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2010 - 2011

Edited by:
Analía Gutiérrez and Elizabeth Stelle

September 2012 **Volume 33**

-Papers for UBC Linguistics-

Qualifying Papers:
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The Department of Linguistics at the University of British Columbia

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Analía Gutiérrez and Elizabeth Stelle

The University of British Columbia Working Papers in Linguistics
Volume 33

September 2012

UBCWPL is published by the graduate students of the University of British Columbia. We feature current research on language and linguistics by students and faculty of the department, and we are the regular publishers of two conference proceedings: the Workshop on Structure and Constituency in Languages of the Americas (WSCLA) and the International Conference on Salish and Neighbouring Languages (ICSNL).

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PREFACE

Volume 33 of the University of British Columbia Working Papers in Linguistics (UBCWPL) series presents the first collection of Qualifying Papers from graduate students in the UBC Department of Linguistics. This collection features papers defended in 2010 and 2011.

We would first like to thank the authors for their submissions.

Enjoy the volume!

Analía Gutiérrez
Elizabeth Stelle

Context-dependent possession relations and the English double genitive[1]

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Storto (2000a,b) suggests that although the English double genitive (e.g. *two books of John's*) is a type of partitive construction (see Barker 1998), it is only felicitous in contexts of ownership/'possession proper', not in context-dependent possession relations (e.g., where John likes the books but does not own them). 20 native speakers of English heard two-sentence conversations in which Sentence 1 created an ownership or a non-ownership context and Sentence 2 contained a double genitive or possessive partitive (e.g. *two of John's books*), and were asked to rate the felicity of Sentence 2 in the context of Sentence 1. Double genitives were not rated as infelicitous in non-ownership contexts, and were often rated higher than corresponding possessive partitives in ownership contexts. In addition, whether the possessed noun could be interpreted as inherently expressing a relation to its possessor was found to have an effect on the felicity of the double genitives.

1 Introduction

There are a number of linguistic analyses in which the English double genitive[2] (e.g., *two books of John's*) is discussed in passing (cf. Smith's (1964) and Jackendoff's (1968) transformational analyses of possessives, and Kayne's (1993, 1994) development of antisymmetry); however, analyses of the construction itself are rather more infrequent. In the analyses of the double genitive which have been put forward, one interpretation which has surfaced more than once is that it is a partitive construction, i.e., a construction in which the NP before the preposition *of* denotes a subset of the NP following *of* (e.g., *one PRO of the men*; cf. Ladusaw 1982, Reed 1991). On this view, the double genitive *two books of John's* and the possessive partitive *two of John's books* will be interpreted similarly (see e.g. Jackendoff 1968, 1977; Quirk and Greenbaum 1973). The particular formulation proposed by Barker (1998) adds detail to this hypothesis in the way that the others have not, and subsequently has been elaborated on by other authors, including Storto (2000a, b). The empirical adequacy of Storto's suggestion for the distribution of double genitives is the subject of this paper.

Barker (1998) proposes that double genitives and possessive partitives are semantically equivalent, and makes two broad claims in support of this proposal. First, he takes the *of* in both constructions to be partitive *of* rather than genitive *of*[3]. According to Barker, having partitive *of* rather than genitive *of* allows both possessive partitives and double genitives to take part in certain kinds of possession relations. For example, both constructions can have as their possessum so-called 'non-relational nouns': i.e., nouns which do not inherently denote a relationship between two entities. Compare, for example, *friend* and *man*: when the noun *friend* is used in discourse, the 'friend-of' relation is "easily accessible" (Barker 1998:684); no such easily accessible relational interpretation is available when *man* is used (see also Muehlbauer 2007). Thus, *friend* is considered to be a 'relational' noun; *man* is not. Double genitives, like possessive partitives, are claimed to be grammatical with non-relational nouns;

[1] Many thanks to my qualifying paper committee – Carla Hudson Kam (chair), Lisa Matthewson, Molly Babel; to Rose-Marie Déchaine, Martina Wiltschko, and my colleagues in the Ling 530 Interface Syntax seminar 2010-2011; to my colleagues in the ISRL; to my participants; and to Douglas and Elizabeth Abel for their vocal talents. All errors and oversights are my own.

[2] 'Double genitive' is the name most often used for this construction, although some analyses of it explicitly state that it is not genitive (see the discussion below). This terminology stems from traditional grammar, where *genitive* is an overarching term encompassing possessives and partitives (see e.g., Quirk and Greenbaum 1973).

[3] Although he does not make clear what the semantic differences between the two *of*s are.

however, a construction which is similar into appearance to the double genitive, but which Barker claims to have a genitive *of* rather than a partitive *of* – the so-called "genitive *of*-phrase" (Barker 1998:683), e.g., *a friend of John* – is not. This distinction is illustrated in (1): (1a) shows the non-relational noun *lake* in a possessive partitive construction; (1b) and (1c) show the same noun in a double genitive and a genitive *of*-phrase, respectively.

(1) a. one of John's lakes
    b. a lake of John's
    c. *a lake of John

In a similar vein, and following McCawley (1988), Barker suggests that because of their having a partitive *of,* both double genitives and possessive partitives are compatible with 'context-dependent possession relations'. These are instances where the relation between possessor and possessum can be anything, so long as it is made available by the discourse context (cf. Williams 1982, Burton 1995); thus, *John's sculpture* could be, for example, a sculpture John owns, a sculpture John made, a sculpture John likes, or a sculpture John knocked over at the museum. The same is claimed to hold for the possessive partitive *one of John's sculptures* and the double genitive *a sculpture of John's*. On the other hand, the genitive *of*-phrase *a sculpture of John*, which has genitive *of* rather than partitive *of*, is claimed to only introduce a single possible relationship: i.e., the relationship in which the sculpture depicts John. For these reasons, Barker claims that double genitives are not actually 'genitive', but are in fact partitive.

Assuming that both double genitives and possessive partitives have partitive *of,* Barker's second broad claim is that both constructions must be properly partitive: i.e., the subset denoted by the possessum must not be equal to the entire set. Thus, in a context in which John has more than two books, both *two books of John's* and *two of John's books* are felicitous; however, if John only has two books, neither one is acceptable due to the violation of proper partitivity.

Barker concludes that the double genitive is "a type of partitive construction" (1998:715), but does not give any indication of distributional differences between the double genitive and the possessive partitive; under his analysis, the two constructions would seem to be interchangeable. The analysis by Storto (2000a, b), on the other hand, claims that while both constructions are indeed partitive, they are felicitous in different contexts. Storto says that this difference hinges on the necessity for double genitives to appear in contexts of ownership or "possession proper" (2000a:206). It is not clear what is meant by this, as no definition of "possession proper" is given; however, taken at face value, it would seem to mean that *two books of John's* is only felicitous in contexts where John is the owner of more than two books. This stems from Storto's suggestion – contra McCawley (1988) and Barker (1998) – that double genitives are unable to license context-dependent possession relations. Possessive partitives, on the other hand, are claimed to be felicitous in situations of context-dependent possession; i.e., they do not require the possessor to own the possessum, but can pick up any relation from the discourse context. This is illustrated in (2) (Storto 2000a:206, (7b, c)):

(2) Yesterday John and Paul were attacked by (different) groups of dogs;
    a. ...unfortunately some of John's dogs were pitbulls.
    b. #...unfortunately some dogs of John's were pitbulls.

The differences between the Barker and Storto analyses of the double genitive, possessive partitive, and genitive *of*-phrase are summarized in Table 1.

Table 1. Differences between Barker's (1998) and Storto's (2000a, b) analyses

Construction	**Partitive?**	**Proper partitivity required?**	**Compatible with context-dependent possession?**	**Compatible with non-relational nouns?**
Double Genitive	Barker: YES Storto: YES	Barker: YES Storto: YES	Barker: YES Storto: NO	Barker: YES Storto: not discussed; presumably YES if they are "properly possessed", NO otherwise
Possessive Partitive	Barker: YES Storto: YES	Barker: YES Storto: YES	Barker: YES Storto: YES	Barker: YES Storto: not discussed; presumably YES
Genitive *of*-phrase	Barker: NO Storto: n/a	Barker: n/a Storto: n/a	Barker: NO Storto: n/a	Barker: NO Storto: n/a

To explain the claimed difference in felicity illustrated in (2), Storto invokes the ability of the possessive DP *John's dogs* to recover a salient possession relation from the context. In Barker's (1995) terminology, *John's dogs* is an 'extrinsic possessive' rather than a 'lexical possessive'[4], and the possession relation is lexically underspecified. This underspecification is often represented by a variable over relations, *R*, which will take its value from some contextually defined relation (Higginbotham 1983, Burton 1995; see also Partee 1997's 'free R' and Partee and Borschev 2003's 'R_{POSS}'). Taking a short discourse parallel to the one in (2) (Storto 2000a:206, (7a)),

(3) Yesterday John and Paul were attacked by (different) groups of dogs;
…unfortunately John's dogs were pitbulls

Storto suggests that extrinsic possessives derive a possession relation from the preceding context due to the discourse semantics of the possessive DP. Because *John's dogs* is a definite DP, then under some version of a requirement that definite DPs refer to familiar referents (cf. Prince 1981, Heim 1982, Gundel et al. 1993, Lambrecht 1994), it is linked to a discourse referent introduced previously – here, the group of dogs which attacked John mentioned in the first sentence – which specifies the nature of the possessive relation. Thus, because the nominal following *of* in (2a) is the definite DP *John's dogs*, it can recover a contextually salient possession relation: namely, that the set of dogs being referred to (of which *some of John's dogs* are a proper subset) are those dogs which were mentioned in the preceding sentence as having attacked John. To explain the claimed difference in distribution between double genitives and possessive partitives, Storto argues that the possessive DP following *of* in (2b) must be indefinite, which means it is subject to Heim's (1982) novelty condition and cannot license a discourse-familiar interpretation. No independent evidence is provided for this claim.[5] In this proposal, then, possessive partitives are definite and can license contextually salient possession relations just like any other definite

[4] Barker 1995's term for a relational noun.

[5] Storto assumes that 'Saxon genitives' like *John's dogs* are "ambiguous between a definite and an indefinite interpretation, and only their indefinite interpretation is licensed in the embedded position of indefinite possessives" (2000a: 209). His evidence for this is that Saxon genitives may not always trigger maximality entailments, which definite DPs typically do; again, no independent evidence is given for this claim:

(i) These [pointing left] are my dogs, and those [pointing right] are my dogs too.
(ii) #These [pointing left] are all the dogs I own, and those [pointing right] are all the dogs I own too.
(Storto 2000a:209, (10))

nominal; double genitives, on the other hand are indefinite and cannot do so, and therefore are limited to expressing ownership relations.

Leaving aside the problem of whether *some of John's dogs* is any more definite than *some dogs of John's*, there is simply insufficient data to determine whether Storto's claim is borne out by English speakers' judgments. The example in (2b) is one of only a very few in the literature which presents a double genitive in any kind of context, and is a constructed example. Further, Abel (2002, 2006) observes that even when Storto's context-setting sentence is reworked to create a context of ownership/'possession proper', double genitives still seem less felicitous than possessive partitives (Abel 2006: 9 (19b, c)):

(4) Yesterday John and Paul bought (different) groups of dogs;
   a. ...unfortunately some of John's dogs were pitbulls.
   b. (#) ...unfortunately some dogs of John's were pitbulls.

However, this is also only a single counter-example based on the intuitions of a very small number of not-naïve English speakers, and does not give much insight into the distribution of double genitives versus possessive partitives.

The study described here explored both sides of Storto's hypothesis: whether double genitives require a context of ownership/possession proper to be felicitous, and whether possessive partitives are felicitous in any kind of possession context, including context-dependent ones. To answer these questions, naïve native speakers of English were presented with two-sentence conversations and asked to rate how 'normal' the second sentence sounded in the context of the first sentence. In half of the conversations, the verb in Sentence 1 created an ownership context for the possessum, while in the other half it created a non-ownership (context-dependent possession, or CDP) situation. 'Own' was, in this case, taken to mean something like "own as property; possess" (*Canadian Oxford Dictionary* 2001:1039). Sentence 2 contained a double genitive referring back to the possessum in half of the conversations, and a possessive partitive referring back to the possessum in the other half. Thus, four types of stimuli were presented: ownership/double genitive, ownership/possessive partitive, non-ownership/double genitive, and non-ownership/possessive partitive. Under a strong version of Storto's hypothesis, we would predict that participants would give second sentences with double genitives low ratings after non-ownership first sentences (i.e., they would find them completely infelicitous in non-ownership contexts), and that they would give second sentences with possessive partitives high ratings after both ownership and non-ownership first sentences (i.e., they would find them completely felicitous in all contexts). Under a weaker version, we would predict that double genitives would be less felicitous in non-ownership contexts than in ownership contexts, and/or that they would be less felicitous than possessive partitives in non-ownership situations.

2 The Present Study

2.1 Participants

Twenty native speakers of English (self-reported) between the ages of 18 and 42 (M = 23.5) participated in the study (6 male, 14 female). Sixteen were speakers of Canadian English, 3 were speakers of American English, and one was a speaker of Brunei English. All were paid for their participation. Participants were recruited via the UBC Psychology Department paid subjects pool mailing list (http://gsc.psych.ubc.ca/studies/paid_studies.html#mailinglist) and via word of mouth. None of the subjects self-reported a background in linguistics or any speech, hearing or language disorders.

2.2 Materials and Design

The experimental materials consisted of ten token sets; each token set was designed in a paradigm-like fashion, with all stimuli within the set (each one representative of a particular stimulus type) being as identical to each other as the design of the experiment would allow (Cowart 1997:13). A

number of the token sets were informally judged by native English speakers before being used. The first of the token sets is given in (5); a full listing is given in Appendix A.

(5) Token Set 1
   a. Ownership/Double Genitive (coded as ODG)
      1. Kevin owns a lot of very valuable sculptures, I heard.
      2. Yes, some sculptures of his are worth millions.

   b. Ownership/Possessive Partitive (coded as OPP)
      1. Kevin owns a lot of very valuable sculptures, I heard.
      2. Yes, some of his sculptures are worth millions.

   c. Non-Ownership/Double Genitive (coded as NDG)
      1. Kevin makes a lot of very valuable sculptures, I heard.
      2. Yes, some sculptures of his are worth millions.

   d. Non-Ownership/Possessive Partitive (coded as NPP)
      1. Kevin makes a lot of very valuable sculptures, I heard.
      2. Yes, some of his sculptures are worth millions.

Across the stimuli, the quantifier in the first sentence was *a lot of* and the quantifier in the second sentence was *some*, as a standardized way of indicating proper partitivity. The second sentence began with *yes*, to create a clear connection between the first sentence and the second sentence while still creating a relatively 'neutral' (reportative) context for the sentence.

Two variables were manipulated in each token set: the construction type in the second sentence (double genitive vs. possessive partitive), and the verb of the first sentence, which was either *owns* or a verb creating a context-dependent possession reading (ownership vs. non-ownership). The 2x2 design resulted in 40 (4x10) stimuli. In addition, in half of the token sets (Sets 1-5), the verb in the first sentence alternated between *owns* and a verb indicating that the subject was the creator or maker of the possessum; in the other half (Sets 6-10), the verb alternated between *owns* and a verb indicating that the subject was the maintainer or repairer of the possessum. It was hoped that, in the event of participants giving different ratings to different types of verbs/contexts, having two large groupings of verbs would show whatever patterns might emerge better than ten entirely different verbs; at the same time, if only a single rating pattern appeared, it could be seen whether that pattern held for more than one type of verb/context.

In addition to the test items, 16 stimuli testing participants' acceptance of context-dependent possession relations were created of the type shown in (6); a full listing is provided in Appendix B. These context-dependent possession (CDP) stimuli were designed to induce a reading in which the subject of the first sentence could not be understood as the owner of the items mentioned in the second sentence.

(6) A: Gerald is a professional Christmas tree decorator, I heard.
    B: Yes, his trees are always really pretty.

Finally, 104 filler items – 64 with what the author judged to be a felicitous second sentence and 40 with what the author judged to be an infelicitous second sentence – were created; an example of each is shown in (7) and (8).

(7) A: Is the symphony performing on Saturday night?
    B: No, they're playing next Thursday.

(8) A: There was a big fire last night, I heard.
    B: Yes, I learned Italian in school.

With the 16 CDPs, the total of non-experimental items was 120, three times as many as experimental items; Cowart (1997:92) recommends at least twice as many non-experimental items as experimental items, with three or four times as many being preferable if it does not create an unreasonably long experiment (the current experiment ran approximately 25 minutes). As well, Cowart advises using a mixed list of fillers, including items of both very high and very low acceptability; he notes (1994, 1997) that while having a mixed filler list (one-third sentences of very low acceptability and two-thirds sentences of very high acceptability) may raise the average rating given to experimental items compared to a pure list consisting of all highly acceptable items, the relative acceptability of experimental items is the same with both types of lists (e.g., if acceptable experimental items are rated as 3.5 and unacceptable ones as 2 with a pure list, they may be rated as 3.8 and 2.3 respectively with a mixed list). The non-experimental-item list used in this study had one-third items of very low second-sentence felicity; overall, 25% of the items the participants saw were of very low felicity. In total, 160 stimuli were used.

Two native speakers of Canadian English in their 60s – one male, one female – were recruited to produce the stimuli. The speakers were aware that their recordings would be used in a subsequent experiment. To ensure that the stimuli were produced in a natural conversational manner, the speakers were recorded together: a pair of sentences was presented using PowerPoint, with the first sentence labeled 'A' and the second sentence labeled 'B'. The speaker acting as 'B' in each of the four recording blocks was then able to produce the second sentence with an intonation contour that followed naturally from 'A''s production (insofar as possible given the (in)felicity of the second sentence in the context of the first). The speakers were also encouraged to say the sentences in a natural, conversational manner, while still pronouncing all the words reasonably clearly (without hypercorrection, but also without e.g., slurring or cutting off the beginnings/ends of sentences). The experimental items were interspersed with the fillers and the CDPs; ten experimental items (one from each token set) were presented in each recording block, and no more than three of any type of item (ODG, NDG, OPP and NPP) appeared in each block. The stimuli were checked auditorily after each recording block, and any stimuli that were not clear were re-recorded immediately. The experimental items in each token set were counterbalanced so that half of the items had a male first sentence and a female second sentence, and half of the items had a female first sentence and a male second sentence. Stimuli were recorded in mono in a sound-attenuated booth using a Sennheiser MKH 416 P48 microphone with MZW 20-1 windscreen. The recording program Audacity, running on an Apple Macintosh PowerBook G4, was used, and the recording was sampled at 44.1 kHz. Stimuli were extracted using Praat (Boersma and Weenink 2009) and saved as .wav files. Approximately 500 ms of silence were retained before the first sentence and after the second sentence in each pair to act as a buffer.

