese prefers to anchor [SG] to the left edge of a word, whereas Blackfoot aligns the [SG] feature to the right edge (with word final devoicing). Furthermore, Japanese onsets that are specified for [SG] share their [SG] specification with the following vowel, creating syllable

tautology. However, the [SG] from the Blackfoot preaspirated obstruent aligns with the adjacent retrograde mora from the previous syllable. Lastly, Japanese is seen to have an undominated OCP constraint that prevents [SG] from occurring on consecutive adjacent syllable, whereas Blackfoot permits consecutively devoiced segments, as seen with the form [naa^hsa] which shows devoicing on the final two syllables.

This discussion of Japanese and Blackfoot vowel devoicing has also exposed some interesting topics for future research. As mentioned in section 3, word final vowel devoicing is sometimes resisted when a word final vowel is accented; however the patterning of this accenting is not clear. In the future, it would be interesting to investigate the environments that give rise to accenting, and the effect that this accenting has on word final vowel devoicing.

Additionally, as mentioned in section 3, the process of gemination in 15, as described by Frantz (2009), has some noteworthy implications for theories of Blackfoot moraic representations. There are conflicting views in the literature about whether or not Blackfoot plain coda consonants carry a mora¹⁴. The currently held gemination theory is that when a coda consonant meets an onsetless syllable, a geminate is formed in order to concurrently fill the subsequent onset position and maintain faithfulness to the mora in the coda. However, the gemination process described in Frantz *ibid.* shows that when two consonants meet, the leftmost consonant assimilates the features from the right most consonant, resulting in a geminate. If Blackfoot codas do not carry weight by position, then it is odd that moraic consonant would be generated, when two non-moraic consonants come into contact. Because the gemination process described in Frantz is markedly different from traditional gemination, it would be worthwhile to investigate the implications that this process has for the latest theories of Blackfoot moraic representations.

¹⁴ See Elfner (2006) and Donald (2006) for further information.

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**The distribution of Irish locatives (*seo, sin, siúd*):
DP, AP, or other?**

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Abstract

This paper presents phonological and syntactic evidence from Irish demonstratives to argue for phrasal structure and an addition to the syntactic hierarchy of projections in the nominal domain – the demonstrative phrase (DemP).

Previously in the literature, demonstratives have been analyzed as belonging to the same category as adjectives (Leu 2008), or as belonging to the same category as determiners (Wiltschko 2009). In this paper, I explore the predictions made by these analyses by extending them to Irish. The Irish data refutes both of those analyses because of obligatory co-occurrence with determiners, and a lack of adjective agreement. Phonological evidence (consonantal weakening effects) further allow me to argue that, unlike what is proposed by Cinque (2005) or Roberts (*to appear*), the demonstrative projection is not low in the nominal structure, but is actually external to the determiner projection and very high in the structure.

I conclude this paper by making cross-linguistic predictions which are briefly extended to English demonstratives and outlining avenues for future research in applying these hypotheses to unrelated, non-Indo-European languages.

1. Introduction*

The literature on demonstratives makes several opposing claims. Leu (2008)¹ argues that the correct categorization of demonstratives is the category A(djective) which may be valued as definite. Wiltschko (2009)² on the other hand argues that demonstratives are D(eterminers) merged with a [location] feature. McCloskey (2004:3), looking specifically at Irish, reaches a similar conclusion stating that "the Demonstrative 'particles' are heads (possibly themselves D) which select definite DP[s]." In this study, I argue that none of these previous analyses can capture all the facts of what are known as demonstratives in Irish grammars and learning aids (Ó Siadail 1995, na mBráithre Críostaí 1999, Mac Congáil 2005). The fact that demonstratives in Irish cannot be effectively categorized as either D or A begs the question: What is the correct syntactic categorization of demonstratives in Irish? I conclude that Irish locatives *seo* 'prox(imal)', *sin* 'dist(al)', and *siúd* 'invis(ible)' belong to their own category, Dem(onstrative) (Shlonsky 2004, Cinque 2005, Roberts *to appear*) which in turn heads its own projection – DemP. It could be argued that this proliferation of syntactic categories gives way to a weaker theory that fails to explain the similarities between demonstratives and either D or A as noted in McCloskey (2004) and Wiltschko (2009), and Leu (2008) respectively. I argue in favour of the DemP only after careful consideration of the evidence which clearly separates Irish locatives from either D or A.

This paper is organized as follows: Section 2 outlines the syntactic constructions that Irish demonstratives can appear in and discusses the relevant syntactic features that this analysis is concerned with. Section 3 provides evidence against demonstratives as belonging to the category A. Section 4 provides evidence against demonstratives as belonging to the category D. Section 5 proposes an analysis of the internal structure of the DemP and makes cross-linguistic comparisons. Section 6 concludes by summarizing the advantages and consequences of this analysis and identifying avenues for further research.

2. Demonstratives in Irish

Before proceeding into an analysis of Irish locatives, it is first important to highlight the relevant features this analysis will be concerned with, as well as providing examples to demonstrate the two possible syntactic constructions locatives may appear in.

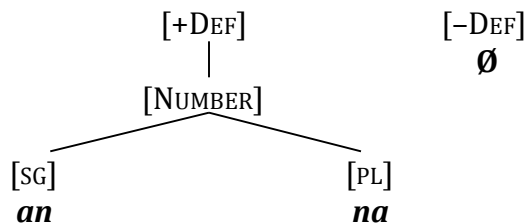
Number is an active feature in Irish, expressed on many syntactic heads: Nouns and adjectives, verbs often show number agreement with subjects, and prepositions may be conjugated for person and number. It is therefore no surprise that determiners may be inflected for number as well. Irish has two definite determiners – singular (*an*) and plural (*na*). In the absence of an overt determiner, the nominal is interpreted as indefinite.

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¹ Leu looks at many languages to make this argument, including: Swiss German, German, Norwegian, Colloquial Slovenian, Swedish, Colloquial Norwegian, Afrikaans, Old Zürich German, Trøndersk Norwegian, Japanese, Greek, Danish, English, Bafut, Icelandic, Romanian, and briefly – Irish.

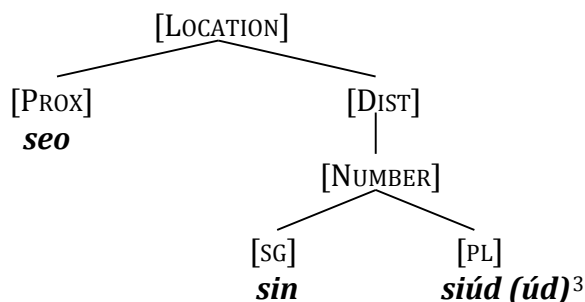
² Wiltschko looks at three languages to make her argument: Blackfoot, Halkomelem, and German.

(1) Features expressed on the determiner



Given the abundance of categories which show singular/plural distinction in Irish, we should also expect that demonstratives (especially if they are really adjectives or determiners) should also participate in this distinction. Given this expectation, I will give a preliminary sketch of the features of demonstratives below in 2. The proximate demonstrative is *seo* whereas in the distal location, both singular *sin* and plural *siúd* are available. This raises the question: Why do only distal demonstratives make this distinction?

(2) Features expressed on the demonstrative (preliminary version)



Using these features as a starting point on which to build an analysis, we can examine instances of what seems like plural agreement between demonstratives and pronouns.

(3) *seo/sin/siúd* and pronouns (Ó Siadhail 1995:36)

- a. *Tá sé seo go maith*
 COP 3SG.M **PROX** PRT good
 'this fellow/thing is good'
- b. *Bhí sí sin go deas*
 COP.PST 3SG.F **DIST.SG** PRT nice
 'that woman/thing was nice'

³ *úd* is a reduced form of *siúd*. Ó Siadhail (1995: 36) states that the difference between these forms is that *úd* is most commonly found with nouns and *siúd* is most commonly found with pronouns – this is up to individual speaker variation though.

- c. *Ní bheidís siúd sásta*
 NEG COP.COND.3PL DIST.PL satisfied
 'they' would not be satisfied'

In the above examples, we can see the contrast between the demonstratives which combine with singular pronouns 3(a-b) and that which combines with the third person plural in 3c. This observation, however, is merely coincidence. Ó Siadhail (1995:36) emphasizes 'they' not because of its plural nature, but to highlight the referent's remote status. Ó Siadhail (1995:8) gives the meaning of the adverb *ansiúd* (and I extend this to the demonstrative *siúd/úd*) as meaning "'there' and emphasizes distance (i.e., not present or not previously mentioned), as opposed to *ansin* 'there' which simply points out where something is." The critical difference between these two can be seen in the example below where the referent of the bolded DP, 'the Twelve Bens... the large mountains north of Connemara' is previously mentioned in the discourse (D-linked).

(4) Plural agreement and demonstratives (Ó Conghaile 1999: 27)

...amach faoi na cnoic, amach faoi na Beanna Beola
 out about DEF.PL hill.PL out about DEF.PL 'Twelve Bens'

[**na cnoic mhóra sin**]DP taobh ó thuaidh de Chonamara
 DEF.PL hill.PL.F big.PL.F DIST side from north of Connemara
 '...near the hills, near the Twelve Bens, those large mountains on the north side of Connemara'

If the demonstrative *siúd/úd* were truly agreeing with the determiner and noun for plural as suggested in examples 2 and 3, we would see it also surface in the bolded DP in 4. *Siúd/úd* does not surface here because the referent of the phrase is previously D-linked. D-linking is not the only instance where *sin* substitutes for *siúd/úd* though. Where, in Ó Siadhail's terms, distance is not emphasized and the speaker merely wants to point out where something is, *sin* is used. This is the case below in 5 where again, if there were plural agreement, we would expect to see *siúd/úd* surface instead of *sin*.

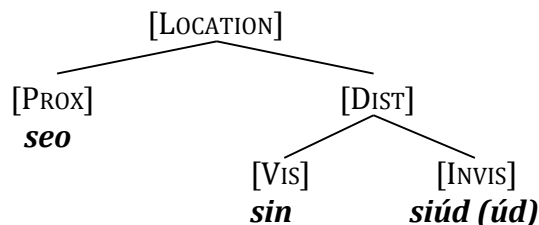
(5) Non D-linked plural agreement and demonstratives (Mac Congáil 2005: 165)

Is feirmeoirí iad na fir sin
 COP farmer.PL 2PL DEF.PL man.PL DIST
 'Those men are farmers'

I take this evidence as support for the feature distribution given below in 6 where the distal demonstratives are differentiated not by a singular/plural distinction but by a visible/invisible distinction.⁴

⁴ McCloskey (2004:2) also includes the form *udaí* in his discussion of Irish demonstratives. This form, he groups into the category of "most distal" together with *siúd/úd* and makes the narrow distinction between them by glossing *siúd/úd* as 'yon' and *udaí* as 'yonder.' I have not yet found any data to suggest that a

(6) Features expressed on the demonstrative (final version)



Now that the relevant features expressed on the demonstrative are understood, I will highlight the various syntactic constructions that demonstratives can appear in.⁵ The most common construction that demonstratives in Irish appear in is what I will call the 'sandwich construction' – so called because the determiner and demonstrative sandwich the nominal (and any adjectives) between them.