2.3 Procedure

The stimuli were presented to the participants in four blocks of 40 stimuli each; these blocks were similar to, but not identical with, the four recording blocks, as the fillers were rearranged after recording to ensure both male- and female-second-sentence stimuli appeared in each block. Again, one experimental item from each token set appeared in each block, including at least two and at most three experimental items of each type, for a total of 10 experimental items per block. The ordering of experimental items in each block is given in Appendix C. In addition, each block contained four CDPs, 16 felicitous fillers, and 10 infelicitous fillers. Four block orderings were created: 1-2-3-4, 2-4-3-1, 3-1-4-2, and 4-3-2-1. Block 1 started with a felicitous filler and ended with an infelicitous filler; Block 2 started with an infelicitous filler and ended with a CDP; Block 3 started with an NPP and ended with a felicitous filler; Block 4 started with a CDP and ended with an NPP. Each block ordering was presented to five participants. The stimuli were pseudo-randomized within blocks: the smallest number of fillers between experimental items was 0; the largest number of fillers between experimental items was 6; the largest number of consecutive infelicitous fillers was 3; the largest number of consecutive felicitous fillers was 4. Experimental items were blocked by male first sentence/female second sentence (Blocks 1 and 3) and female first sentence/male second sentence (Blocks 2 and 4). Other stimuli were not balanced for second

sentence speaker between blocks, but all blocks contained both male first sentence/female second sentence and female first sentence/male second sentence CDPs and fillers.

The experiment was conducted using E-Prime 2.0 (Schneider et al. 2007). Instructions were given orally. Participants were told they would be hearing short conversations and would be asked to decide how 'normal' the second sentence in each conversation sounded given the first sentence. If the sentence sounded completely normal to them (e.g., was a sentence they would say or would expect to hear as a response in that context), the appropriate rating would be a 4; if the second sentence sounded completely odd (e.g., was not a sentence they would say or would expect to hear in that context), the appropriate rating would be a 1; if it was somewhere between these poles, a 2 or 3 should be used. This method of explicitly defining the end points of the scale but not the inner points is recommended by Cowart (1997). Participants were encouraged to use their 'gut instincts' to make their judgments regarding the second sentence, but were also told that there would be no penalties for taking a little time to consider their responses. They were assured that there were no right answers. They were also presented with an example of what the author considered to be a felicitous-second-sentence filler (a '4' on the scale being used) and an infelicitous-second-sentence filler (a '1' on the scale being used) to orient them to the types of stimuli and the voices they would be hearing, as well as to set audio levels; these items were not used during the experiment itself. The experimenter did mention that she considered the examples to be a '4' and a '1', so as to reinforce which endpoint of the scale was which; all participants indicated that they generally agreed with those judgments. The stimuli were presented auditorily through headphones. Each stimulus was presented with a blank (blue) computer screen; when the sound file finished playing, a screen came up with the instructions "Normal? Press 4. Odd? Press 1. Somewhere in between? Press 2 or 3." Each sound file was presented once; no replays were given. Participants were permitted to take a short break between each block, and resumed the experiment by pressing the space bar on the computer keyboard. Responses were entered using a 5-button button box, of which only four buttons were used. These four buttons corresponded to a four-point ordinal scale (4 = normal second sentence, 1 = odd second sentence); an even-numbered scale was used to eliminate the possibility of having an effective 'no answer' judgment through the use of the middle value of an odd-numbered scale (Carla Hudson Kam, p.c.). Responses were recorded automatically by the computer; when the participants pressed their desired response on the button box, the next sound file began.

2.4 Results and Discussion

The results for the filler items showed a mean rating (out of 4) for the felicitous-second-sentence fillers of 3.898 (SD = 0.379), and 1.111 (SD = 0.382) for the infelicitous-second-sentence fillers. This indicates that the participants were using the rating scale as intended, and provides a standard of comparison for the felicity and infelicity of the experimental items. The CDPs received a mean rating of 3.694 (SD = 0.565), indicating that participants were generally willing to accept context-dependent possession relations as being felicitous.

Turning to the distinct experimental item types, the ratings for double genitives and possessive partitives in non-ownership and ownership contexts are represented graphically in Figure 1.

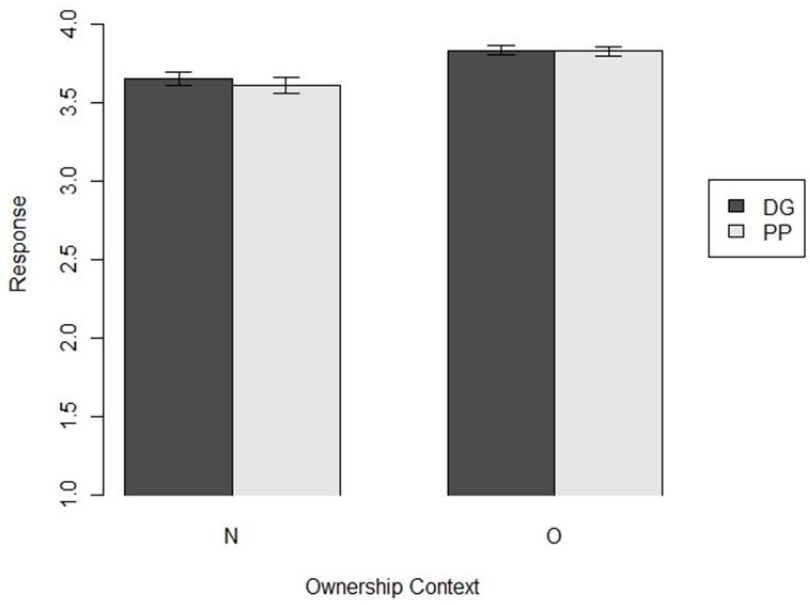

Figure 1. Mean ratings for double genitives and possessive partitives in non-ownership and ownership contexts. Error bars indicate standard error. Ownership context: 'N' = non-ownership; 'O' = ownership. Response: 1 = second sentence judged infelicitous; 4 = second sentence judged felicitous.

Recall that a strong version of Storto's (2000a, b) hypothesis predicts that the double genitives will be given low ratings – i.e., will be infelicitous – in the non-ownership condition, and that possessive partitives will be given high ratings in both ownership and non-ownership conditions. These results do not support that version of the hypothesis; the double genitives in the non-ownership condition have a mean rating far higher than the infelicitous fillers (3.65 NDG (SD = 0.632) vs. 1.11 infelicitous filler (SD = 0.382)). As well, the possessive partitives are not rated as highly as the felicitous fillers in the non-ownership condition (3.605 NPP (SD = 0.729) vs. 3.898 felicitous filler (SD = 0.379)).

The open-source program R was used for the statistical analysis (R Development Core Team 2011). Using Rating as the dependent variable and Ownership, Construction Type, and Verb Grouping as the independent variables, a by-subjects repeated measures ANOVA showed significant main effects of Ownership ($F(1, 19) = 20.4$, $p < .001$) and Verb Grouping ($F(1, 19) = 43.4$, $p < .001$), and a significant interaction between Ownership and Verb Grouping ($F(1, 19) = 10.595$, $p < .01$). Construction Type was not found to have a significant main effect ($F(1, 19) = 0.872$, $p = 0.36$). There were no other significant interactions besides that of Ownership and Verb Grouping.

While the preceding coarse-grained results seem sufficient to reject the strong version of Storto's hypothesis, a more fine-grained analysis seems desirable before making conclusions about a weaker form of the hypothesis (i.e., that double genitives will be less felicitous in non-ownership contexts than in ownership contexts, and/or that they will be less felicitous than possessive partitives in non-ownership situations), as different token sets or other groupings may show different results. Given this, and the observed interaction between Ownership and Verb Grouping, it seems desirable to split apart the two large verb groupings (Creator/Maker, in token sets 1-5, and Maintainer/Repairer, in token sets 6-10) to determine the effect of Ownership in each verb grouping. Figure 2 shows the mean ratings for the experimental items in the Creator/Maker (Figure 2a) and Maintainer/Repairer (Figure 2b) groupings.

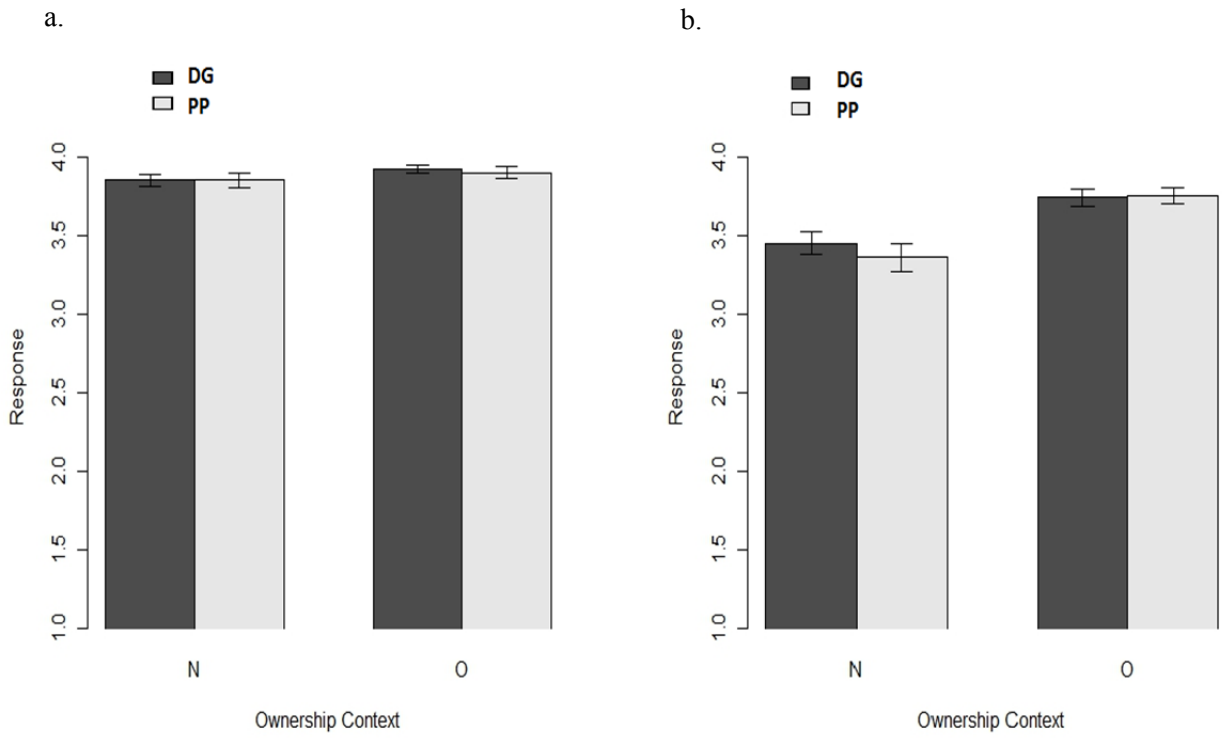

Figure 2. Mean ratings for double genitives and possessive partitives in non-ownership and ownership contexts in a) the Creator/Maker sets and b) the Maintainer/Repairer sets. Error bars indicate standard error. Ownership context: 'N' = non-ownership; 'O' = ownership. Response: 1 = second sentence judged infelicitous; 4 = second sentence judged felicitous.

These ratings show double genitives as being less felicitous in non-ownership contexts than in ownership contexts (3.85 NDG (SD = 0.41) vs. 3.92 ODG (SD = 0.27) in the Creator/Maker sets; 3.45 NDG (SD = 0.73) vs. 3.74 ODG (SD = 0.54) in the Maintainer/Repairer sets), but as being just as felicitous as possessive partitives in the Creator/Maker sets (3.85 for both NDG and NPP (SD 0.41 for NDG, 0.435 for NPP)), and more felicitous than possessive partitives in the Maintainer/Repairer sets (3.45 NDG (SD = 0.73) vs. 3.36 NPP (SD = 0.87)). Again, these results do not support a strong version of Storto's hypothesis; they also do not support a weaker version in which double genitives are predicted to be less felicitous than possessive partitives in non-ownership contexts. However, the double genitives are more felicitous in the ownership contexts than in the non-ownership contexts; this difference is much more pronounced in the Maintainer/Repairer sets than in the Creator/Maker sets, suggesting again that the interaction between ownership and verb type requires further analysis. Possessive partitives were also less felicitous in the non-ownership condition in the Maintainer/Repairer sets than the Creator/Maker sets, again reinforcing the interaction between ownership and verb type.

Separating out the two verb groupings, a by-subjects repeated measures ANOVA on the Creator/Maker stimuli – using Rating as the dependent variable and Construction Type and Ownership as the independent variables – showed a marginally significant main effect of Ownership, if one accepts significance at the .1 level ($F(1, 19) = 3.931$, $p < .1$). No significant main effect of Construction Type ($F(1, 19) = 0.0706$, $p = 0.79$) and no significant interaction between Ownership and Construction Type ($F(1, 19) = 0.1743$, $p = 0.68$) were found. A by-subjects repeated measures ANOVA on the Maintainer/Repairer stimuli, using the same variables, showed a significant main effect of Ownership ($F(1, 19) = 17.24$, $p < .001$). No significant main effect of Construction Type ($F(1, 19) = 0.3478$, $p = 0.56$) and no significant interaction between Ownership and Construction Type ($F(1, 19) = 1.234$, $p = 0.28$) were found. These results show that the effect of ownership is only truly significant in the Maintainer/Repairer sets, not in the Creator/Maker sets.

Finally, Table 2 separates out the ten token sets, showing the mean ratings for each type of experimental item within each set, as well as the overall rating for each set (SD in parentheses).

Table 2. Mean experimental item ratings and overall ratings for each token set.

Set	NDG	NPP	ODG	OPP	Overall Rating for Set
1	3.95 (0.22)	3.9 (0.45)	3.95 (0.22)	3.95 (0.22)	3.9375 (0.29)
2	3.8 (0.52)	3.7 (0.57)	4 (0)	3.75 (0.64)	3.8125 (0.505)
3	3.65 (0.59)	3.75 (0.55)	3.85 (0.37)	3.85 (0.37)	3.775 (0.48)
4	3.95 (0.22)	3.9 (0.31)	3.9 (0.31)	4 (0)	3.9375 (0.24)
5	3.9 (0.31)	4 (0)	3.9 (0.31)	3.95 (0.22)	3.9375 (0.24)
6	3.75 (0.44)	3.8 (0.41)	3.9 (0.31)	3.95 (0.22)	3.85 (0.36)
7	3.15 (0.745)	3.1 (0.97)	3.85 (0.37)	3.8 (0.41)	3.475 (0.746)
8	3.15 (0.93)	2.8 (1.06)	3.75 (0.55)	3.95 (0.22)	3.4125 (0.88)
9	3.5 (0.76)	3.4 (0.68)	3.9 (0.31)	3.95 (0.22)	3.6875 (0.59)
10	3.7 (0.57)	3.7 (0.73)	3.3 (0.73)	3.1 (0.72)	3.45 (0.73)

These results also do not support a strong version of Storto's hypothesis: the lowest-rated NDGs have mean ratings of 3.15, well above the infelicitous filler rating of 1.111, and only 9 of 20 possessive partitive stimuli received ratings as high as the felicitous fillers (3.898). Again, the results are somewhat less clear if a weaker version is assumed: while NDGs are rated as good as or better than ODGs in four of the token sets (1, 4, 5 and 10), they are rated lower in six of the ten sets. In comparison to the NPPs, the NDGs received identical or higher ratings in seven of ten token sets (1, 2, 4, 7, 8, 9, and 10). Thus, there is no unequivocal support for a weaker version of Storto's hypothesis, either one in which double genitives are less felicitous than possessive partitives in non-ownership situations seems quite strong, or one in which double genitives are less felicitous in non-ownership contexts than ownership contexts.

Using the token sets as the items, with Rating as the dependent variable and Ownership, Construction Type, and Verb Grouping as the independent variables, a repeated measures by-items ANOVA showed a significant main effect of Verb Grouping ($F(1, 8) = 11.22$, $p < .05$); this factor was not repeatable across all items, as each token set only contained one type of non-ownership verb (the model was singular); no main effects or interactions were found of any factors repeatable across all items. Separating out the two verb groupings, a by-items repeated measures ANOVA on the Creator/Maker stimuli – using Rating as the dependent variable and Construction Type and Ownership as the independent variables – showed no significant main effects or interactions. A by-items repeated measures ANOVA on the Maintainer/Repairer stimuli, using the same variables, also showed no significant main effects or interactions.

3 General Discussion

The experiment described here explored Storto's (2000a, b) claim that double genitives, unlike possessive partitives, are infelicitous when not used in a context of 'ownership or possession proper'. The study compared participants' ratings of double genitives and possessive partitives after sentences containing either the verb 'own' (assuming a definition of 'ownership' as something like "own as property; possess" (*Canadian Oxford Dictionary* 2001:1039)) or a non-ownership verb which created a context-dependent possession relation. Assuming a strong version of Storto's hypothesis, it was predicted that double genitives would receive low ratings – in the same range as those of infelicitous fillers – after non-ownership verbs, and that possessive partitives would receive high ratings – in the same range as those of felicitous fillers – in all contexts. Weaker versions of Storto's proposal predicted that double genitives would receive lower ratings in non-ownership contexts than in ownership ones, or would receive lower ratings in non-ownership contexts than possessive partitives. None of these predictions were borne out in full: the double genitives were rated much higher than the infelicitous fillers in both ownership and non-ownership conditions, and double genitives in the non-ownership condition were

frequently (but not universally) rated as equal to or better than either double genitives in the ownership condition or possessive partitives in the non-ownership condition. In addition, possessive partitives did not universally receive ratings as high as the felicitous fillers in both ownership and non-ownership conditions. Although a full rejection of Storto's proposal rests on there never being a difference between the double genitives in the two ownership conditions, or between the double genitives and possessive partitives in the non-ownership condition, these results nevertheless disfavour any version of his hypothesis: there is no unequivocal evidence that double genitives are always infelicitous – or are always less felicitous than in other contexts, or less felicitous than other constructions – in context-dependent possession situations.