(7) The 'sandwich' construction

- a. *Tá [an fear seo]_{DP} sásta*
 COP DEF man PROX satisfied
 'this man is satisfied' (Ó Siadhail 1995: 36)
- b. *Tá [an chloch mhór sin]_{DP} go deas*
 COP DEF stone big DIST PRT nice
 'that big stone is nice' (Ó Siadhail 1995: 36)
- c. *Níl [na fir úd]_{DP} sásta*
 COP.NEG DEF.PL man.PL DIST satisfied
 'those' men are not satisfied' (Ó Siadhail 1995: 36)
- d. **Tá [Ø fear seo]_{DP} sásta*
 COP [-DEF] man PROX satisfied

The data above in 7(a-c) shows the fact that determiners and demonstratives are the peripheral members of the nominal domain. Crucially, example 7d shows that when the determiner is indefinite, use of a demonstrative is ungrammatical. McCloskey (2004:2) (although he does not agree with that analysis) identifies the most common view of this phenomenon as "discontinuous determiners" – something that will be discussed at length in section 4. When not organized with the definite determiner *an* or *na*, demonstratives may also combine with pronouns as in 8 (and above in 3), proper nouns as in 9, vocatives such as in 10, or appear as bare demonstratives as given in 11.

meaningful distinction between these forms exists in Connemara Irish – the dialect my data are largely drawn from, and so I will not consider *udaí* in this paper.

⁵ In this paper I consider only demonstratives which occur in the nominal domain. In Irish, demonstratives may also occur in sentence-initial position as what den Dikken (2006) calls a "defective copula." I leave the analysis of this form for future research.

(8) Demonstratives plus pronouns (adapted from McCloskey 2004:2)

- a. *Chuaigh sé seo ar seachrán*
go.PST 3SG.M PROX on astray
'this person went astray'
- b. *b'fhearr liom é seo fanacht sa bhaile*
prefer with.1SG 3SG.M PROX stay at home
'I'd prefer for this person to stay at home'

I assume, following Postal (1970), Abney (1987), and Baggaley (1998) (among others) that pronouns belong to the category D – so example 8 still follows the sandwich construction. The same may not be able to be said about all the other constructions listed below.

(9) Demonstratives plus proper nouns

- a. *Mháirtín sin* (Ó Shiadhail 1995:36)
Martin DIST
'That Martin' (cp. 'Oh, that Martin, he's always late')
- b. *Jackie seo* (McCloskey 2004:2)
Jackie PROX
'this Jackie person'
- c. *bhí urradh as miosúr i nGoll seo* (McCloskey 2004:2)
be.PST strength out-of measure in **Goll PROX**
'This guy Goll had astonishing strength'

(10) Demonstratives plus vocatives (adapted from McCloskey 2004: 3)⁶

- a. *a bhean seo*
Voc woman PROX
'hey, you' (addressed to a woman)
- b. *a bhean sin*
Voc woman DIST
'hey you (over there)' (addressed to a woman)

(11) Bare demonstratives (adapted from McCloskey 2004: 2)

- a. *tabhair dhom sin*
give.IMP to.1SG **DIST**
'give me that'

⁶ McCloskey notes that there is no direct translation of these forms into English, but this is a close approximation.

- b. *tá seo ag goillstean orm*
 be.PRES **PROX** PROG bother on.1SG
 'this is bothering me'

I will suggest that, although all of the above examples do not conform to the suggested structure of the 'sandwich construction', there is a commonality between all of these constructions. Rather than arguing for the account of the sandwich construction as discontinuous determiners, McCloskey (2004) suggests that the particle head of the demonstrative selects a definite DP. McCloskey cites Doyle (2002) as reaching a similar conclusion on "more or less independent grounds." Ignoring for the moment the status of the particle head, I suggest a slight revision to this statement: A demonstrative selects a DP who's referent is specific.⁷ With respect to example 11, this seems to be more accurate, and I would hypothesize that these sentences would be ungrammatical without a gesture to a specific object (as in 11a) or without D-linking (as in 11b). This hypothesis still needs to be confirmed with native speakers, however.

Now that the constructions including demonstratives in Irish are understood, as well as the syntactic features they are concerned with, I proceed with an argument against classifying these elements as belonging to the category A.

3. Arguments against an AP interpretation

In his arguments for treating demonstratives as adjectives, Leu (2008:25), in a footnote, calls the demonstratives *seo/sin* reduced forms of *anseo/ansin* 'here/there'. If this observation is indeed correct, it is pertinent to better understand these adverbs and their relationship to the locatives.