Nevertheless, an interesting pattern emerged from the set-up of the experiment – in particular, from the use of non-ownership verbs falling into two broad categories: Creator/Maker and Maintainer/Repairer. Figure 2 and Table 2 show that overall, the NDGs in the Creator/Maker grouping received higher mean ratings than in the Maintainer/Repairer grouping: they were rated as good as or better than the ODGs in three of the five Creator/Maker token sets, but received an identical or better rating than the ODGs in only one of the five Maintainer/Repairer token sets. There a number of possible reasons which might explain why this occurred, including frequency of the verbs in the different groups (see Ellis 2002 for an overview of research on the impact of frequency on sentence processing), or frequency of the verbs in different syntactic frames or with different subcategorization options, i.e., whether they are usually used intransitively or transitively (the verb's 'bias'; see e.g., Clifton et al. 1984, Trueswell et al. 1993 *inter alia* for the effect of mismatched verb bias on sentence processing). However, the most likely possibility would seem to be a difference between the interpretation of creating/making and maintaining/repairing as possession relations. While this study, based on the vagueness in Storto (2000a, b), made a distinction between possession as 'owning as property' or as being completely freely determined by context, these are neither the only nor the most commonly discussed possession relations. More frequently cited are alienable relations, which are often taken to involve some formulation of the R relation discussed earlier; inalienable relations, prototypically involving body parts (cf. Vergnaud and Zubizarreta 1992); and possession involving relational nouns such as *brother* or *mother*. If one assumes that the existence of a creator or maker is inherent to the interpretation of any created or made item – such as a sculpture, a comic book, or a model train – then these would seem to be some type of relational nouns, and thus invokers of relational possession interpretations. No such relation would seem to be inherently part of the semantics of nouns like *house* or *car*[6]. It is possible, then, that some notion of possession *does* make double genitives more felicitous, but that it is *not* 'ownership/possession proper', as Storto claimed. Further investigation is thus necessary to determine precisely what kind of possession relations double genitives encode.

Appendix A: Experimental Stimuli for Experiment 1

Token Sets 1-5: Ownership vs. creator/maker

Token Set 1
First Sentences: Kevin [owns/makes] a lot of very valuable sculptures, I heard.
Second Sentences: Yes, [some sculptures of his/some of his sculptures] are worth millions.

Token Set 2
First Sentences: Does Carrie [own/design] a lot of unusual bracelets now?
Second Sentences: Yes, [some of her bracelets/some of her bracelets] are one of a kind.

[6] Although these nouns might be considered "extended inalienables" (Vergnaud and Zubizarreta 1992: 597): that is, an item taken to be an extension of the body, such as a piece of clothing or even (depending on the culture) a computer or car.

Token Set 3
First Sentences: Denise [owns/sews] a lot of colourful dresses, I heard.
Second Sentences: Yes, [some dresses of hers/some of her dresses] are lime green and orange.

Token Set 4
First Sentences: Neil [owns/builds] a lot of elaborate model trains, doesn't he?
Second Sentences: Yes, [some trains of his/some of his trains] are very detailed.

Token Set 5
First Sentences: Janine [owns/draws] a lot of violent comics, doesn't she?
Second Sentences: Yes, [some comics of hers/some of her comics] are too graphic for me.

Token Sets 6-10: Ownership vs. maintainer/repairer

Token Set 6
First Sentences: Jamie [owns/grooms] a lot of beautiful dogs, doesn't he?
Second Sentences: Yes, [some dogs of his/some of his dogs] are really gorgeous.

Token Set 7
First Sentences: Marie [owns/fixes] a lot of hard-to-find drums, I heard.
Second Sentences: Yes, [some drums of hers/some of her drums] are extremely rare.

Token Set 8
First Sentences: Does Lisa [own/clean] a lot of old houses now?
Second Sentences: Yes, [some houses of hers/some of her houses] were built around 1900.

Token Set 9
First Sentences: Adam [owns/repairs] a lot of luxury boats, I heard.
Second Sentences: Yes, [some boats of his/some of his boats] are really fancy.

Token Set 10
First Sentences: Daniel [owns/restores] a lot of antique cars, doesn't he?
Second Sentences: Yes, [some cars of his/some of his cars] are as good as new.

Appendix B: Context-Dependent Possession Items (CDPs)

1. A: Gerald is a professional Christmas tree decorator, I heard.
B: Yes, his trees are always really pretty.

2. A: Julie tends a lot of the neighbours' gardens, I heard.
B: Yes, her gardens are the best on this street.

3. A: Hayley is the best skate sharpener at the rink, isn't she?
B: Yes, her skates have excellent edges on them.

4. A: Lyle photographs a lot of beautiful sunsets, doesn't he?
B: Yes, his sunsets are just amazing to look at.

5. A: Morgan creates a lot of the desserts at the restaurant, I heard.
B: Yes, his desserts are to die for.

6. A: Does Carlos fold paper airplanes for his grandchildren?
B: Yes, his airplanes are their favourite toys.

7. A: Does Elaine wrap presents at the mall at Christmas?
B: Yes, her presents are almost too nice to open.

8. A: Cindy paints the sets for the community theatre, I heard.
B: Yes, her sets are the best part of the play sometimes.

9. A: Judy waxes the skis for the cross-country ski team, I heard.
B: Yes, her skis run faster than any others.

10. A: Heather decorates windows for small businesses, doesn't she?
B: Yes, her windows draw in a lot of customers.

11.A: Leslie is the worst shirt folder in the store, I heard.
B: Yes, her shirts always come out wrinkled.

12. A: Does Antoine sweep out chimneys for a living?
B: Yes, his chimneys are the cleanest in the city.

13. A: Scotty runs a kitchen renovation business, I heard.
B: Yes, his kitchens are featured in magazines sometimes.

14. A: Valerie customizes computers for recording studios, doesn't she?
B: Yes, her computers are set up just for music recording.

15. A: Does Ryan re-sole boots for construction workers?
B: Yes, his boots are usually good for another two years.

16. A: Maggie plans weddings for a lot of rich women, I heard.
B: Yes, her weddings are incredibly lavish.

Appendix C: Ordering of Test Items

Block 1	Block 2	Block 3	Block 4
1OPP	8NPP	2ODG	5NDG
2NDG	5ODG	9NPP	8OPP
3NPP	6OPP	7OPP	10NPP
4ODG	3NDG	8NDG	3ODG
5OPP	2OPP	1NPP	9NDG
6NDG	4NPP	10ODG	4OPP
7NPP	9ODG	4NDG	1NDG
8ODG	7NDG	3OPP	2NPP
9OPP	10OPP	5NPP	7ODG
10NDG	1ODG	6ODG	6NPP

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Acoustic and social parameters on phonetic imitation: gender, emotion, and feature saliency

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Unconscious phonetic imitation has been elicited in a variety of paradigms. Conflicting findings have centered on the potential influence of a person's gender, and have alternately reported greater imitation by men, greater imitation by women, and no gender differences in imitation. The present investigation was designed to clarify this issue by examining interactions between participants and model-talker gender across two acoustic features: voice onset time and vowel quality. Two additional social factors – affective stance towards the models' voices and emotional reactivity of the participant – were also examined for their influences on degree of imitation. Three main results emerge: 1) an imitator is more likely to mimic a model talker of the opposite gender; 2) males and females are equally likely to imitate across acoustic features; and 3) features are imitated to different degrees, and may be imitated differently across socially defined subgroups (i.e. not gender-based).

1 Introduction

Research has demonstrated that subtle forms of imitation pervade our every interaction. Sometimes we are aware of these behaviors – we might notice yawning in response to a neighbor's yawn, or adopt a friend's accent for a word or two in conversation. Studies have shown, moreover, that mimicry is frequently unconscious. For example, behavioral imitation has been observed in unwitting physical actions, such as foot-tapping, face-touching, or head-scratching (Chartrand & Bargh, 1999). Imitation of facial expressions, along with the associated emotional affect, has been documented even in response to inanimate stimuli (Dimberg et al., 2000). Speech-oriented imitation has been observed across a wide range of species (Hile et al., 2000), age groups (Grusec & Abramowitch, 1982; Goldinger, 1996), and social situations (Giles & Powesland, 1975; Babel, 2009). These behaviors appear to begin in infancy: gross imitation of adult oral gestures has been observed in human and primate populations as early as the first day after birth (Meltzoff & Moore, 1983; Ferrari et. al, 2006), while vocal imitation has been documented in newborns by the twenty-week mark (Kuhl & Meltzoff, 1996). It is theorized that imitation in early development is crucial for cognitive and social development (Bandura, 1986); the functions and origins of adult imitation, however, are less clear.

Current theories of imitation largely adhere to one of two categories: those that cite unconscious, automatic behavioral responses as the underlying mechanism, and those that hypothesize social, albeit frequently subconscious, motivations as the primary function driving imitation. In the adult phonetic accommodation literature, Trudgill (2008), for example, suggests that imitation is automatic, and should emerge irrespective of social or abstract linguistic factors. He argues against the idea that imitation serves primarily as a means of expressing national/social identity, but rather that it is a mechanical, innate, and "deeply automatic process" (2008: 252). Labov (2001) and Eckert (2001), on the other hand, claim that imitation is a socially-mediated process that functions to signal association with or distance from a particular social class/group. Though often conceptualized as being in opposition to one another, these two theories are not mutually exclusive. Rather, they appear to describe different aspects of a broad and ubiquitous phenomenon. The cognitive mechanism that allows the behavior to take place may in fact reflect a primary, evolutionary drive to imitate. The degree and direction of imitation, however, may reflect a vast array of social nuances.

Recent research seems to support this idea (Nielsen 2008; Babel 2010). For example, in a study on vowel imitation of an Australian talker by New Zealanders, Babel sought to manipulate degree of imitation by presenting negative and positive versions of the stimulus to the participants. This manipulation yielded no results – participants were equally likely to imitate the Australian model talker,

regardless of presentation. Participants' implicit biases for or against Australians, however, was predictive of future imitation. These results suggest that there is an underlying drive to imitate, and that this drive is stable enough to overcome a short-term negative social manipulation. A person's implicit world-view, however, is sufficient to block an otherwise "automatic" response to novel stimuli. Findings such as these have highlighted the importance of characterizing the extent and nature of both phonetic and social influences on imitation so that the field can develop more accurate and useful theoretical models of how imitation happens, when it is predicted to occur, and what functions it serves.

One way of determining the multiple factors influencing imitation is by identifying those areas where it is variable. For example, population differences in rates or types of phonetic imitation could offer insight into a potential hierarchy of automatic versus socially-moderated behavior. One population parameter that has been frequently examined in the imitation literature is gender. Intriguingly, however, experimental results have led to conflicting conclusions: results have alternately demonstrated higher degrees of imitation among men (Pardo, 2006; Nielsen, 2008), higher degrees among women (Bilous & Kraus, 1988; Namy et al., 2002), and equal amounts of imitation from both sexes (Babel, 2010). These different findings are further compounded by the varying metrics used to analyze imitation, which have relied on a mixture of perceptual and acoustic measures.

For example, Namy, Nygaard, and Sauerteig (2002) found that women accommodated more than their male counterparts in an immediate shadowing task in which participants were exposed to identical word-list productions of two male and two female model voices. Furthermore, while male participants showed no difference in degree of imitation to either male or female models, women were observed as imitating the male voice to a greater degree. These findings were taken to support the perceptual sensitivity hypothesis, which claims that women are more sensitive to subtle acoustic features than are men (2002: 423-424). As noted by the authors, however, one voice appeared to garner the greatest amount of imitation from all participants. This may indicate that a particularly salient, or appealing, characteristic of the model talker's voice blocked imitation to the other models, making a gender-based comparison across talkers untenable.

Subsequent studies have illustrated the tenuousness of these findings. For example, using a similar perceptual task for assessing imitation, Pardo (2006) found that males were perceived as showing greater levels of imitation than females. Due to the differences in experimental paradigm (Pardo used conversational dyads as opposed to the immediate shadowing paradigm used by Namy and colleagues), a direct comparison of the two studies is difficult. Both studies, however, highlight a central problem in the phonetic accommodation literature: without concrete acoustic measurements of imitation, it is impossible to determine what the imitation-perceivers are basing their decisions on, and thus what might be driving the different types of imitation in the two experiments. Furthermore, we cannot dismiss the possibility that participants converge with a model in ways that perceivers systematically fail to recognize.

Recent imitation studies have begun to address this gap by manipulating and analyzing specific acoustic features. Nielsen (2008) used extended voice onset time (VOT) as a trackable acoustic measurement of imitation in a spontaneous imitation task with an exposure phase. Her results converged with Pardo's reported gender asymmetries: males imitated more than females. Yet Nielsen noted in her analysis that female participants had naturally longer VOTs than their male counterparts. Nielsen proposed two hypotheses to account for the gender-based pattern. Women may have accommodated less because the modified VOT stimuli were less salient (i.e. too close to their own baseline productions). Alternatively, perhaps this pattern is a reflection of a universal tendency to converge more towards the same gender – as only a male model voice was presented during the experiment, female participants showed lower levels of imitation.

Another study that used explicit acoustic measures of imitation discovered yet another pattern of gender-based differences. In an immediate shadowing task Babel (2009) determined that both men and women showed similar cumulative degrees of imitation to vowel targets. An asymmetry in the timing of this imitation was noted: while men accommodated to the target in the first imitation block and did not change over time, women showed increasing amounts of imitation over repeated exposure to the stimuli. These results were further moderated by the participants' implicit racial biases, whether or not visual representations of the model talkers accompanied the auditory stimuli, and how attractive the participant considered the model talker. Babel, echoing Dijksterhuis and Bargh (2001), concludes that a fundamental component of the social nature of accommodation may actually be the ability to *not* imitate a stimulus

(2009: 145 – 148). Babel's results furthermore suggest that a diverse number of social factors may have caused the variety of gender-based patterns of imitation reported in the literature.

These disparate findings leave us with a number of unanswered questions. First, despite the conflicting nature of the observed gender-based patterns in the literature, is the degree to which a person imitates actually moderated by his/her gender and/or by the model talker's gender? Are these results confounded by unrelated social factors? Alternatively, perhaps studies have unintentionally targeted different acoustic features that are differentially available to imitation. If this is the case, it might suggest that men and women mimic different sets of acoustic features.

The present study addresses each of these questions. The basic design, following Nielsen (2008), involved a blocked-shadowing task in which participants were exposed to a continuous stream of the model voice stimuli during one block. Unlike in previous studies, the current design exposed participants simultaneously to both a male and female model talkers' voices, one of which exhibited an acoustic manipulation (extended VOT) that allowed the researchers to unambiguously track gender-based differences in imitation. A second acoustic feature, vowel quality, was also examined, allowing for a comparison of the relative salience of the different acoustic features. Follow-up questionnaires and informal interviews were conducted to assess participants' affective stance towards the stimuli and the participant's emotional reactivity profile. With this information, it is possible to examine the relative contributions of gender, voice preference, and emotion to predicting imitation.

1.1 Predictions

A number of findings in the linguistic literature conspire to suggest that women are more likely to imitate, or to imitate to a greater degree, than men. Firstly, numerous studies have reported higher levels of imitation by women than men (Namy et al, 2002, Bilous & Kraus, 1988). Evidence also derives from sociological studies, where it has been repeatedly suggested that women are the bearers of language change (e.g. Labov, 2001). More specifically, women use a higher degree of newly innovated forms than do men – a process that likely involves explicit imitation of novel linguistic forms. Recent research has also indicated that women rely more heavily on episodic traces than men (Ullman et al, 2008). This is of particular import to imitation studies, since a popular theory of the mechanism allowing phonetic imitation involves exemplar-type representations (Goldinger, 1996).

According to exemplar theory, linguistic perception involves storing detailed traces of phonetic units (e.g. phrases, words, or syllable) in memory. Activation of recently acquired traces in subsequent productions results in imitation. An important prediction of this theory is that lexical frequency will negatively correlate with degree of imitation, i.e. lower frequency words, which have a less stable exemplar-based representation in memory, will be more influenced by novel percepts of that token. Higher frequency tokens, on the other hand, have a much more stable phonetic representation due to the massive accumulation of episodic traces. It then follows that newly perceived repetitions of a given token will have less weight in changing the abstract memory form. These predictions have found some support in the accommodation literature (Goldinger, 1998). If the Ullman et al. findings are correct, an additional prediction of exemplar theory will be that women imitate to a greater degree than men.

Other social factors are known to influence imitation and may be responsible for the observed gender asymmetries in the imitation literature. It is well known that behavioral imitation is highly influenced by a person's affective stance toward the target. For example, McIntosh et al. (2006) found in a controlled study that both pre-existing and artificially manipulated liking led to greater levels of imitation. It has also been observed that the emotional valence of the model used to elicit imitation has an influence (Hess and Blair, 2001). A factor that has not yet been explored, however, is the emotional profile of the person doing the imitating. Studies have demonstrated that people high on emotional reactivity are quicker at correctly identifying facial affect than control participants (Lynch et al., 2006). This suggests that higher levels of emotional reactivity correlate with greater sensitivity of other people's facial cues. It was hypothesized in this study that people high on emotional reactivity (as assessed by the Nock et al. 2008 questionnaire) would be more sensitive to multiple types of interpersonal cues, and thus would exhibit higher degrees of imitation.

In sum, determining the parameters that influence the direction of phonetic mimicry is mired in complexity. This study seeks to systematically examine the effect of gender on imitation, while

addressing the potential confounds created by other social factors and different acoustic features. The specific questions pursued in the analysis are as follows: (1) Does an imitator's gender determine their degree of imitation? (2) Does a target's gender determine degree of imitation? (3) Do other social factors predict the direction of imitation to the same degree, or better than gender? and (4) Are there feature-based differences in imitation?