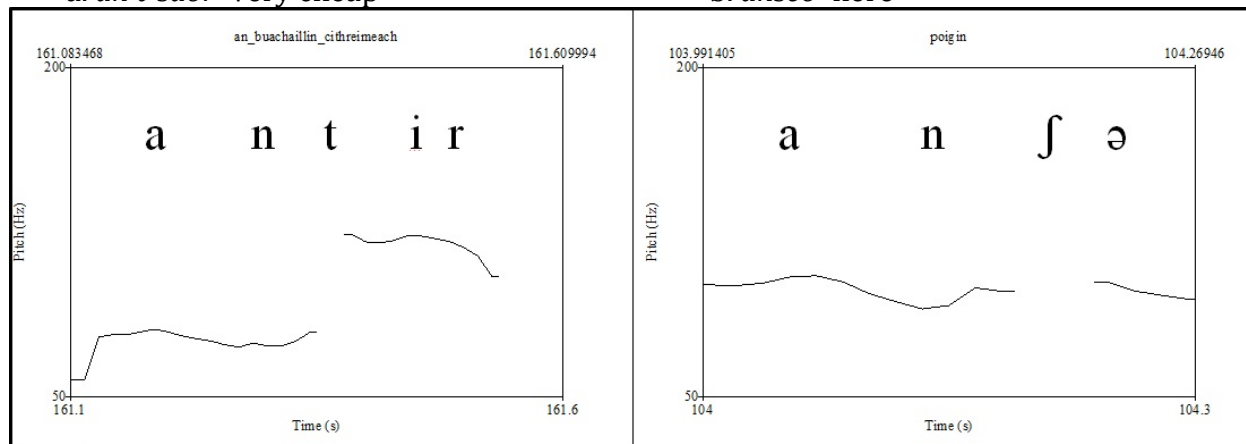
3.1. Adverbial 'here/there'

Given the sandwich construction outlined above as well as proposed DP-internal movement – either of N⁰ to D (Guilfoyle 1988, Duffield 1995, Elfner 2012) or of snowballing to get the order Noun > Adjective (Shlonsky 2004, Cinque 2005) it is possible to conceive of *anseo/ansin/ansiúd* 'here/there/yonder' as compounds made up of the definite determiner *an* and a demonstrative. Leu (2008:24-5) claims that this is evidence of locative morphemes and their compositionality cross-linguistically which feeds into his analysis of demonstratives as adjectives which may be valued as definite through movement. This is fortunately a testable hypothesis in Irish.

Compounds in Irish such as *seanmháthair* (old+mother) 'grandmother' as well as the definite article plus noun i.e., *an tír* 'the land' or quantifiers and nouns i.e., *an tsaor* 'very-cheap' have a secondary-primary stress pattern owing to a recursive prosodic word structure which mirrors the syntax (see Green 2008 or Windsor 2011b for a full discussion). The compound stress pattern can be seen on the left below in 12 where the quantifier *an* 'very' has a minor pitch raise, followed by a much higher pitch peak in *(t)saor* 'cheap.' If the adverbs *anseo/ansin/ansiúd* were compositional, as Leu (2008:24-5) seems to claim, then we should see the same stress pattern in them as in other compositional words in Irish.

⁷ Doyle (2002: section 5.4) argues in favor of a Ref(erential)P.

(12) Stress patterns in compositional forms (Ó Conghaile 1999: 27)

a. *an t-saor* 'very cheap'b. *anseo* 'here'

As can be seen in the pitch traces above, the prediction is not borne out. The pitch trace on the right displays a single primary stress peak over the first vowel and then the pitch trace steadily falls away from there. The slight raise around the halfway point is a false trace owing to the strident consonant and is not part of the word stress. In addition to the prosodic evidence, what would be classified as the determiner portion of these adverbs, *an*, cannot be pluralized. While the sandwich construction may take a plural determiner, adverbs cannot – as shown below in 13. I take this as further evidence that Irish adverbs are non-compositional.

(13) Plural determiners and demonstratives/adverbs

a. *tá an fear seo/sin anseo/ansin/ansiúd*
 COP DEF man PROX/DIST here/there/yonder
 'this/that man is here/there/yonder'

b. *tá na fir seo/sin anseo/ansin/ansiúd/*naseo/*nasin/*nasiúd*
 COP DEF.PL man.PL PROX/DIST here/there/yonder
 'this/that man is here/there/yonder'

These two pieces of evidence go against considering *anseo/ansin/ansiúd* as compositional and allows a grouping with other "adverbs of direction" (Mac Congáil 2005:104) which, with very few exceptions, are almost entirely bisyllabic as well. This points to the fact that the adverbs *anseo/ansin/ansiúd* and the demonstratives *seo/sin/siúd* are completely different lexemes though no doubt share a common ancestor. Given this conclusion, I will proceed to discuss the categorization of the locatives *seo/sin/siúd* without further discussion of adverbs.

3.2. Adjective agreement (lenition)

Lenition is a consonantal weakening phenomenon which affects word-initial consonants in certain morphosyntactic environments (Green 2007:70) (for an exhaustive list of lenition environments, see na mBráithre Críostaí 1999:27-36). Lenition is orthographically recognized as any word which has <h> in second position i.e., *bean* 'woman' ~ *an bhean*

'the woman'. Crucial to this analysis, when a feminine noun is valued as definite, the noun and all of its adjectives lenite. The locative at the end of the adjective string does not participate in this adjective agreement though, as shown in 14a. Example 14b shows that the lack of lenition on the demonstrative is not due to it being too far removed (by multiple adjectives) from the noun.

(14) Lenition and adjectives

- a. an **chloch** **ghorm** **mhór** ***sheo**/***shin**/seo/sin
DEF stone.F blue.F big.F PROX/DIST
'this/that big blue stone'
- b. an **chloch** ***sheo**/***shin**/seo/sin
DEF stone.F PROX/DIST
'this/that stone'

Importantly, the ungrammaticality of lenition on the demonstratives also does not stem from the lexeme being somehow lexically immune to the process. In the correct morphosyntactic construction, demonstratives also lenite. This is the case below in 15 where the distal demonstrative follows the lenition-causing preposition *ó* 'from', and lenites as expected.

(15) Lenition of demonstratives (Mac Congáil 2005:112)

- a. *fada* *ó* *shin*
long from DIST
'long ago'
- b. *seachtain* *ó* *shin*
week from DIST
'a week ago'

The fact that demonstratives are not lexically immune to lenition, and they do not participate in adjective agreement leads me to conclude that they are not of the category A. Whereas Leu's (2008) analysis of demonstratives as adjectives cannot be extended to Irish, I will now turn to Wiltschko's (2009) proposal that demonstratives are location features merged in D.

4. Arguments against a DP interpretation

Wiltschko (2009) argues that demonstratives are a [LOCATION] feature merged in the D⁰ drawing a distinction between languages which have the [LOCATION] feature as an inherent feature on the D (i.e., Blackfoot) and languages where [LOCATION] is an optional modifying feature (i.e., German). One prediction that comes from this analysis is that if demonstratives are determiners, they cannot co-occur. Wiltschko (2009:5) gives a German example highlighting exactly this, showing that the co-occurrence of demonstratives and determiners is ungrammatical.

(16) Ungrammaticality of Dem + D in German (Wiltschko 2009:5)

- a. **Ich habe diesen den Mann gesehen.*
I have this the man seen
- b. **Ich habe den diesen Mann gesehen.*
I have the this man seen

As we have seen in the sandwich construction, not only do determiners and demonstratives co-occur in Irish, but this co-occurrence is obligatory.

4.1. Co-occurrence

The sandwich construction, so named because nouns and adjectives when used with a demonstrative are obligatorily sandwiched between the demonstrative and a determiner, was given as 7 in section 2 and is repeated as 17 below. The fact that determiners and demonstratives not only co-occur in Irish, but are separable from each other by interceding nouns and adjectives makes it difficult to extend Wiltschko's analysis to Irish. In order to do so, we would need to propose that the structure of the sandwich constructions is: [_{DP} Det [_{NP} N] [_{AP} A] [_{DP} Dem]]. This, however, cannot be the case in Irish as the Irish DP is formed in what appears to be the *Construct State* (CS) (Guilfoyle 1988, Duffield 1995, Ó Donnchadha 2007) and the use of two determiners inside a single DP is ungrammatical as shown in 18.

(17) Co-occurrence of determiners and demonstratives (Ó Siadhail 1995:36)

- a. *Tá an fear seo sásta*
COP DEF man PROX satisfied
'this man is satisfied'
- b. *Tá an chloch mhór sin go deas*
COP DEF stone big DIST.VIS PRT nice
'that big stone is nice'
- c. *Níl na fir úd sásta*
COP.NEG DEF.PL man.PL DIST.INVIS satisfied
'those' men are not satisfied'
- d. **Tá Ø fear seo sásta*
COP [-DEF] man PROX satisfied

(18) Ungrammaticality of two determiners (Windsor 2011a)

- a. *hata an mhairnéalaigh*
hat.SG.M DEF.SG.M.GEN sailor.SG.M.GEN
'the hat of the sailor / the sailor's hat'

- b. **an hata an mhairnéalaigh*
 DEF.SG.M hat.SG.M DEF.SG.M.GEN sailor.SG.M.GEN
- c. *an hata mhairnéalaigh*
 DEF.SG.M hat.SG.M sailor.GEN(1st declension adjective)
 'the sailor hat' (Mac Congáil 2005:86)

Because the appearance of two determiners is strictly prohibited in Irish, we have strong evidence to suspect that the determiner and demonstrative are not co-occurring D-heads unless they are exactly what McCloskey (2004) argues against – discontinuous determiners (a single D head being separated across the string of [D D...Dem] with any nouns and adjectives intervening).

4.2. Arguments against a discontinuous determiner

There are two pieces of evidence against thinking that a discontinuous determiner is the correct analysis of Irish demonstratives: Number agreement and coordination. In section 2, I demonstrated that determiners and their complements (nouns and adjectives) agree in number, but demonstratives do not. I repeat the data from 5 below as 19.

(19) Non D-linked plural agreement and demonstratives (Mac Congáil 2005:165)

Is feirmeoirí iad na fir sin
 COP farmer.PL 2PL DEF.PL man.PL DIST
 'Those men are farmers'

If the sequence [D {N} {A_n} Dem] were truly a discontinuous determiner, we would expect to see some form of plurality expressed on the demonstrative as well, but there is no lexeme for plural demonstratives. Further evidence against the idea of [D...Dem] being a discontinuous determiner comes from a coordination test provided by McCloskey (2004:4).

(20) Coordinate DPs (adapted from McCloskey 2004:4)

na fir agus na mná sin...
 DEF.PL man.PL and DEF.PL woman.PL DIST.VIS...
 'those men and woman'

According to McCloskey, the data in 20 is expected if we assume that the complement of the particle Dem head (which he states may be a D itself) is in fact a coordinated DP. It is much more difficult to explain this data if *na...sin* is analyzed as a single discontinuous syntactic element.