2 Methods

Participants

Twenty native speakers of English were recruited from the University of British Columbia. Participants had no reported history of speech or hearing deficits, and received ten dollars for their participation. Two participants have been excluded from the analysis – one due to experimenter error, the other due to technical issues. Seven female and three male subjects, ranging from 19 to 34 years old, participated in each condition.

Design

Following Nielsen (2008), this study employed a blocked-shadowing design. In a blocked-shadowing task participants proceed through three phases: a pre-exposure production block, the exposure block, and a post-exposure production block. A novel aspect of this study was the presentation of two model talker voices (one male, one female) during the exposure phase; one of the two voices was modified to extend the voice onset time (VOT) of every token with initial aspiration. Participants were additionally asked to complete a fourth block, where they filled out vocal preference and emotion questionnaires.

Procedure

Participants were assigned to one of two conditions: *male-modified* or *female-modified.* Stimuli were presented through E-prime Experimental Software (Schneider et al., 2007) in a sound-attenuated booth at the University of British Columbia. Participants were digitally recorded using a head-mounted AKG C520 microphone. In the first block of the experiment, participants were asked to produce the stimuli word list as naturally as possible as individual words were displayed at two second intervals on a computer screen. In block two the auditory stimuli were played in a continuous stream, exposing the participants to four repetitions of each word (two identical male tokens; two identical female tokens), randomly dispersed across the list. In the male-modified condition, participants heard the extended VOT productions from the male model talker, and the unmodified tokens from the female talker. The female modified condition involved the reverse. Finally, in the third block participants reproduced the entire word list. Stimuli were randomized in every phase. Vocal preference and emotion questionnaires were administered in the final block, and informal interviews were conducted post-experiment to corroborate participants' implicit/explicit emotional stance towards the vocal stimuli.

In the production blocks (pre- and post-exposure), participants read a randomized list of the entire stimuli set off of a computer screen. In the exposure phase, however, only a subset of the stimuli was presented auditorily. This subset included all of the /p-/ initial and the majority of the sonorant/fricative-initial words. The /k-/ initial words were not presented during the exposure phase; they therefore served as a way of measuring generalization of extended VOT to a novel place of articulation.

Materials

Stimuli

Stimuli included a total of 184 words, divided into three types: /p-/ initial (n=87), /k-/ initial (n=22), and sonorant or fricative initial (n=75) (see Appendix B for a complete stimuli list). Imitation targets were defined as voiceless stop-initial words or words with a particular vowel quality. Stimuli were further divided based on lexical frequency. Most of the /p-/ and /k-/ words were identical to those used in Nielsen (2008) (n=103). High frequency words were designated as those occurring more than 50 times per million in the Kucera and Francis (1967) database and above 1000 in CELEX2 (Baayen et al., 1995). Low frequency words occur in the Kucera & Francis and CELEX databases fewer than 5 times (per million) and below 300, respectively. The remaining 75 sonorant/fricative initial and six voiceless

stop initial words were selected from Nielsen (2008) and Babel (2009). The Babel stimuli were similarly coded for high vs. low frequency, based on the CELEX database (Baayen et al., 1993). Fifty-two percent of the stimuli were coded for vowel quality, belonging to one of four categories: /ɪ, æ, ɑ, u/. This left 15 sonorant/fricative-initial words as filler.

Stimulus construction

Two model talkers, a 28-year-old male Idaho-native and a 22-year-old female Montana-native were asked to produce the /p-/ and sonorant/fricative-initial stimuli three times. The stimuli were presented in random order using E-prime Experimental Software 2.0 (Schneider et al., 2007) with self-administered breaks between blocks. The model talkers were digitally recorded using a head-mounted AKG C520 microphone in a sound-attenuated booth at the University of British Columbia. For the sonorant/fricative-initial stimuli the most natural-sounding tokens (one per stimulus type) were selected for each talker by the investigator. The /p-/ initial stimuli were selected based on two criteria: relatively long aspiration, as produced naturally by the model talkers (approximately 60-80 ms.), and clarity/naturalness. Restricting /p/ tokens to those with naturally longer VOTs was done to minimize the artificiality of manipulated tokens that might occur due to word duration or segment transitions associated with short VOT. All /p/-initial stimuli were manipulated to increase aspiration by 40 msec. This was achieved by copying a 20 ms slice from a point near the initial burst, and splicing the copied aspiration into the middle of the 20 ms section two times. This location in the aspiration was chosen so as to minimize conflicting transition information that might occur closer to the point of voicing onset. All manipulated stimuli had VOTs of more than 100 ms. A graphic representation of an unmodified and modified /p-/ initial token is given in Appendix A. A trained phonetician confirmed naturalness of tokens in a blind-to-condition test post-manipulation.

Post-task questionnaires

Two questionnaires were administered at the end of the task in order to assess a participant's affective stance toward the male and female model talkers' voices and the participant's emotional reactivity score. Affective stance was determined through questions directed at the participant's like/dislike of the male and female voices, familiarity with their perceived regional accents, and sense of vocal similarity between participant and model talker. This questionnaire was automated and completed in the sound booth; however, participants' answers were corroborated and explored in informal interviews post-experiment with the investigator. Emotional reactivity was assessed through the Emotion Reactivity Scale (Nock, et al., 2008), and was administered automatically through the E-Prime Experimental Software 2.0 (Schneider et al., 2007) in the fourth block of the experiment. All questions in both formal and informal questionnaires are included in Appendix C.

2.1 Analysis

Formant and VOT measures were derived through Praat (Boersma & Weenink, 2005). The procedure for analyzing each acoustic feature is discussed below. (1) summarizes the steps used to create an imitation metric for each feature.

Aspiration was defined as the interval between the initial burst and the onset of voicing. For consistency, onset of voicing was defined as the point at which the first glottal pulse crossed the zero amplitude bar of the waveform in the negative direction. These endpoints were set by hand, and a Praat script automatically extracted the duration. Imitation scores were then calculated for every token by subtracting the pre-exposure VOT of a given word from that word's post-exposure VOT. This meant that a positive value indicated an increase in the participant's VOT, i.e. imitation, while a negative value indicated decreased VOT, i.e. divergence (see (1)).

For the vowel analysis, boundaries were set by hand around target vowels. A Praat script extracted averages of the first and second formants from the middle 50% of each vowel. These formant values were normalized using the Lobanov z-score formula (Lobanov, 1971; Adank, Smits, & Van Hout, 2004) to eliminate physiological differences across talkers without masking meaningful dialectal or stylistic features. It was necessary to establish the relationship between the participant's pre- and post-exposure production to the models' productions in order to assess imitation. On the assumption that

changes in an individual's vowel space are best understood in the aggregate (i.e. through a combination of F1 and F2), difference scores between model talker and participant were calculated using the Euclidean distance, which yields a non-linear combination of F1 and F2 measures. Imitation scores were then derived by subtracting the post-exposure difference value from the pre-exposure. These values represent relative distance of a vowel token to the model talkers' vowel space; therefore, a negative difference score indicates a decrease in distance (i.e. imitation). As noted above, however, VOT scores representing imitation are *positive* in value. For ease of comparison across features, all vowel difference scores were therefore assigned the opposite sign (see (1)).

In order to make gender-based comparison of imitation rates to vowels, it was necessary to map the relative similarities/differences between the model talkers. If their vowel spaces differ, observed differences in levels of imitation may reflect dialect preference, and hence confound imitation asymmetries due to target/participant sex. A multivariate analysis of variance with normalized F1 and F2 measures as the dependent variables and Vowel type (i, ɪ, e, ɛ, æ, u, o, a) and Talker as independent variables revealed no significant difference between talkers across vowels ($F(2,211)=0.279$, $p=.757$) and no interaction between Talker and Vowel type ($F(14,424)=1.16$, $p=.307$). Vowel type (as expected) was a significant factor ($F(14,424)=76.44$, $p<.001$). A chart of their separate vowel spaces can be found in Appendix A.

All statistical analyses were conducted through SPSS 13.0 statistical software (SPSS Inc., Chicago, IL).

(1) *Steps taken to derive imitation scores for each acoustic feature under analysis. Subscripts reference block number; DF = difference.*

Acoustic Feature	Step 1	Step 2	Imitation Scores
VOT			$VOT_2 - VOT_1$
Vowel	*Lobanov Normalization*	*Euclidian distance:* $Model_1 - Partipant_1 = DF_1$ $Model_2 - Partipant_2 = DF_2$	$(DF_2 - DF_1)*(-1)$

3 Results

The effects of gender, voice preference, and emotional reactivity profile as predictors of imitation are first analyzed by each feature type (vowel and VOT) separately. Comparisons of imitation across features are made in section *3.3*.

3.1 VOT

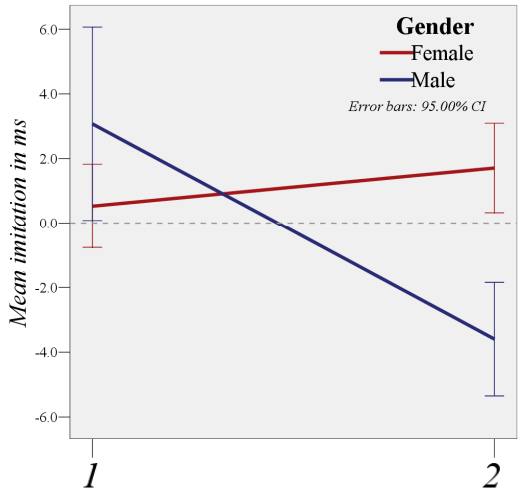
Three factors were hypothesized to have a potential effect on VOT accommodation: gender of participant, gender of the model talker, and lexical frequency. An additional component of the experimental design involved the inclusion of /k/- initial stimuli in the production set. Participants were not exposed to /k/-initial stimuli from either model talker; rather, they served as test items for evidence of feature generalization. This effect has been reported by Nielsen (2008), and is taken as evidence for the use of a higher-level linguistic process than simple exemplar-trace activation in the process of imitation. Four fixed factors were therefore entered into a mixed effects model with Imitation as the dependent variable: Gender, Condition (female-modified vs. male-modified), Frequency, and Stimulus type (target /p/- vs. novel /k/-). The model revealed significant effects of Condition ($F(1,1861)=7.95$, $p=.005$) and Frequency ($F(1,1861)=5.27$, $p=.022$). There was also a significant interaction between Condition and Gender ($F(1,1861)=16.75$, $p<.001$).

The interaction of condition and sex is demonstrated in the figure in (2). The individual lines represent male vs. female participants, and indicate the degree of imitation in both the female-modified and male-modified conditions. Imitation scores are given in milliseconds along the y-axis, where zero signifies no change from pre- to post-exposure productions. As the figure illustrates, males and females imitated models of the opposite sex. In the Female-Modified Condition, males displayed greater degrees of imitation than their female counterparts. In the Male-Modified condition, females were larger imitators

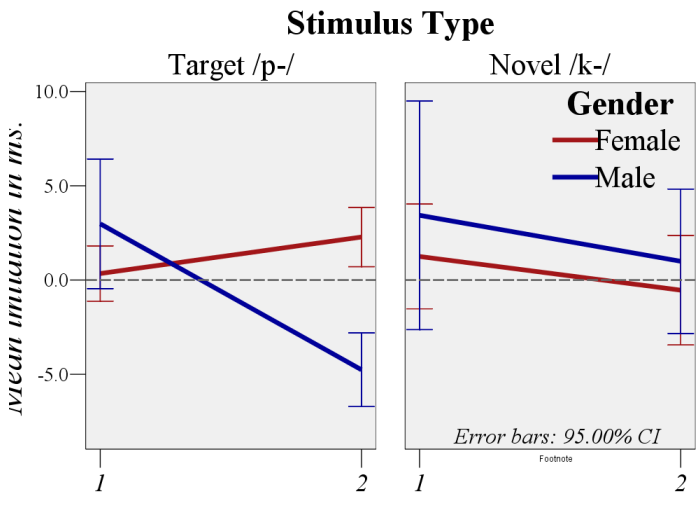
than the males. In fact, (2) reveals that not only did men imitate the male model less than the female model, they actually *diverged* from the male's extended VOT by significantly shortening their own VOT productions. Female participants were less likely to imitate the female model; however, they did not show significant divergence from the female-modified voice.

The effect of gender and condition was also analyzed in reference to target type. Only the /p-/ initial stimuli were present in the exposure phase. All /k-/ initial tokens were included to test for patterns of generalization, and thus corroborate Nielsen's findings (2008). As can be seen in (3), there was no significant generalization to /k-/, in either difference direction. Furthermore, while males and females display the previously discussed asymmetrical pattern for the target /p-/ stimuli, their behavior is parallel in their productions of /k-/ initial stimuli. This is compelling evidence for a lack of generalization to the novel /k-/ stimuli.

(2) ***VOT Imitation by Gender and Condition***



(3) ***VOT Imitation of Target vs. Novel Stimuli***



Mean VOT results collapsing across participants are reported in the table in (4). Similarly to previous studies on VOT, there was great variability both between and within subjects, as can be seen from the large standard deviations. Significant imitation was present only for low frequency words ($t(1076)=2.59$, $p=.010$, $M=1.54$ms, $SD=19.52$). Neither lengthened VOT imitation nor VOT divergence were significant effects for high frequency words ($t(789)=-.819$, $p=.413$, $M=-0.56$, $SD=19.20$). This relationship follows the pattern for frequency effects predicted by exemplar theory. Presence of imitation was also calculated for each participant through one-sample *t*-tests. A participant was considered an imitator if their VOT imitation score (the difference between pre- and post-exposure VOTs) was significantly greater than zero ($p<.05$). By this criterion, four participants imitated the lengthened VOT (6). The imitation scores from one additional participant reached a marginal level of significance ($p=.053$). Three participants exhibited the reverse behavior, and significantly decreased their VOT durations (5).

3.1.1 Emotion and voice preference

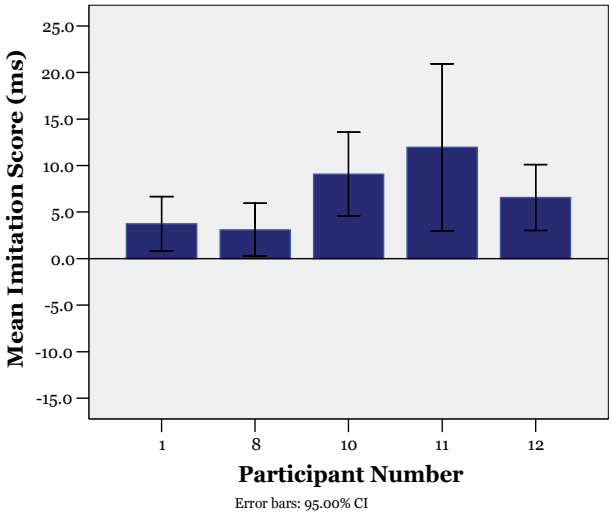
Degree of imitation was further analyzed in relation to vocal preference and emotional reactivity (Nock et al., 2008). A mixed effects model, with vocal preference and emotional reactivity as fixed factors, revealed significant effects of both emotion ($F(15,1831)=6.58$, $p<.001$) and voice preference ($F(1,1831)=7.90$, $p=.005$) on imitation. To determine the relationship between emotional profile and imitation, a Spearman's correlation was calculated, yielding a non-significant mild positive correlation ($r(2950)=.042$, $p=.105$). This relationship indicates that people with higher emotional reactivity scores are *more* likely to imitate than those with low emotion scores. To display this interaction more intuitively,

(4) *Average VOT, standard error, and standard deviation (ms) are given by stimulus type*

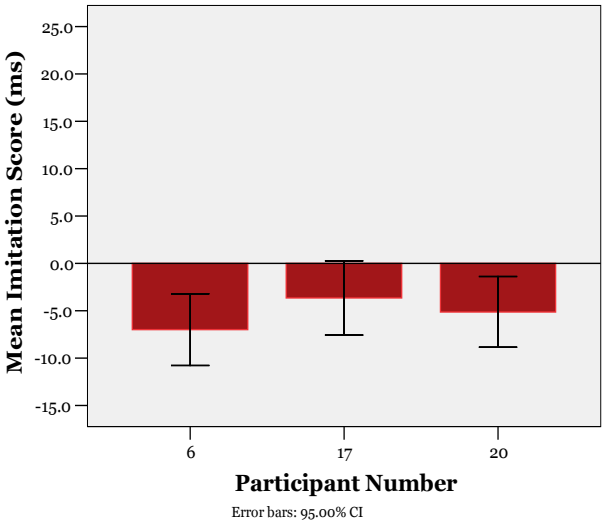
Stimulus Type	Production Type	Mean	Std. Error of Mean	Std. Deviation
Target /p/ High	Baseline	64.20	0.74	20.16
	Post-exposure	62.81	0.72	19.57
Target /p/ Low	Baseline	61.72	0.69	19.87
	Post-exposure	62.11	0.72	20.69
Novel /k/ High	Baseline	73.92	2.22	16.31
	Post-exposure	72.57	2.70	19.83
Novel /k/ Low	Baseline	75.77	1.24	19.60
	Post-exposure	77.01	1.23	19.52

(5) ***Imitators vs. Divergers***

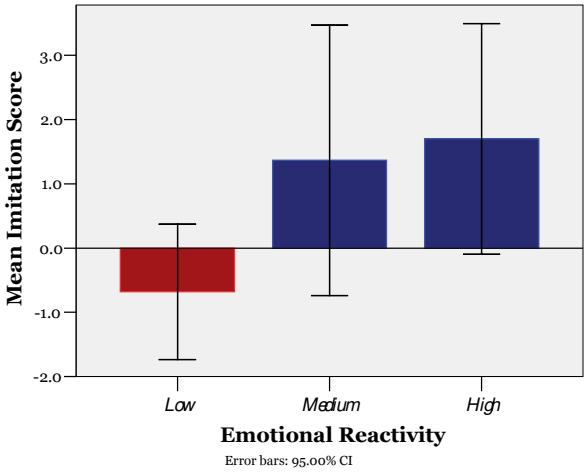
VOT Change by Participant: Imitation



VOT Change by Participant: Divergence



(6) ***VOT Imitation by Emotional Reactivity Score***



the emotion variable was split between three groups. As can be seen in the figure in (6), participants with the lowest emotion reactivity scores were significantly different from participants with the highest emotion reactivity scores ($t(742)= -2.25$, $p=.025$). More specifically, high-emotion participants ($M=1.70$, $SD=19.05$) are more likely to imitate extended VOT than low-emotion participants ($M= -0.681$, $SD=15.77$).