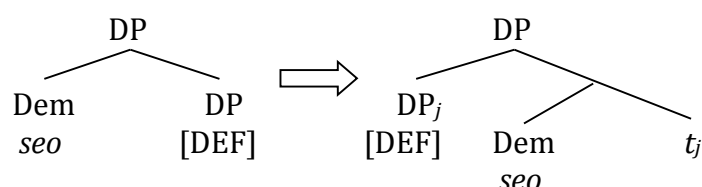
Given that determiners and demonstratives have different featural compositions (determiners may be inflected for plurality, demonstratives cannot) and that a single demonstrative may modify a coordinated DP both point to the conclusion that the string *na...sin* cannot be a discontinuous determiner. Likewise, the different featural compositions as well as the fact that two determiners within a single DP is ungrammatical in Irish means that demonstratives cannot be of the category D. Because Irish demonstratives do not

pattern with either adjectives or determiners, I propose that they must head their own phrase – DemP. I now proceed with a proposal for the structure of the DemP.

5. The structure of DemP

The subject of McCloskey's (2004) paper was not to discern the category of demonstratives, but rather to determine whether or not demonstrative heads select definite DPs, and if the word order shown in the previous examples is derived through movement or if they appear in their base merge position. Regardless of the category of the demonstrative, McCloskey argues in favor of the structure given below as 21 where the DP is merged below Dem and raises to the specifier position.

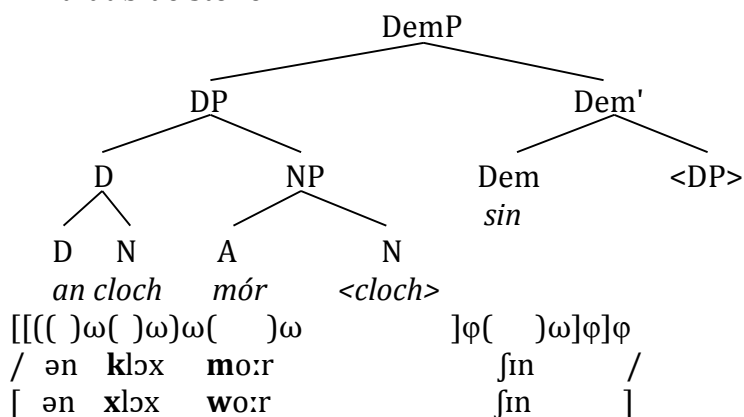
(21) DP raising to spec (adapted from McCloskey 2004:3)



I agree with the movement analysis expressed above, however, I will argue that the maximal projection which the definite DP specifies is in fact DemP.⁸ The hypothesized structure is given below in 22. This example also highlights the phonological form of the sentence which will be used as further evidence that the demonstrative is outside of the DP.

(22) The DemP

an chloch mhór sin
 DEF stone.F big.F DIST
 'that blue stone'

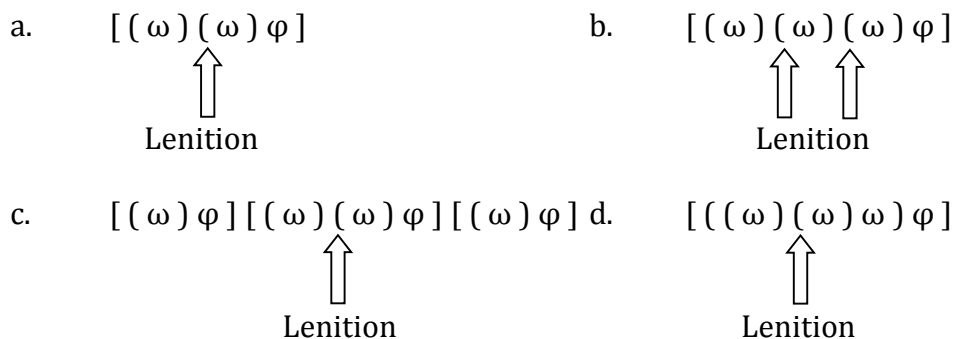


The above schematization shows the proposed structure for the Irish DemP and how it relates to the phonological output. What can be seen in this diagram is that the

⁸ See McCloskey (2004) for a full discussion of movement tests for raising the definite DP to a higher specifier position based on relationship to the modifier *eile* 'other'.

phonological component matches syntactic structure (Selkirk 2009; 2011) such that, in general terms, syntactic heads become prosodic words (ω) and syntactic phrases become prosodic phrases (φ) (Windsor 2012). Of specific interest is the phonological environment for lenition: Wherever two or more ω s are parsed into a single higher prosodic unit, lenition takes place at the left edge of the second or subsequent ω . In other words, right ω boundaries cause lenition to take place on left ω boundaries provided they are not separated by a higher prosodic boundary i.e., not belong to different φ s.