The result of the VOT analysis suggest that men are more likely to imitate a female's extended aspiration, while women are more likely to imitate a male's extended aspiration. Men that are exposed to a male talker with extended VOT significantly diverge from the model. Emotional reactivity, voice preference, and lexical frequency were also predictive of imitation, but not to the same degree as gender.

3.2 Vowels

Model talkers with similar vowel spaces were chosen for the experimental stimuli in order to control for potential dialectal preferences among participants. As was noted above, there was a highly significant degree of overlap between the normalized male and female vowels. Participants' imitation of the two vowel spaces might then be considered as an aggregate measure of imitation. To determine the validity of this approach imitation scores were calculated to both the male and female model vowels (see above for a description of the imitation score calculation). A multivariate analysis of variance (MANOVA) was performed to examine imitation to the male vs. the female model talker, with Vowel Type as the main factor. No differences in imitation to either model talker by vowel quality were found ($F(8,3302)=1.09$, $p=.366$ (Wilk's Lambda)). All subsequent analyses are therefore based on the average of these two sets of imitation scores. The mean imitation scores for all participants, the standard errors of the mean, and standard deviations are presented by vowel type in (7) below.

(7) *Mean imitation scores, standard errors of the mean, and standard deviations for imitation to the Averaged Model Talker by vowel type.*

Vowel Type	Mean Imitation Score	Standard Error of the Mean	Standard Deviation
ɪ	-.0312	.0315	.6417
æ	-.0523	.0279	.5203
a	-.0448	.0219	.4238
u	-.0699	.0371	.7329

Five factors were hypothesized to have a potential effect on imitation of vowels: gender (of participant), vowel type, lexical frequency, order of presentation, and condition (male-modified vs. female-modified). To explore these possible factors a mixed effects model was conducted with Participant as the random effect, Imitation to the averaged model talker vowels as dependent variable, and Vowel type, Condition, Gender and Frequency as fixed factors. The model revealed that imitation was significant ($F(1,1330)=40.32$, $p<.001$). None of the single factors were significant predictors for vowel imitation. This suggests equal degrees of imitation to all vowel types, no difference in imitation based on lexical frequency, and no difference in imitation based on condition (male- or female-modified). It also indicates that male and female participants displayed similar degrees of imitation; this was confirmed with a post-hoc independent samples *t*-test ($t(1149)= -0.53$, $p=.55$).

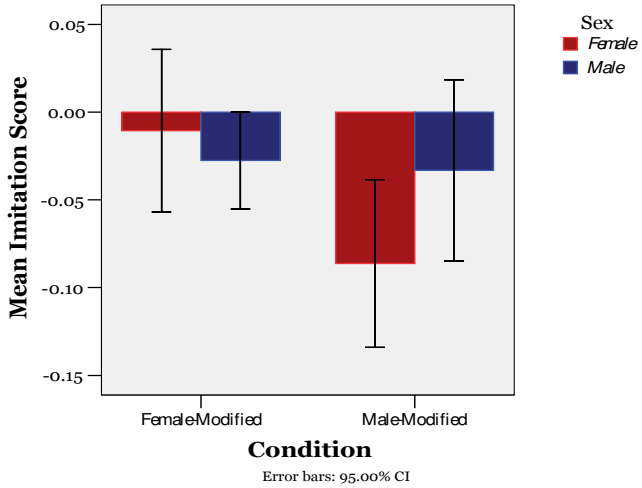
Though none of the fixed factors yielded significant results at the .05 alpha level in the overall model, Condition as a main effect reached marginal significance ($F(1,1116)=3.48$, $p=.062$). This was explored further through a post-hoc mixed model analysis restricted by participant gender. These models revealed a significant effect of condition for male participants ($F(1,1174)=5.20$, $p=.023$). More specifically, it was discovered that males did not significantly imitate in the male-modified condition ($F(1,1124)=2.51$, $p=.113$). Females, on the other hand, imitated in both conditions ($F(1,1161)=10.47$, $p=.001$ (*Female-Modified*); $F(1,1161)=8.68$, $p=.003$ (*Male-Modified*)). Furthermore, the results of an

independent samples *t*-test suggest that females imitated to a larger degree in the male-modified condition than in the female-modified condition ($t(1362)=2.23$, $p=.026$; *Male-Modified:* $M= -0.07$, $SD=0.52$; *Female-Modified:* $M= -0.02$, $SD=0.45$). This effect is demonstrated in (8), where averaged imitation to the model voices is presented by condition and gender of participant. As the figure shows, female, but not male, participants were more likely to imitate the vowel space in the male-modified condition. It is important to remember that this does not necessarily indicate higher levels of imitation to the *male* voice. In both conditions, imitation is assessed in reference to both the male and female model talkers, whose vowel qualities were identical to each other across conditions. A post-hoc one-sample *t*-test was conducted to ascertain presence of imitation in the female-modified condition by both males and females, and confirmed significance of imitation ($t(1317)= -3.63$, $p<.001$).

3.2.1 Emotional reactivity and voice preference

A mixed effects model examined the interactions of emotional reactivity and voice preference with degree of imitation. Emotional reactivity emerged as a significant main effect ($F(15,1363)=3.62$, $p<.001$); voice preference, however, showed no predictive relationship to degree of imitation ($F(1,1363)=0.04$, $p=.851$). Emotional reactivity was calculated on a continuous scale, but is presented in (9) as a dichotomous variable for simplicity (computed by transforming the continuous scale into a high vs. low variable on a median-split). A comparison of means indicates that people who scored low on emotional reactivity were more likely to imitate ($M= -.08$, $SD=.51$) than those who scored very high ($M=.01$, $SD=.75$). This pattern is a reversal of the predicted effect.

(8) ***Vowel Imitation by Condition and Gender***



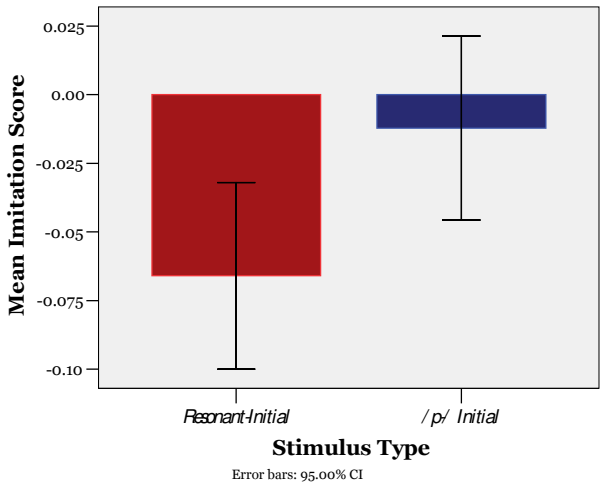
(9) ***Vowel Imitation by Emotional Reactivity***

3.3 Influence of acoustic features

Supplementary analyses were conducted to determine feature-based interactions. Because the vowel-analysis stimuli included both voiceless-stop initial and sonorant-initial tokens, it was possible to compare rates of imitation across the two stimulus types. A second mixed effects model was calculated for the vowel stimuli, with Condition and Stimulus type as fixed factors (Frequency and Vowel type were eliminated, as they were insignificant predictors in the original model). This model revealed both Condition ($F(1,1541)=4.75$, $p=.030$) and Stimulus type ($F(1,1541)=5.42$, $p=.020$) as significant factors. Through a comparison of the means it was determined that sonorant-initial stimuli were imitated to a significantly higher degree than /p-/ initial stimuli ($t(1497)= -2.43$, $p=.015$; $M= -0.07$, $SD=0.50$ (*Sonorant-Initial)*; $M= -0.01$, $SD=0.44$ (*/p-/ Initial)*). This is demonstrated in (10).

Two feature-based asymmetries have already been noted in the preceding analyses: the effect of lexical frequency (which was a factor in VOT imitation but not vowel imitation) and emotional reactivity (which correlated with less imitation of vowels but with more imitation of VOT). Further discussion of these differences is left for the concluding sections of the paper.

(10) ***Vowel Imitation by Stimulus Type***



Unsurprisingly, it appears that the degree of convergence to vowel space was greater than that to extended VOTs. This is likely a result of the experimental design – while participants are exposed to multiple talkers who share a general vowel space, they are exposed to two significantly different samples of VOT. This variability in the signal means that imitative impulses could be influenced in either direction – to an extended VOT token, or to a baseline token.

4 Discussion

The purpose of this investigation was to examine the influence of gender, voice preference, emotional profile, and acoustic features on phonetic imitation. A blocked-shadowing imitation experiment was conducted in which participants were exposed to two model talkers' voices. One of the two voices presented to the participants exhibited artificially extended initial-stop aspiration, which enabled the investigator to unambiguously track gender-based asymmetries in phonetic accommodation. Vowel imitation was also examined, and was considered as an aggregate metric of imitation to either talker. Four questions were addressed by the study: (1) Is degree of imitation moderated by a person's gender? (2) Does a person's gender determine whether or not they will be imitated? (3) Are the observed gender-based asymmetries in the literature an unintentional result of other individual differences? (4) Do different features engender differential levels of imitation? We consider each question in turn.

4.1 Gender differences in degree of imitation

Previous studies have suggested alternately that men imitate more than women (Pardo 2006; Nielsen 2008), women more than men (Namy et al, 2002), and both sexes imitate at equivalent levels (Babel, 2009). This study confirms the latter – levels of imitation by either sex were roughly equivalent in both VOT and vowel quality accommodation, as evidenced by non-significant factors of gender in the two models. This fails to support the hypothesis that women will imitate more than men as derived from the sociological and exemplar-based theories. If Ullman's findings are correct (i.e. women rely more heavily on exemplar storage than men), this result may suggest that women and men equally encode episodic traces, regardless of how they use those exemplars over time. It moreover suggests that women's explicit imitation of novel linguistic forms – making them the "bearers" of language change – is in some way a different process from automatic phonetic imitation.

4.2 Gender differences in direction of imitation

Equal amounts of imitation from both sexes does not, however, equate with an absence of gender-based asymmetries in imitation. Rather, the results of the VOT analysis suggest that men are more likely to imitate women, while women are more likely to imitate men. It was not predicted that such an asymmetrical effect would emerge from the vowel analysis. The vowel spaces of the male and female talker were nearly identical – it is thus impossible to determine whether a participant was imitating one model over another. The exploratory analyses, however, revealed a condition-based asymmetry that parallels the gender-based asymmetry found in the VOT analysis. For the vowel analysis, men trended towards imitation in both conditions, but were found to significantly imitate only in the Female-modified condition. Similarly, though females imitated in both conditions, they imitated to a significantly greater degree in the Male-Modified Condition than in the Female-Modified. This pattern is clearly parallel to the gender-condition interaction for VOT accommodation. One major difference between the two analyses, however, lies in the fact that male participants significantly diverged from the male modified talker in their VOT productions. Why would we not find a parallel in the vowel qualities? The data are insufficient to truly answer this question. We might speculate, however, that because the vowel space of the two models was so similar, male participants may not have associated the vowel space with the male target. Alternatively, divergence from vowels may be psychologically more complex, and hence more difficult to produce, than attenuating VOT.

Overall levels of accommodation to the lengthened VOT were quite low. Though VOT is known to be highly variable, previous studies on VOT accommodation still achieved a greater than 50% rate of accommodation. It is probable that the low levels found in this study derive from the novel paradigm design. Listeners were presented with two model talkers – only one of which had lengthened VOTs. These low levels of imitation suggest that the mere presence of a novel auditory stimulus in the speech stream is insufficient to provoke automatic accommodation; rather, external factors such as gender, voice preference, and emotional stance to the speaker modulate the process.

4.3 Emotion and vocal preference as predictors of imitation

The gender-based asymmetry that resulted from the different conditions was a factor unmitigated by participants' affective valence towards the voices or emotional profile. Surprisingly, a person's like or dislike of the model talkers' voices was unassociated with imitation in the vowel analysis, and only mildly associated with imitation to extended VOTs. This coincides with the Babel findings (i.e. short-term affective manipulation was uncorrelated with imitation), but contradicts the non-speech imitation literature. Further exploration is needed to better understand the relationship of affective stance towards a target and imitation.

A factor that has not been explored in previous imitation studies is the emotional profile of a person who imitates. The current investigation yields evidence suggesting that a person's emotional reactivity is predictive of whether or not they will imitate. An unexpected finding, however, is that the direction of this relationship depended on the feature type under investigation. Specifically, people with lower emotional reactivity were more likely to imitate vowels than people who score higher on emotional reactivity. VOT accommodation, on the other hand, is more significantly represented among high-emotion participants than low-emotion participants. This pattern is difficult to interpret, and may be a result of the small sample size. It is conceivable, however, that certain acoustic features are associated with a particular social meaning, and that this in turn makes certain features more attractive/imitable to different groups of people.

4.4 Feature-based differences in imitation

Several feature-based differences were noted in the analysis. As expected, the extended VOT tokens were accommodated to less than the vocalic stimuli. This is likely due to the greater variability of the VOT tokens (i.e. participants heard *both* extended and unmodified /p-/ initial tokens), whereas the vocalic stimuli was acoustically similar for both model talkers.

Other asymmetries, however, were not expected. For example, the effect of lexical frequency was only present in the VOT analysis – it played no predictive role in degree of imitation to the vowel stimuli. A further unanticipated finding was that vowel accommodation to the /p-/ initial stimuli was

significantly less robust than that to the sonorant-initial stimuli. Reasons for this remain speculative. It may be that the modified nature of the /p-/ initial stimuli drew participants' attention away from the vowel qualities. This effect would then reflect an exemplar-type mechanism; i.e., participants are only able to produce those phonetic details that were acquired and retained in short-term memory. Finally, it was also noted that the direction of the relationship between emotional reactivity and imitation depended on the feature under analysis. Participants with lower emotion scores were more likely to imitate the vowel space, whereas participants with higher emotion scores were more likely to imitate VOT. As previously mentioned, this may be due to the small sample size. Further studies will continue to use this measure, and attempt to untangle the potential role of emotional reactivity in predicting imitation.

5 Conclusion

This study aimed to elucidate conflicting findings on the relationship of gender and imitation by examining the influence of voice preference, emotional reactivity, target acoustic feature, and model-talker gender. A blocked-shadowing imitation experiment was conducted in which participants were exposed to two model talkers' voices. One of the two voices presented to the participants exhibited modified voice onset times for all voiceless-stop initial stimuli, which enabled unambiguous tracking of gender-based asymmetries in phonetic accommodation. Vowel imitation was also examined, and served as a control acoustic feature for comparing base rates of accommodation.

The experiment found that men and women are equally likely to imitate; however, the degree and direction of imitation is influenced by participant and target gender. More concretely, men are more likely to imitate women, and women are more likely to imitate men. This was the strongest predictor of degree and direction of imitation. Affective stance towards the models' voices was unrelated to imitation. Emotional reactivity, on the other hand, was predictive of imitation, but to a lesser degree than gender. The direction of this relationship, furthermore, shifted depending on feature under analysis.

There are a number of limitations that might challenge the conclusions of this study. The small sample size means that asymmetric effects may have been driven primarily by one or two participants. Given that only two model talkers were present in the stimuli, it is possible that certain characteristics of either voice blocked greater levels of imitation than is the norm. One way to address this issue might be by having multiple talkers, where all female voices exhibit modified VOT or all male voices exhibit modified VOT. Regardless of these limitations, however, this study has raised important questions that will continue to drive future research: how and why are different acoustic features imitated? How can we manipulate a person's likeliness to imitate, and what does this tell us about linguistic storage?

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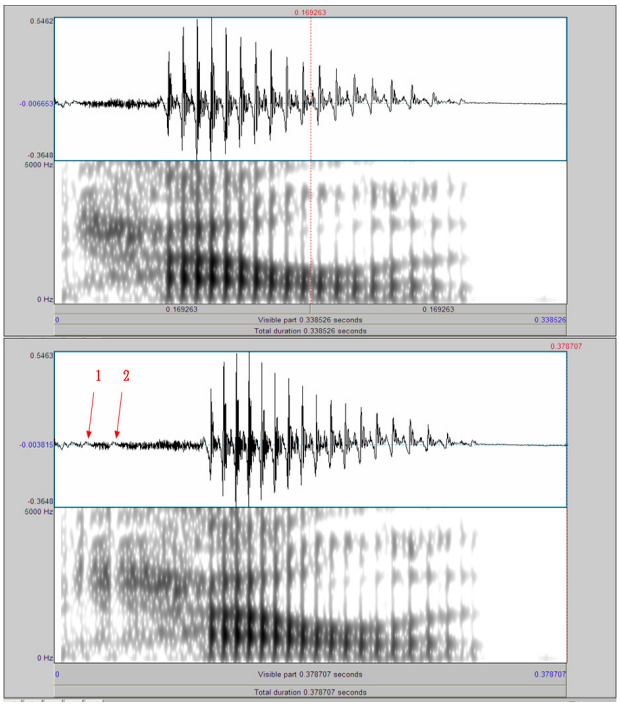
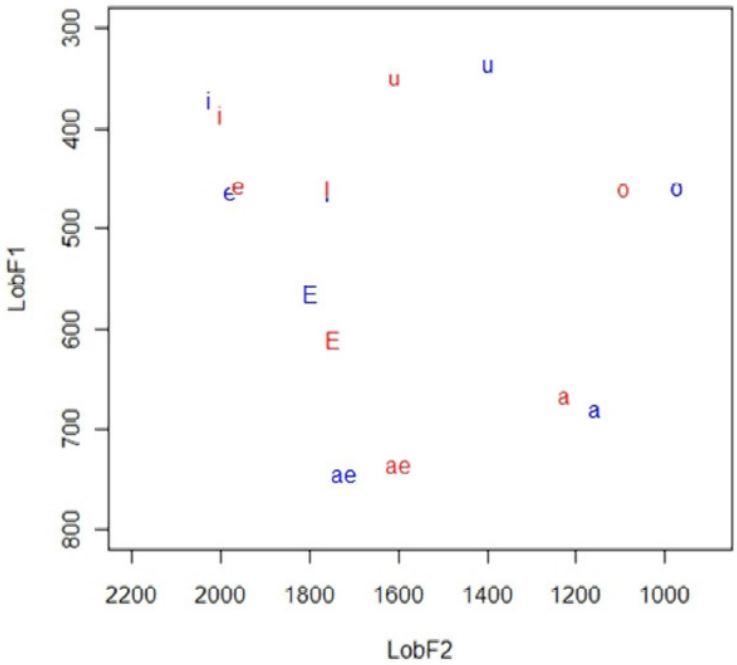
Appendix A

(1) ***The artificial extension of Voice Onset Time in the female stimulus token "palate"***



(2) ***The Lobanov normalized vowel space of the male and female model talkers. Red = female; Blue = male.***



Appendix B

/p-/ initial
pain
pair
pallet
pamper
panama
panther
paper
parachute
parasol
parcel
parent
Paris
park
parody
parrot
partly
party
pass
passage
past
pastry
patio
pattern
pave
paw
payment
peace
peacock
peal
pebble
peck
pedal
pendant
people
perfect
period
perish
perk
permanent
permit
person
personal
pester
pick
pickle
picture
pidgin
pillar
piping
pirate
pitfall
pitiful
pivot
pocket
pod
pod
point
pointer
poke
polarize
policy
polio
politic
politics
polo
pompom
poncho
poodle
pool
popular
porcelain
positive
possible
possibly
post
potter
pout
poverty
power
powerful
public
publish
pull
pulp
puppy
purchase
purpose

/k-/ initial
cabbage
candid
canine
canker
capsule
cartoon
catchy
cater
caucus
cavern
coco
colon
comet
comrade
consul
coolant
corny
cot
courtship
kinship
kitten
kosher

Resonant-initial
account
all
art
attitude
equipment
fist
flue
food
foppish
hoop
increase
interest
latch
lisp
list
look
loom
loony
loop
loop
loose
lose
lute
map
mask
matter
mitt
moony
moose
mop
mythical
nag
natural
neuter
now
numeral
olive
prudish
raft
random
ratchet
religion

risk	snap	wish
rock	soon	wish
rooster	soup	wistful
rot	super	wit
rude	unwritten	wrist
sin	use	zoo
smash	win	

Appendix C

ERS

This questionnaire asks different questions about how you experience emotions **on a regular basis (for example, each day)**. When you are asked about being "emotional," this may refer to being angry, sad, excited, or some other emotion. Please rate the following statements.

		0 Not at all like me	**1** A little like me	**2** Somewh at like me	**3** A lot like me	**4** Complete ly like me
1	When something happens that upsets me, it's all I can think about it for a long time.	**0**	**1**	**2**	**3**	**4**
2	My feelings get hurt easily.	**0**	**1**	**2**	**3**	**4**
3	When I experience emotions, I feel them very strongly/intensely.	**0**	**1**	**2**	**3**	**4**
4	When I'm emotionally upset, my whole body gets physically upset as well.	**0**	**1**	**2**	**3**	**4**
5	I tend to get very emotional very easily.	**0**	**1**	**2**	**3**	**4**
6	I experience emotions very strongly.	**0**	**1**	**2**	**3**	**4**
7	I often feel extremely anxious.	**0**	**1**	**2**	**3**	**4**
8	When I feel emotional, it's hard for me to imagine feeling any other way.	**0**	**1**	**2**	**3**	**4**
9	Even the littlest things make me emotional.	**0**	**1**	**2**	**3**	**4**
10	If I have a disagreement with someone, it takes a long time for me to get over it.	**0**	**1**	**2**	**3**	**4**
11	When I am angry/upset, it takes me much longer than most people to calm down.	**0**	**1**	**2**	**3**	**4**
12	I get angry at people very easily.	**0**	**1**	**2**	**3**	**4**
13	I am often bothered by things that other people don't react to.	**0**	**1**	**2**	**3**	**4**
14	I am easily agitated.	**0**	**1**	**2**	**3**	**4**
15	My emotions go from neutral to extreme in an instant.	**0**	**1**	**2**	**3**	**4**
16	When something bad happens, my mood changes very quickly. People tell me I have a very short fuse.	**0**	**1**	**2**	**3**	**4**
17	People tell me that my emotions are often too intense for the situation.	**0**	**1**	**2**	**3**	**4**

18	I am a very sensitive person.	**0**	**1**	**2**	**3**	**4**
19	My moods are very strong and powerful.	**0**	**1**	**2**	**3**	**4**
20	I often get so upset it's hard for me to think straight.	**0**	**1**	**2**	**3**	**4**
21	Other people tell me I'm overreacting.	**0**	**1**	**2**	**3**	**4**

Dialect and voice preference questionnaire:

1) Which voice did you like better: Female (1) or Male (2)?
2) On a scale of 1-5, how similar did you find the female's voice to your own?
3) On a scale of 1-5, how similar did you find the male's voice to your own?

Informal post-experiment questionnaire:

1) How was the experiment?
2) Which voice did you like better?
3) Why?
4) Did you notice anything strange about the voices?

Ostension and definiteness in the Kwak'wala noun phrase: a syntactic and semantic examination[1]

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Recent work has examined the pragmatics of the Kwak'wala noun-phrase morphemes termed "locative" and "visibility" markers (Nicolson and Werle 2009). The current paper investigates yet another of the noun-phrase morphemes: the so-called "definite" marker. Through a systematic semantic analysis, we conclude that the Kwak'wala morpheme *–da* does not encode definiteness, nor does it encode specificity, domain restriction, or assertion of existence. Rather, it is proposed that *–da* is fundamentally demonstrative, and encodes *ostension* – the linguistic equivalent of a physical pointing gesture.

1 Introduction

One of the best-known features of Kwak'wala, a Northern Wakashan language spoken in Northern-eastern Vancouver Island and along the BC coast, is its complex nominal phrase morphology. The maximal set of morphologically distinct features that may characterize an argument phrase includes case, location, definiteness, number, tense, and visibility. These categories were identified and defined by Boas (1911, 1947). Some elements of the nominal string have been discussed previously (Anderson 1984, 2005; Bach 2006; Chung 2007; Nicolson and Werle 2009; Littell 2010). No prior analysis, however, has been devoted to the so-called definite determiner, *–da*. As a result, most analyses have assumed – following Boas – that *–da* bears the syntactic and semantic features correlated cross-linguistically with "definite determiners." It is the goal of this article to challenge this assumption.

At first glance, the definite determiner appears to be the simplest element of the Kwak'wala noun phrase. It was described by Boas (1911, 1947) as encliticizing to the preceding word in an utterance and as alternating with zero morphology, which contrastively denotes "indefinite." Indeed, in translations from Kwak'wala to English it is quite common that noun phrases characterized by *-da* in Kwak'wala are translated as "the" in English, and vice versa:

(1) denxala=o<u>x</u>=**da** tseda<u>k</u>[2]
sing=2.LOC=**DEF** woman[3]
'The woman is singing'

Furthermore, Kwak'wala *–da* displays paradigmatic asymmetries that parallel the distribution of the English definite determiner. For example, though the English determiner "the" marks an entity as *definite,* it does not co-occur with possessive morphology or proper names. The identical distributional pattern is found in Kwak'wala:

[1] I am deeply grateful to my consultant RCD for sharing her language with me, with great humour and patience. I am indebted to Henry Davis, Lisa Matthewson, and Molly Babel for their valuable feedback and comments on previous drafts of this work. Support for this research has come from the Jacobs Research Fund.

[2] Data are from the investigator's field work unless otherwise noted. Morphemic representations are given on the first line in the Kwak'wala orthography (c.f. U'mista Cultural Society).

[3] The following abbreviations are used: Aux = *Auxiliary*; Disc = *Discourse marker;* Rep=*Reportative*; Inch = *Inchoative*; Perf = *Perfective*; Cont=*Continuative;* Pro = *Pronoun*; 1.sg = *1st person singular pronoun (2.sg; etc)*; Comp = *Completive*; FV = *Fill Vowel*; Acc = *Accusative*; Obl = *Oblique*; Prep = *Prepositional;* Loc = *Loctive Determiner;* Def = *Definite Determiner*; Ind=*Indefinite Determiner;* red=*Reduplication;* Vis = *Visibility Determiner*; Poss = *Possessive*; Dem=*Demonstrative;* Neg=*Negation*

(2) *Proper names*

denxala=ox=(***da)** Ruby
sing=2.LOC=(**DEF)** Ruby
'(*The) Ruby is singing'

(3) *Possessives*

a. gukwila=ox=da bagwanam-a=x=is=(***da**) gukw
build.house=2.LOC=DEF man-COMP=ACC=3.POSS=(*DEF) house
'The man built his (*the) house'

b. axaxsd=ox ajako x=an=(***da**) ayandzis=ax
want=2.LOC Ayako ACC=1.POSS=(***DEF**) orange=2.VIS
'Ayako wants my (*the) orange'

This distributional parallel between English and Kwak'wala is suggestive of a parallel structure.

Despite these distributional similarities, however, the mapping between English and Kwak'wala determiner phrases is not exact. For example, Kwak'wala arguments are obligatorily marked by locative clitics. There is, of course, no direct parallel in English – which raises the question: what is the semantic/pragmatic contribution and syntactic position of the LOC morphemes, and how do they relate to the semantics and syntax of *-da*? Secondly, and perhaps more directly, the semantic correspondence between *the* and *–da* frequently fails to hold. For example, in the following two sentences we find 'indefinite' Kwak'wala morphology that is translated as a definite English DP (4), and 'definite' morphology that corresponds to an indefinite English DP (5):

(4) ax'exsd-an=x-a=**Ø** kuki
want-1.PRO=ACC-4.LOC=**IND** cookie
'I want the cookie'

(5) ax'exsd-an=x-a=**da** kuki
want-1.PRO=ACC-4.LOC=**DEF** cookie
'I want a cookie'

These examples indicate that the semantic content of *-da* is unlikely to involve a prototypical concept of English definiteness. Irrespective of the apparent syntactic parallelism, this semantic mismatch is not unexpected. Recent work has demonstrated the non-uniformity of determiner semantics cross-linguistically, despite determiners' syntactic similarities (Enç 1991, Matthewson 1998, Gillon 2006).

In order to more precisely characterize the semantic properties of *-da*, I will administer a series of tests developed in the cross-linguistic literature to probe determiner semantics. The results of these tests lead to the following conclusions: *–da* does not encode any feature typically associated with *definite*, nor does it encode specificity or assertion of existence. Instead, I propose that *-da* is the linguistic equivalent to a "pointing gesture" (Diessel 1997). A semantic consequence of the morpheme's deictic nature is domain restriction, which, when combined with certain deictic features, yields an implicature of uniqueness/maximality.

The paper is organized as follows. Section 2 provides a description of the Kwak'wala nominal phrase in more detail to aid in the analysis that follows. Section 3 tests *–da* against the semantic features *familiarity*, *uniqueness*, *specificity*, *assertion of existence,* and *domain restriction*. I then summarize the results of this examination in the fourth section, and present evidence for the proposal that *–da* encodes *ostension*.

2 Language Background

Kwak'wala belongs to the Northern branch of the Wakashan language family and is spoken by an estimated 200 people. The long-term viability of the language is in doubt; however, significant revitalization efforts have been initiated in the last several years (Anonby 1999; Jamieson-McLarnon 2005). The bulk of linguistic knowledge about Kwak'wala derives from the works of Franz Boas (1911, 1947), who spent decades documenting and analyzing the language with the assistance of George Hunt, a half-Tlingit, half-British ethnologist who was connected through childhood and marriage to the Kwak'wakawakw people (Berman 1994). The volumes Boas published are primarily based on Hunt's

adopted dialect (Kwakiutl), though at least 5 dialects exhibiting non-trivial distinctions have been claimed to exist in the modern era (Anonby, 1999). The data presented in this paper are from the author's fieldwork, and reflect the judgments of a speaker of the Gwaɣi community.

Kwak'wala is usually characterized as a VSO language. Main clauses are frequently headed by auxiliaries, the first of which is always inflected for subject agreement. DP subjects generally surface in second position; however, they may also appear following any of the stacked auxiliaries or the main verb. Direct objects, obliques, and prepositional phrases are realized in that order following the main predicate. As mentioned above, argument phrases in Kwak'wala can be marked by case, up to three deictic features (location, visibility, and tense), number, and definiteness (Boas 1911, 1947; Chung 2007; Anderson 1984, 2003; Bach 2006; Nicolson and Werle 2009). This determiner complex has previously garnered attention due to its curious phono-syntactic properties (Anderson 1984, 2003; Chung 2007). The case, deictic, and determiner clitics are split between prenominal and postnominal positions. Kwak'wala is an entirely suffixing/encliticizing language[4]; therefore, the prenominal clitics encliticize to a preceding word in the utterance. This creates a mismatch between syntactic and prosodic constituency. A schema and example are provided in (6):

(6) **Preceding Word =[$_{DP}$ Case = LOC = DEF #-Noun =Temp=VIS]**

Prenominal *Postnominal*

duq^{w}-x̌id=as	= [$_{DP}$ x = ox = da	guk^{w} =ix]?
see-PERF=2.sg	= [$_{DP}$ ACC = LOC = DEF	house =VIS]?

'Do you see this house (near addressee, visible)?'

The clitic morphemes are provided in two charts in (7).

(7) **Kwak'wala determiners**

a. Kwakiutl dialect (Boas 1947)

Prenominal			Postnominal
Anchor	LOC	DEF	VIS
1-vis	-g^{j}a	-(d)a (Def) -Ø (Indef)	-k
1-inv			-gaʔ
2-vis	-oχ		-iχ
2-inv			-aq'/aχ
3-vis	-i (+Subj) -Ø (-Subj)		-Ø/-i
3-inv			-a/-i

b. Gwaɣi dialect (2010)

Prenominal			Postnominal
Distance	LOC	DEM	VIS
1-vis	-g^{j}a	-da (+Dem)	-x
1-inv			
2-vis	-oχ		-iχ, -εχ, -χ
2-inv			
3-vis	-i		
3-inv			-a/-εʔ
4-	-a ('-Subj')		

The first chart (7a) represents the system as it was described by Boas in 1947, which has been assumed by many as the canonical representation of Kwak'wala DP morphology (Anderson 1984; Berman 1982, 1983; Bach 2006; Chung 2007). The second (7b) employs the paradigmatic organization defined by Boas, but lists those morphemes that have been attested in current field work (Black 2010; Nicolson and Werle 2009).

There are two substantive differences between these charts that merit brief mention. It should first be noted that the label corresponding to the numbers (1)-(4) has been altered from *Anchor* to *Distance*. *Anchor* is a concept adopted from the literature on deixis (c.f. Fillmore 1966, Gerner 2009). It signifies the discourse participant's perspective from which deictic features derive. For example, English deictic terms (e.g. *this, that*) are generally considered to reflect the *speaker*'s point of view, and hence instantiate a speaker-anchor. Other languages display shifting anchors, or compound anchors (e.g. Miao, see Gerner 2009 for a detailed cross-linguistic survey). Boas' description of Kwak'wala suggests a

[4] With the exception of number marking, however, which is marked through initial CV reduplication of the stem.

deictic anchor that shifts between speaker, addressee, and a third person – the numbers one through three signify these referents, respectively. Recent work has demonstrated that at least one contemporary dialect does not employ this shifting-anchor system; rather, it appears that all LOC and VIS markers denote distance (physical or metaphorical) between the associated referent/topic and the speaker (Nicolson and Werle 2009). The numbers (1)-(3), therefore, more closely signify the concepts *proximal, medial,* and *distal*.

The second substantive difference between the two determiner charts is the introduction of a fourth LOC category. It is hypothesized that this morpheme has no deictic features, but that it occupies the same syntactic position as the deictically inflected LOC markers (please see Appendix A for details). I propose that the proximal, medial, and distal locative markers are composed of two semantic feature sets: they assert the existence of the modified NP, and contribute the relevant deictic features. The 4.LOC marker, on the other hand, simply denotes "assertion of existence" (Matthewson 1998). Justification for this analysis will be discussed in section 3.4.

To begin to decode the nature of *–da,* it is necessary to first examine Boas' original description of the morpheme and the evidence that led to his label of "definite." In his *Kwakiutl Grammar* (1947), Boas described two contrastive sets of prenominal demonstratives: the *vocalic* and *consonantic* series. The *vocalic* series corresponds to "definite" interpretations. These morphemes are termed *vocalic* because each word of the series shares word-final "-da," which is sometimes realized as "-a" alone; therefore all members of the set are unified by a *vocalic* ending (i.e. Subject set: *–ida*, *-oxda*, *-gada*; Accusative set: *-xa*, *-xoxda/xwa*, *-xgada*; Oblique set: *-sa*, *-soxda*, *-sgada*). The *consonantic* forms, on the other hand, are not characterized by this terminal "-a," and are found preceding indefinite nouns. The term "indefinite" is characterized as "when a noun is used in a general sense" (see example (1), Appendix B) or "when the existence of an object is unknown" (example (2), Appendix B) (1947: 259). Boas notes that "the use of the indefinite is . . . much more restricted than that of the corresponding forms in English" (1900: 715). Unfortunately, he gives no further explication of these restricted contexts.