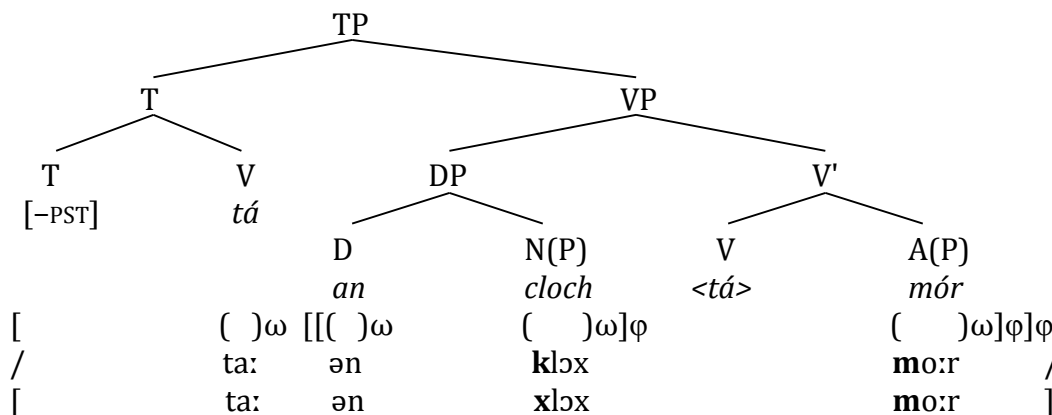
(23) Lenition environment (Windsor 2012:106)



The fact that, in the schematization given in 22, lenition is observable on the noun and adjective, but not on the demonstrative points to the conclusion that it is part of a separate φ , and by extension, a separate XP as well. This conclusion can be supported by comparing the lenition of the adjective in 22 with a copular example using the same adjective in which it is separated from the would-be lenition-causing noun by a phrasal boundary as schematized in 24.

(24) Copular modification and lenition (adapted from Carnie 1991; Windsor 2010)

tá an chloch mór
 COP DEF stone big
 'the stone is big'



The phonological evidence from lenition is contrary what would be expected if we followed the Low-Dem proposal of Roberts (*to appear*) which would place the demonstrative particle low within the DP structure below any adjectives. If this were the case, we would expect demonstratives to also show lenition, which they do not do in sandwich constructions. However, this evidence alone does not prevent the demonstrative particle from still being part of the category D, nor from projecting what could be analyzed as a recursive DP structure. In order to make this argument, I return to the argument surrounding the ungrammaticality of two determiners inside a single DP due to what has been analyzed as CS nominals. The data were presented above as 18 and are repeated below as 25.

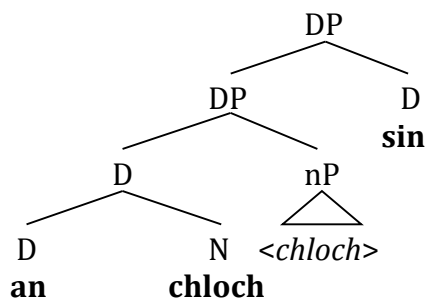
(25) The construct state

- a. *hata an mhairnéalaigh*
 hat.SG.M DEF.SG.M.GEN sailor.SG.M.GEN
 'the hat of the sailor / the sailor's hat'
- b. **an hata an mhairnéalaigh*
 DEF.SG.M hat.SG.M DEF.SG.M.GEN sailor.SG.M.GEN
- c. *an hata mhairnéalaigh*
 DEF.SG.M hat.SG.M sailor.GEN(1st declension adjective)
 'the sailor hat' (Mac Congáil 2004: 86)

In the CS, a N^0 raises to a D^0 position preventing the spellout of an overt determiner in the higher position, but forming an agreement chain for definiteness with the remainder of the DP (see Ritter 1990 or Longobardi 2001 for full discussion). The result of this movement is a string of the type $[_{DP} D N \textit{hata}_i [_{NP} [_{DP} D \textit{an} N \textit{mhairnéalaigh}] N <\textit{hata}_i>]]$ in order to gain the structure given in 25a. In order to argue that demonstratives in Irish are D^0 s themselves, or project a recursive DP, we would need to employ the structure below:

(26) Demonstratives as D^0

an chloch sin
 DEF stone.F DIST
 'that stone'

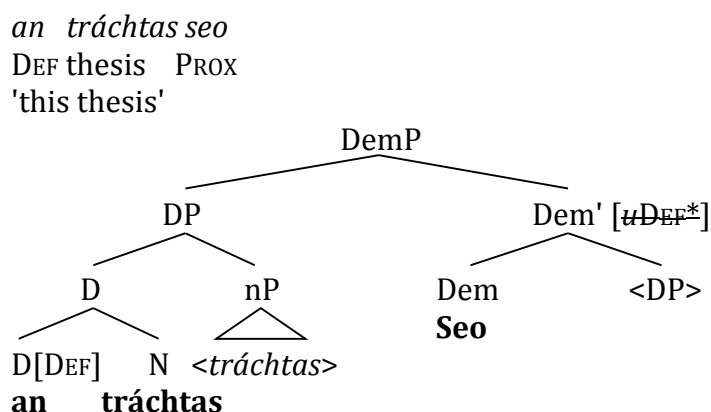


There are two major problems with this structure⁹ the most grievous of which is that it does not predict the CS to hold. In Hebrew, there is optionality between using the CS or a free genitive (Ritter 1990) but in Irish, the construct state is obligatory. If demonstrative particles were really D⁰s though, we would expect more than ever that Wiltschko's (2009) criterion banning co-occurrence would hold. Additionally, this structure fails to predict why the demonstrative must select a definite DP, and not an indefinite DP.¹⁰ I will argue that this structure is largely correct except for an additional movement and the label assigned to the demonstrative.