Much of this description has been confirmed in contemporary speech. The concatenations of LOC and DEF morphology listed in the *vocalic* and *consonantic* series above are all attested. An important point of difference between Boas' description and the analysis that follows, however, is that the so-called definite series, described as ending in word-final "-a" (or "-da") by Boas, is *always* characterized by *–da* in the present work (please see Appendix A for more details). Finally, though Boas notes a paradigmatic contrast between *–da*-marked and unmarked determiner strings, we observe a three-way contrast. Argument phrases in Kwak'wala can be marked with LOC clitics + *da,* LOC clitics alone, or with no LOC or DEF morphology at all. This morphological split does not appear straightforwardly amenable to a definite/indefinite distinction. Furthermore, it should be noted that a fourth logical possibility – argument phrases marked with *–da* but not LOC – is ungrammatical. Rather, it appears that *-da* is licensed by the LOC morphemes.

In this section I have laid out the morphological structure of Kwak'wala noun phrases. It was noted that a contemporary dialect employs a single-anchor deictic system, as opposed to a shifting-anchor. A fourth LOC category is proposed under the current analysis; this morpheme is not deictic, but shares the semantics of "assertion of existence" with its deictic counterparts. According to the historical documents, the definite/indefinite distinction is instantiated by a contrast between LOC morphology + *da* versus LOC morphology by itself. When the concatenation of *case*, LOC, and "definiteness" morphemes are considered, however, we observe a three-way contrast in noun phrases that is not as easily applied to the definite/indefinite English distinction originally proposed. With this information in hand, we now turn to the semantic analysis of *–da*.

3 The semantics of definiteness

The semantic properties associated with determiners have been a subject of great debate over the past thirty years (Russell 1905, Heim 1982, Kadmon 1992, Matthewson 1998, Gillon 2006, and many others). For the purposes of this paper, I examine those features claimed to be associated with definiteness and/or the syntactic position D^0 by Heim (1982), Ludlow and Neale (1991), Matthewson

(1998), and Gillon (2006). In the following sections I will describe these features and demonstrate their applicability (or lack thereof) to *-da.*

3.1 Familiarity

In her doctoral thesis (1982), Irene Heim proposed that definiteness fundamentally hinges on a familiarity/novelty contrast in discourse. This conceptualization relies on the notion of the common ground, which is defined as the propositions shared by every participant in discourse in a given context (Stalnaker 1979, p. 321 [Heim 1982, p285-286]). According to this depiction of definiteness, a definite NP is one that is familiar to the common ground (CG). Indefinite NPs, on the other hand, are novel. This can easily be demonstrated in English (from Matthewson, 1998):

(8) *Context: out of the blue*
   a. I met a man today
   b. *I met the man today

(9) *Context: Conversation b/w two interlocutors*
   Interlocutor$_1$: I met a man today.
   Interlocutor$_2$:
   a. What did the man look like?
   b. *What did a man look like?

It is, of course, possible to introduce novel NPs with definite morphology in English (e.g. "Beware of the dog!"). These "exceptions" are argued to be felicitous due to *accommodation* (Lewis 1979); there are real-world restrictions, however, on the availability of this option. For example, a novel, out-of-the-blue utterance such as "Beware of the dog" relies on discourse participants' awareness that people in their community commonly keep dogs as pets. In other words, a hearer must have some reason to believe that the novel referent exists, and that this knowledge is/can be shared between the discourse participants without previous mention.

Assuming this definition of definiteness, we must first ask, then, whether Kwak'wala DPs reflect a simple distinction between novel and familiar references. As was stated in the introduction, it is often the case that *-da* morphology corresponds with English definite usage. This is most evident in the context of story-telling. For example, in the following story a novel referent (the mouse) is introduced with an accusative case and distal LOC marker, but without the *–da* morpheme. In the next sentence, the referent is now marked by *-da*:

(10) a. nikiyekala-an dukwala=[x=a=**Ø** giga'yatsaga] dzalxwa=i
   think-1.sg see=[ACC-4.LOC=**IND** mouse] run=3.LOC
   lax-a=Ø awiˈnagwił s=a=da kafe. giga'yatsaga='am!
   PREP-4.LOC=Ind floor OBL=4.LOC=DEF café mouse-DISC
   'I thought I saw a mouse run across the floor of the cafe. It was a mouse!'

   b. la-ˈm-[i-**da** **giga**ˈ**jatsaga**] dzulxw-i lax-a awiˈnagwił
   AUX-DISC-[3.LOC-**DEF** **mouse**] run-3.LOC PREP-4.LOC floor
   'The mouse ran across the floor'

If the story ended here, we might conclude that *–da* does indeed reflect the familiar/novel contrast. In the very next sentence of the story, however, we observe that the definite marker disappears:

   c. dukwatła-an [x=a=**Ø** **giga**ˈ**jatsaga**] dzulxw-i lax-is kwabił
   see-1.sg [ACC-3.LOC=**IND** **mouse** run-3.LOC PREP-3.POSS hole
   'I saw the mouse run into his hole.'

This appears to be an alternation by syntactic position rather than a pragmatic/semantic distinction. In other words, when the NP is mentioned in the accusative, it is marked by the indefinite (i.e. null morpheme). When it is in subject position, it surfaces with definite morphology. This positional alternation is evidenced in the historical texts as well, and in ways that also indicate a non-English usage

of "definiteness." For example, in the following passage the definite article is used to mark the *first* mention of the man.

(11) la-ˈam-ˈl-(a)-i walas gukw-i-da gax-i ax'als lax
AUX-DISC-REP-3.LOC big house-3.LOC-DEF come-3.LOC put PREP
k'wał-as-as wakas-i, ji-x gukw-as Quˈmasila. we
sit-place-POSS Wakas-3.VIS 3.DEM-ACC house-POSS Quˈmasila So
la-ˈm-i nił'id-**[**i-**da** xwał-xwap-ala-gam-i
AUX-DISC-3.LOC appear-**[**3.LOC-**DEF** RED-hole-CONT-face-3.VIS
bagwanam]…
man]…
'A large house came to be on the ground at the place where Great-River (Wakas) was sitting. It was the house of Wealth-Maker (Qumasila). Then **a man** with holes all over his face appeared (in the rear of the house)' (Boas 1903:427).

The use of *–da* on the first occurrence of a nominal in discourse is also found in contemporary speech. For example, the sentence in (12) was offered as the translation for "A boy is painting a house." An out-of-the-blue novel NP (*boy*) is modified by *da.* It was subsequently confirmed, moreover, that this structure can be translated with either an indefinite or definite English determiner.

(12) gals=ox=**da** babagwama x-a gukw
paint=2.LOC=**DEF** boy Acc-4.LOC house
'A boy is painting a house'

The preceding examples have examined discourse-new and discourse-old contexts, and have indicated that there is no alternation of *–da* on the basis of these contexts. It is also possible to draw a distinction between hearer-new and hearer-old (Prince 1992). We continue to see the identical asymmetry by syntactic position in these contexts. For example, mention of "the sun" or "the moon" is considered hearer-old. In (13) and (14) we observe reference to these entities in subject position marked by *–da,* while those in non-subject position are marked by LOC alone.

(13) *Subject position* (discourse-new, hearer-old)

a. nakwala=ox=**da** t'łisala=x
bright=2.LOC=**DEF** sun=VIS
'The sun is bright (today)'

b. nakwala=ox=**da** m̓akwala x=ox ganutłe
bright=2.LOC=**DEF** moon Acc=2.LOC night
'The moon is bright tonight'

(14) *Object position* (discourse-new, hearer-old)

a. nap'-x'id=i gigamej=s=a=**Ø** t'łisala lax=ox ik'i
throw-INCH=3.LOC chief=OBL=4.LOC=**IND** sun PREP=2.LOC sky
'God threw the sun at the sky'

b. nap'-x'id=ans gigamej=s=a=**Ø** makwala=x lax=ox t'i-t'ut'u
throw-INCH=1.pl.POSS chief=OBL=4.LOC= **IND** moon=VIS PREP=2.LOC RED=star
'(Our) God threw the moon at the stars'

These data have clearly illustrated the non-applicability of the familiar/novel distinction with regards to *–da.* The alternation between *–da*-marked NPs in subject position as opposed to object and oblique positions, however, is telling. While *–da* is licit in non-subject positions (as can be seen in (10a), for example), a preliminary examination of the texts compiled by Hunt and Boas and stories elicited in

current fieldwork indicates a higher propensity for *–da* to occur with subjects. I will return to this asymmetry in section 4.

3.2 Uniqueness

Many theorists have proposed that *uniqueness*, rather than familiarity, plays an essential role in the denotation of the English definite determiner (Russell 1905; Hawkins 1978, 1999; Kadmon 1992, 2001; Heim 1991; Abbott 1999; Lyons 1999; Gillon 2006). Differences emerge primarily in whether uniqueness is presupposed (c.f. Frege 1892) or asserted (c.f. Russell 1905). Regardless, the crucial observation is the following: *the* requires the existence of a single referent, while *a* implies the existence of alternatives. This is demonstrated in the examples in (15).

(15) a. **The** king is on holiday. → Only one king in context
a. **A** king is on holiday. → Implies "one, out of many"

The extension of this concept to plurals and mass nouns poses some complications; for the remainder of this paper I assume the formal definition of maximality as presented in Gillon (2006). Her analysis relies on the notion of the supremum (Link 1983), the maximal individual sum of the members in a predicate. If a single atom is a member of the predicate, it is the maximal sum. In Gillon's definition of *the* (see (17)), uniqueness is derived through the intersection of the supremum operation with domain restriction.

For example, in the following exchange in English, the breakdown in (16a) can be traced back to a violation of uniqueness:

(16) *Context: Two interlocutors sit across from each other. Two pencils lie on the table in front of one of the interlocutors.*
a. **Interlocuter1: ***Give me **the** pencil
b. **Interlocuter1:** Give me **a** pencil

Adopting Gillon's formalism of *the* (given in (17)), the violation occurs due to a mismatch between the need for a maximal *individual* and the maximal sum given by the domain (which yields a supremum that is not an atom).

(17) [[the]] = max(λx[P(x) ∧ C(x)]); where C = domain restriction
a. *Give me the pencil $C_{\text{the pencil}} = \{\text{pencil}_i, \text{pencil}_{ii}\}$
[[the pencil]] = max(λx[pencil'(x) ∧ C(x)]) = undefined

The same situation in Kwak'wala, however, is entirely licit:

(18) tso-la-as=s=ən x=a=**da** k'adayu
give-Imp-2.sg=Obl=1.sg Acc=3.LOC=**DEF** pencil
Give me the pencil

We might thus conclude that *–da* does not encode uniqueness. The data, however, require a bit more contemplation. Kwak'wala plural morphology crucially differs from English in that it is generally considered to be optional. Under a uniqueness/maximality analysis of *–da*, therefore, we do not simply predict the same failure as in English for "Give me the pencil," when two pencils are in the domain. Rather, since Kwak'wala bare nouns may be interpreted as referring to more than one entity, we would predict that the Kwak'wala equivalent of "Give me the pencil" could target the set of pencils in the domain. This, however, is not the case; rather, the consultant demonstrates sharp judgments that the interlocutor's command targets a single pencil. This uniqueness effect is not amenable to a definite analysis of *–da*, which would predict infelicity in the given context. Furthermore, the effect is not restricted to the use of *–da*, for the consultant responds similarly to the same context when bare LOC morphology modifies the noun phrase.

Gillon employs a number of maximality tests with plural and mass nouns in her analysis of Sḵwx̱wú7mesh. These include contexts similar to (19).

(19) I went hunting yesterday. I saw four bears. I killed the bears, but one of them escaped.

Native speaker judgments of this and similar English contexts should, according to the given denotation of *the*, reject this sequence of utterances; however, I have found that judgments vary (my own, for example, is that this sequence is perfectly acceptable). This may suggest the need for a more flexible plural denotation (i.e. that *the* does not always denote a supremum) than previously assumed (c.f. Brisson 1998). For example, it may indicate that maximality is an implicature of English, rather than a presupposition. To the extent that there are stronger ungrammaticality judgments associated with these contexts in English than in Skwxwu7mesh, however, such an analysis would still fail to account for the gradient differences between the two languages. Interestingly, this issue is similarly raised by the Kwak'wala data. As shown in (20), the use of the "definite" determiner in a test context is marginal:

(20) mu=i=da bi-bi-bagwanam lax= pati=s Stacey.
four=3.LOC=DEF RED-RED-man PREP=LOC/DEF party=OBL Stacey
mitsa=i Stacey=x=a=**(#da)** bi-bi-bagwanam. k'is
kiss=3.LOC Stacey=ACC=3.LOC=(**DEF**) RED-RED-man. NEG
mitsa=x=a nimukw bagwanam=a
kiss=ACC=4.LOC one man=VIS
'Four men came to Stacey's party. Stacey kissed the men. Stacey didn't kiss one of the men'

We have thus far determined that familiarity cannot account for *–da*'s function in Kwak'wala; however, our tests have yielded inconclusive results regarding uniqueness. A related concept that has been shown to interact with the definite/indefinite distinction is specificity. Perhaps the gradient readings associated with the preceding examples derive from this conceptually similar designation.

3.3 Specificity

It has long been noted that *specificity* is logically separable from definiteness. For example, it is possible to use the definite English determiner in a non-specific context (e.g. *The murderer of Smith* is insane*)* (Donnellan 1966), and it is equally possible to use specific indefinites (e.g. John will marry *a girl his parents don't approve of)* (Partee 1972). Some languages are known to morphologically encode specificity in their determiner system (e.g. Turkish, Enç 1991). It is therefore possible that *–da* is restricted to a specific/non-specific function. Ludlow and Neale (1991) define specificity as a feature that arises from the conflict between a speaker's knowledge underlying the expressed proposition and the proposition that the speaker intends to communicate. In other words, if the speaker has some reason to communicate a proposition as indefinite (for example, if the speaker has some reason to believe the hearer is unfamiliar with the given entity), but has a unique referent in mind, the resulting proposition represents a specific indefinite.

(21) Specificity (Ludlow and Neale 1991:176):
a. *Speaker's Grounds* : the proposition that is the object of the most relevant belief furnishing the grounds for an utterance
b. *Proposition meant:* the proposition(s) a speaker intends to communicate
c. *Proposition expressed:* the proposition expressed by the utterance

In Kwak'wala, these mismatches are irrelevant to determiner usage. For example, the same sentence is used to express "A doctor is coming over today," irrespective of the various represented permutations of speaker vs addressee knowledge (see Appendix C for four test contexts):

(22) gax-tł=i=**da** dagwada x=ox=da nala=x
come-FUT=3.LOC=**DEF** doctor ACC=2.LOC=DEF day=VIS
'A/The doctor is coming over today'

These examples demonstrate the target NP in subject position; despite the fact that this is an unfamiliar topic introduced to the discourse, the subject NP is marked by *–da.* The Kwak'wala translation for these contexts further contrasts with the English counterpart of the specific and non-specific indefinites above. When the sentence is changed to control for syntactic position, the previously observed asymmetry again emerges. Given the same contexts as in (22), the sentence "I'm going to see a doctor today" is consistently given without *–da*, as in (23):

(23) dukwatła-tł-an x=a=**Ø** dagwada x=ox=nala=x
see-Fut-1.sg. Acc=4.LOC=**Ind** doctor Acc=2.LOC=day=VIS
'I'm going to see a doctor today.'

We have now conclusively determined that *–da* does not denote familiarity, nor does it interact with specificity. It does not appear to encode uniqueness, but may be sensitive to maximality. We will finally consider two other features that have been hypothesized to characterize determiner heads: assertion of existence (Matthewson 1998) and domain restriction (Gillon 2006).

3.4 Assertion of existence

Matthewson (1998) describes Salishan determiners as operating on an "assertion of existence" contrast. Assertion of existence differs from the existential force of definiteness in that it informs the discourse participants of the truth/existence of a given entity. Definites presuppose this information, and are thus subject to accommodation. Assertion of existence determiners, on the other hand, will not be subject to accommodation. Using a File Change Semantics approach (Heim 1982), Matthewson argues that all assertion of existence determiners will move outside the scope of a non–factual operator (a category whose members can be language-dependent), whereas non-assertion of existence determiners will be licensed only in the scope of non-factual operators.

The morpheme *–da* is an unlikely candidate for the "assertion of existence" parameter. An important distributional fact about *–da,* as mentioned above, is that it is only licensed in co-occurrence with LOC markers. The locative markers are deictic – in other words, their interpretation is contingent on the context of the discourse, and their use is to *locate* the referent in the space of discourse. This function is not compatible with entities whose existence is in doubt; in fact, their usage would appear to assert/presuppose existence. As *–da* cannot occur without the use of one of these spatially anchored locative morphemes, we can therefore reject the idea that *–da* itself encodes assertion of existence. There is evidence, however, that "assertion of existence" is directly encoded in the Kwak'wala grammar. Three of the four locative markers denote deictic spaces. The proximal marker (1.LOC) references an entity within an intimate/immediate relationship to the speaker; the medial (2.LOC) indicates that the NP is within the common ground, or visible; the distal marker (3.LOC) appears to denote a referent that is not present, or is novel to the discourse. This same function is not shared, however, by the non-subjective *–a* (4.LOC). The fourth locative marker appears to be used, rather, as a default – it makes no claim about the deictic space of the referent. I hypothesize that the 4.LOC marker is therefore the non-deictic version of the LOC markers – and that this non-deictic form boils down to assertion of existence.

Evidence to support these hypotheses comes in the form of negated sentences. First, I have hypothesized that locative markings entail the existence of the noun they reference. Negative existential sentences do not display any locative marking, as exemplified in (24a). When locative morphology is inserted into the same structure, the negative existential reading no longer obtains; rather, the sentence is a standard case of sentential negation (24b).

(24) *Negated sentences*

a. k'ios bagwanam
NEG man
'There is no man'
*'He is not a man'

b. k'is=ox bagwanam
NEG=2.LOC man
'This/He is not a man'
*'There is no man'

Negation also provides evidence for the hypothesis that the 4.LOC marker similarly entails assertion of existence, despite its lack of spatial deictic features. This is demonstrated in (25a) and (b), where a contrast between a dog asserted to exist vs. one not asserted to exist is reflected in an alternation between locative marking and a bare case marker.