As previewed in example 22 above, I argue that in place of the demonstrative being labeled as an adjunct D⁰, it is actually the projecting head – Dem. Since Dem⁰ projects a phrase, it is no longer in the adjunct position, and may (from a theoretical stance) have selectional features. In this case, I argue that that selectional feature looks for definiteness and may be either a strong or weak feature depending on the language in question. Exactly the opposite of Wiltschko's (2009) analysis, I argue that demonstratives are inherently definite (rather than determiners carrying the possibility of location as either an inherent or modifying feature). If demonstratives obligatorily (cross-linguistically) carry an uninterpretable feature [*u*DEF], we can now answer why, in Irish, a definite DP is obligatorily selected. Recall that in section 2, I argued that the tie that binds all of the possible constructions with Demonstratives in Irish (in combination with: Pronouns, proper nouns, vocatives, or bare demonstratives accompanied with a gesture or a D-linked argument) was that they were all definite.

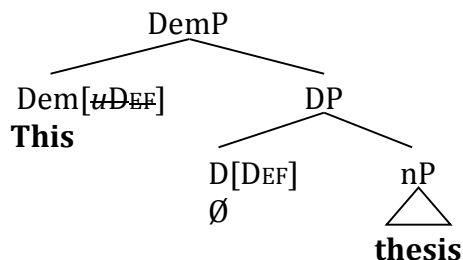
The problem for the present analysis is that I have stated that this is cross-linguistically true, and that languages would show variation depending on whether the [*u*DEF] feature on the demonstrative is strong or weak. To provide initial evidence for this claim, I offer two schematizations – one in Irish with a strong [*u*DEF*] feature (27), and the same sentence in English with a weak [*u*DEF] feature (28).

(27) Strong [*u*DEF*] in Irish



⁹ For a discussion of incorporation and head linearization in Irish, see Windsor 2012.

¹⁰ Adjuncts are typically analyzed as not having selectional features.

(28) Weak [$u\text{DEF}$] in English

In the above two structures, there are two main differences: The strength of the [$u\text{DEF}$] feature which, if strong, requires overt movement to be valued, and the fact that a demonstrative in English selects a definite, but null determiner. However, it is possible to find a construction where the (normally) null determiner in English becomes overt such as: *It was that very analysis which convinced me* where the word *very* functions as a determiner.

If this analysis is correct, it resolves the problems with analyzing the demonstrative particles in Irish as D^0 s: It does not contradict the fact that two overt determiners cannot be spelled out in a single DP; it allows demonstratives to select for definite features because they are no longer adjuncts, and as an additional advantage, it predicts and explains cross-linguistic variation such as the structure found in English.

6. Conclusion

In this paper, I have argued for the syntactic category DemP (demonstrative phrase) which dominates the previously motivated DP (determiner phrase) (Abney 1987 among many others) in the hierarchy of projections. In order to motivate this category, I have used both phonological and syntactic evidence from Irish to show that, contra previous work (Leu 2008 and Wiltschko 2009), demonstratives cannot belong to the category A or D. As mentioned earlier, it could be argued that this proliferation of syntactic categories leads to a weaker theory. I have argued that the Irish data gives positive evidence that this category is not just advantageous, but is needed, and that it offers borne-out predictions for cross-linguistic variation.

In terms of the Irish data, this analysis presents a number of advantages over other possible analyses: It explains the obligatory co-occurrence of determiners and demonstratives; it maintains a strictly left-branching structure – something that exists in all other parts of the Irish syntactic structure; it explains how demonstratives can select for definite features; it maintains a predictable phonology-syntax interface with reference to lenition patterns – and also explains why demonstratives do not participate in adjective agreement patterns, and finally, it predicts attested cross-linguistic variations which have successfully been extended to the observable pattern in English.

However, even with its many advantages, there are still several questions which need to be answered, and will be the subject of future research. It has previously been argued that in order to get case, nominals must be arguments, and to be arguments, they must have a DP layer (Longobardi 2001). This explains why nouns require DPs in their projections before merging with clausal structure, but does not motivate why a DemP layer would be required. Building on this consequence, if a DemP layer becomes required in the hierarchy of projections for the nominal domain but demonstratives themselves are not

always required we are left with additional vacuous structure. Further, if the DemP merges with clausal structure, why is extraction of the DP for subject raising (for example) to the exclusion of the demonstrative not possible? While a DemP layer makes the hierarchy of projections more parallel between the nominal and clausal domains (Szabolcsi 1994) (CP = DemP, TP = DP, vP = nP, VP = NP), and the impossibility of extraction is possibly handled through either feature percolation up to the DemP, or through a left-branching Island constraint (Ross 1967) it remains to be investigated as to whether any of these analyses makes better predictions than the others. While the present analysis offers a reason why demonstratives and determiners are so intertwined (demonstratives are obligatorily definite), the close relationship between demonstratives and adjectives (*à la* Leu 2008) is not yet understood. Finally, I have proposed a structure for English in which a null determiner is selected when a demonstrative is present (usually), however, it is not understood what this means for languages which do not have determiners, but only demonstratives – such as Korean or Blackfoot. Having provided an analysis which captures the facts of Irish and makes predictions that are borne out for at least one other language – English – future research on this topic is required using evidence from Blackfoot – a language which has five demonstratives each of which may be inflected for animacy, number, emphasis, or diminutive size, and is analyzed as having no determiners at all. I hypothesize that the phonological and syntactic facts of Blackfoot will support the proposed analysis of a DemP and will offer answers to the questions raised above.

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