(25) *Negated sentences*

a. k'is=en dukwala x=**a** w'at'si
NEG=1.sg see ACC=**4.LOC** dog
'I don't see the dog'

b. k'ios=en dukwala=x w'at'si
NEG=1.sg see=Acc dog
'I don't see any dog'

More generally, this hypothesis predicts a difference in scopal behavior between the arguments marked by locative morphology versus arguments that are unmarked for locative: unmarked arguments should be restricted to narrow scope contexts, while locative-marked arguments will force wide scope interpretations. Preliminary tests have yielded some support for this hypothesis. For example, in examples with the strong quantifier *wi'la* 'all (please see Appendix E for examples),' we find that both the deictically-anchored and the "assertion of existence" marked arguments are restricted to specific interpretations. Furthermore, it is important to note that *–da* is not responsible for forcing these wide-scope interpretations. A full exploration of scopal contexts is unfortunately beyond the scope of this paper. In the meantime, therefore, I tentatively hypothesize that "assertion of existence" is a relevant concept for Kwak'wala DPs, but only within the LOC determiner category. While the evidence presented here is not sufficient to conclude the exact relationship between "assertion of existence" and the LOC clitics, it is sufficient for us to conclude that *–da* is *not* responsible for the wide-scope behavior of locative-marked DPs.

3.5 Domain restriction

Gillon (2006, 2009) proposes that the universal property of determiners cross-linguistically is domain restriction, or discourse anchoring. Formally, this property derives from an unpronounced variable C, which represents the characteristic function of the set of individuals provided by the discourse context (Gillon 2009:189). Some languages have determiners that consist of *only* this property (e.g. *kwi* in Skwxú7mesh), while other determiners denote domain restriction as well as other semantic properties (e.g. uniqueness, as in English *the*). As was noted in the previous section, Kwak'wala argument phrases are obligatorily marked by the locative clitics, which bear deictic features that actively situate the referent within the discourse space. The "definite" determiner, however, is not obligatory, and never occurs without accompanying locative morphology. This suggests that domain restriction, when conceived of at the level proposed by Gillon, takes place via the denotation of the locative clitics – but not via *-da*. We have now determined that *–da* does not encode familiarity, specificity, or assertion of existence. There is minimal evidence, furthermore, that *–da* is sensitive to uniqueness/maximality. If this "determiner" does not encode any of these properties, what *is* its function in the DP?

4 The proposal: *ostension*

We have now established a lack of semantic correspondence between the English and Kwak'wala determiners. At this juncture it is instructive to ask: what occurrences of *–da* in the language have we not yet considered?

The *-da* morpheme is not limited to nominal phrases; rather, it is also found in 3rd person pronominal constructions. In the following section, I will briefly visit the properties of Kwak'wala pronouns. As will be shown, *-da* is an *optional* component of pronominal forms. The pragmatic contexts that accompany the use of *–da* are therefore useful for determining *–da*'s denotation. The 3rd person pronoun enclitics described by Boas (1947) as well as those observed in contemporary speech can be found in chart (2a) of Appendix D. The third person pronoun is homophonous with the case marker (i.e. Nominative = null; Accusative = x; Oblique = s); however, these forms can be additionally modified by the locative and visibility deictic morphology. Boas terms these the "demonstrative pronominals."

There is no mention in the Boas data of pronominal forms that combine with *–da*. However, pronominal forms with *–da* are common in the current dialect (and other Wakashan languages, e.g. Haisla (Bach, et al, see http://www.people.umass.edu/ebach/xles-3.htm)):

(26) a. *Context: One of the men at a party didn't get kissed, but all the other men did*
ju=x=ox=da k'is mitsa-su
2.DEM-ACC=2.LOC= Def. NEG kiss-PASS
'That one didn't get kissed (VG)'

b. tsaya-nukw=ox=da
youger.sibling-have=2.LOC=DEF
'That person has a young person or sibling (VG)'

As the translations indicate, the insertion of *–da* gives a demonstrative flavor to the constructions. Perhaps even more direct evidence of the nature of *–da*'s contribution is the fact that pronominal demonstratives with *–da* are often judged infelicitous if not accompanied by a pointing-gesture.

This may be somewhat unexpected. Demonstratives are frequently conceived of in English as the combination of locational deixis and definiteness. In Kwak'wala, the Locative markers are, at least partially, locational deictic elements – it would therefore seem reasonable, upon noting this demonstrative flavor in translation and use, to assume that *–da* contributes the definite portion of the demonstrative complex[5]. I have already shown that this position is untenable – *-da* is simply not a definite marker. Deixis, on the other hand, is itself composed of many features (Gerner 2009). We might hypothesize, then, that while the LOC markers denote spatial deixis, *-da* represents a separate deictic feature. One such feature that appears particularly appropriate is OSTENSIVE (Gerner 2009). Ostensive demonstratives contrast with non-ostensive demonstratives in that they often require a physical gesture, and are typically used when "confusion with other potential referents exists. (Gerner 2009:62)." For example, in Lisu, a Tibeto-Burman language that contrasts demonstratives on an ostensive dimension, the non-ostensive demonstrative is used when referring to a mountain which is easily distinguishable from other referents in the context. The ostensive demonstrative, on the other hand, is used when the referenced mountain is a part of a range – and therefore potentially confusable with respect to the other mountains in context.

This division is supported by the deictic contrasts employed in noun phrases. For example, in the following situations, the speaker does not use *–da* when referring to a pencil that she is holding (and hence cannot easily point to, nor has any need to disambiguate by pointing to). When the pencil is lying on the table, it is typically marked by a medial LOC marker; however, it can still be marked by the proximal locative deictic, but *only* if this marker is accompanied by *–da* and an accompanying pointing gesture. The medial distal marker in this context does not have to be accompanied by *–da.* If it *is* spoken with *–da,* a pointing gesture is again preferred.

(27) *Context:* Speaker is holding a pen
axexsd=en x-a=x=**ga** k'adayu.
want=1.sg ACC-4.LOC=ACC=**1.LOC** pencil
'I want **this pen**.' (VF, VG) Consultant's comment: "It's mine."

(28) *Context:* The pencil is on the table – i.e., the speaker is **not** holding the pencil
a. *axexsd=an x=a=x=**ga** k'adayu.
want=1.sg ACC-4.LOC=ACC=**1.LOC** pencil
b. axexsd=an x=**ox=da** k'adayu.
want=1.sg ACC-**2.LOC= DEF** pencil
c. axexsd=an x=a=x=**ga=da** k'adayu.
want=1.sg ACC-4.LOC=ACC=**1.LOC=DEF** pencil

[5] This assumes a referential English-type demonstrative; it should be noted that other languages (e.g. Salishan) employ demonstratives that lack this presuppositional component (Henry Davis, p.c.)

It isn't necessary for the speaker to be holding the item, or for the item to be visible, in order to use the proximal marker. However, as the following examples show, it is necessary for the item to be visible – and thus reference-able by a pointing gesture – if the speaker wishes to combine the proximal locative marker with *–da.*

(29) *Context:* There's a special cookie that you know I really like, and I've been thinking about eating it – but it's in my bag, because I've been saving it for later. I say, "I want that/my/the cookie"

a. #axexsd=an x=ga=da kuki
want-1.sg ACC=1.LOC=DEF cookie
I want the cookie
Consultant's comment: This is okay if it's right in front of you (but not if it's in your bag)

b. axexsd=an x=a=x=ga kuki
want=1.sg ACC=4.LOC=3.PRO=1.LOC cookie
Consultant's comment: You can say this if we all know where it is, I've been talking about it (but it's in the bag at the time of utterance)

These examples support the general hypothesis that *–da* signifies ostension. However, "ostension" is merely a descriptive term. How can we formalize this concept? As discussed above, one function of ostension is to restrict the range of referents when there is a potential for confusion (Gerner 2009). This might lead us to hypothesize that *–da* operates as a contrastive-topic marker. However, disambiguating between multiple possible referents need not be ostension's sole function. For example, English demonstratives are frequently used to achieve "mutually-recognized salience" for a referent/topic between discourse participants (Mount 2008). This might lead us to predict that *–da* will serve to mark focus. But are all demonstrations necessarily focus-sensitive? In English, at least, the answer is no. For example, consider the following context: Three friends have found a cookie lying on the ground, and are discussing who will eat the cookie. Two of the friends are known to really love sweets, and aren't particularly fastidious. The third friend is much pickier, but suddenly says that he's going to eat the cookie. In this context, it would be perfectly reasonable for one of his friends to exclaim, "YOU wanna eat that cookie?!" while pointing at the cookie. In this context, "that cookie" is not in focus, yet is accompanied by a demonstrative and a demonstration. The focused second person pronoun, on the other hand, cannot co-occur with a demonstrative (similarly to the distributional facts of Kwak'wala), and need not co-occur with a demonstration. These facts illustrate that demonstratives and demonstrations are not synonymous with focus. It is also worth noting that demonstrations and demonstratives in English are not synonymous with each other. In other words, it is possible to use *demonstrations* in English without an accompanying demonstrative (e.g. "Give me the pencil" while pointing at the pencil).

As far as I am aware, there is as yet no comprehensive analysis that can account for these factors with regards to demonstration/demonstratives, nor are there studies that provide formal analyses of pure ostensive markers (e.g. as in Lisu). This makes the next step of our analysis difficult. Though I will not be able to solve this complex issue within this paper, I offer a few additional observations that may help lead us to a more concrete understanding of *-da*.

The Kwak'wala examples addressed thus far give rise to the following question: if *–da* is equivalent to a pointing gesture, does this predict that it can only be used in contexts for which there is a visual referent? The answer, of course, is no – we already know that *–da* combines freely with the Distal (3.LOC) marker. As was noted in Section 2, the distal marker denotes that the associated NP is either not present, or is novel to the domain of discourse. I have proposed that the *–i* LOC marker, like all the LOC markers, functions to "assert the existence" of the following NP in addition to its particular deictic meaning (i.e. "not-present"). It then follows that the *–da* is an abstract pointing gesture to an entity that we are asserting to exist, but that we cannot see. What is the function of this abstract gesture?

I propose that *–da* serves both the pragmatic functions previously mentioned: disambiguation and promoting the salience of a referent. These functions, furthermore, interact with the LOC denotations. When *-da* combines with the distal LOC morpheme it serves both to restrict the domain (from the domain of entities) as well as mark the NP as salient to the discourse. This is the nature of the "abstract" pointing

gesture, and is functionally parallel to the "domain restriction" feature proposed by Gillon for Skwxwú7mesh determiners. When *–da* combines with either a proximal or medial LOC morpheme, on the other hand, it will primarily function to mark salience (because objects that are already located in the space of the discourse are inherently less likely to be ambiguous). This proposal may explain the propensity for *–da* to occur in subject position: as subjects are often the topic of the given discourse context, *-da* naturally co-occurs with this position as it promotes the noun to salience. *–da* is not, however, limited to this syntactic position (as non-subjects may be salient, or may require disambiguation), nor are *subjects* required to be marked as salient.

5 Conclusions

This exploration of Kwak'wala noun phrase morphology has led to the following conclusion: *-da* is not a definite determiner; rather, it is the equivalent of a "pointing gesture," or ostension in deictic terms. It bears no other deictic or referential features, and is thus different from English demonstratives both in terms of a) not being definite and b) not indicating location. As predicted by the definition of "ostension" it serves two functions: to help disambiguate when there are multiple references in the domain, and to promote the referent to salience in the discourse. When combined with the distal LOC marker, *-da* is equivalent to "domain restriction" in the sense of Gillon (2006). In combination with the medial and proximal LOC markers, *-da* primarily serves to mark salience.

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Appendix A

Boas' description of the prenominal determiners is called into question by three additional forms that are attested in the current dialect (-*x̲ada*, -*sada*, -*x̲wada*). In Boas' description, the *vocalic* series (associated with definite) are characterized by the morpheme –*da.* In the accusative and oblique forms, however, the "-d" is absent when the argument is not marked by the proximal or medial Loc marker. Boas claims that these forms derive from older, more transparent forms (e.g. –*sida*) (1911: 531). According to his description, the three additional forms found in this dialect would represent adjacent occurrences of the *da* morpheme (i.e. *x̲+i+da+da*). This does not occur in the historical data; furthermore, there are no other instances of *da* doubling with the other Locative morphemes (e.g. **x̲+ga+da+da*). On the other hand, the –*a* ending of these accusative and oblique forms occurs in complementary distribution with 1st and 2nd LOC morphemes:

(1) Table

Loc Category	Nominative	Accusative	Oblique
1st	Word]-[$_{DP}$Ø=ga . . .	Word]-[$_{DP}$χ=ga . . .	Word]-[$_{DP}$s=ga . . .
2nd	Word]-[$_{DP}$Ø=oχ . . .	Word]-[$_{DP}$χ=oχ . . .	Word]-[$_{DP}$s=oχ . . .
3rd	Word]-[$_{DP}$Ø=i . . .	Word]-[$_{DP}$χ=a . . .	Word]-[$_{DP}$s=a . . .

This parallelism suggests that the –*a* suffix functions similarly to the –*i* clitic found in the Nominative 3.LOC environment. Indeed, Boas' himself provides data supporting this conclusion: "in the Newettee and Koskimo dialects -*x̲a* and -*sa* are replaced by -*x̲i* and -*si* (1947: 254)." The forms –*x̲ada* and –*sada* are much less common than their nominative counterparts; I believe that this distributional fact, coupled with the availability of definite readings on the unmarked 3.LOC forms, may have misled Boas. Regardless, it does not appear tenable to claim that –*x̲a* and –*sa* represent coalescence of LOC and DEF morphology in the current dialect. I will therefore treat the –*a* of these forms as a separate morpheme belonging to the LOC clitic category.

Appendix B

(1) General:

a. He-7a̲m=Ø=**Ø** walhda̲m-s=**Ø** ba̲gwana̲m
3.DEM-DISC=LOC=**IND** word-OBL.=**IND** man
'That is the word of mankind'

b. la-m'-a̲n wa̲tla=x̲=ga=**Ø** ba̲gwana̲m-k.
AUX-DISC-1.sg ask-ACC-1.LOC=IND man=1.VIS
'I ask the men in present existence'

(2) Existence doubtful:

b. ʔalasa̲w'=i=**Ø** laisa=s=a ts'idaq
search=3.LOC=**IND** mussel-OBL=DEF woman
'Mussels are searched for by the women'

Appendix C

The four test contexts for specificity:

a. **Speaker grounds (familiar & specific); Addressee (novel)**
   I've been sick, and have had a lot of doctors coming to see me b/c it's an interesting disease. I get a phone call, and it's one of the doctors telling me that he's coming over later. I hang up, and turn to you and tell you . . .
b. **Speaker grounds (familiar & specific); Addressee (familiar & specific)**
   Let's say my cousin is a doctor – and you know that my cousin is a doctor. I've been hoping that he's going to visit for some time (b/c I think that he'll be a good match for our mutual friend). I get a phone call, and it's him, telling me that he's coming over later. I hang up, and turn to you and tell you . . .
c. **Speaker grounds (familiar, non-specific); Addressee (novel)**[6]
   I've been sick, and have had lots of doctors coming to see me. The secretary calls me and tells me that one of them is coming over to visit this afternoon. I hang up, and turn to you and tell you . . .
d. **Speaker grounds (novel); Addressee (novel)**
   Let's say we're in a class, and I've been getting visits from all different professionals. A lawyer one day, an astronaut another day – I know that the theme of the day is "medical professionals." You ask me: Who's coming today? I answer . . .

Appendix D

The enclitic pronoun series of Kwak'wala

2a. **Kwakiutl (1947)**

Demonstrative 3rd person Pronominal		
NOM	ACC	OBL
-Ø+	-χ+	-s+

Anchor	LOC+VIS
1-vis	-k^{j}
1-inv	-g^{j}aʔ
2-vis	-oχ
2-inv	-oʔ
3-vis	-iq
3-inv	-iʔ

2b. **Gway'i (2010)**

Demonstrative 3rd person Pronominal		
NOM	ACC	OBL
-Ø+	-χ+	-s+

Distance	LOC+VIS
1	-g^{j}a
2-vis	-oχ
2-inv	-oʔ
3-vis	-i
3-inv	-ɛʔ

The label "visibile/invisible" is kept for simplicity; however, it should be noted that this is neither a sufficient nor required feature for use of the so-called "visible/invisible" forms.

Appendix E

Wide-scope interpretations under the scope of quantifiers:

(30) wíl'a-m'=ox=da tsi-tsí-tsidak mítsa=χ=**oχ**(=**da**) ginánem

[6] This context is not generally used in tests of specificity

all-DISC=2.LOC=DEF RED-RED-woman kiss=ACC=**2.LOC=DEF** child
'Every woman kissed a child'
Consultant's comment: There's only one child; it can't be different children, unless you make it (child) plural.

(31) wíl'a-m'=i=da tsi-tsidak jaqentama=x=**a** bagwanam lax=a biya'ilas
all-DISC=3.LOC=DEF RED-woman talk=ACC=**4.LOC** man PREP=4.LOC bar
Every woman talked to a man at the bar
Consultant's comment: There's only one man.

Appendix F

IPA transcriptions of examples by number:

(1) [tɛnxalóχda tsɪdáq]
(2) [tɛ́nxalóχ(*da) rubi]
(3) a. [gʲúkwilòχda bəgwánəmʔéχìs(*da) gʲúkʷ]
b. [aχʔéχstoχ ájako χə́n(*da) ájɛndʒisɛχ]
(4) [aχʔéχsdən χa kúki]
(5) [aχʔéχsdən χada kúki]
(13) a. [níkijèqələn dúqʷalaχa gígiʲatsáɢa dzə́lxʷi láχa ʔəwíʔnaɢʷìł sáda kafé. gígiʲatsáɢa]
b. [ləmida gígiʲatsáɢa dzə́lxʷi láχa ʔəwíʔnaɢʷìł]
c. [dúχʷaλɛn χá gígiʲatsáɢa dzə́lxʷi láχìs qʷəbíł]
(15) [ɢə́lsoχda bábagwəmɛχá gʲúkw]
(16) a. [náχwaloχda t'lísalaχ]
b. [naqwaloχda m̓ə̲kwalá χwa ɢánutlɛ]
(17) a. [nəp'idi giɢamejəsa t'ɬisala laχwa ik'i]
b. [nəp'idəns giɢamejəsa m̓ə̲kwalaχ laχwa t'it'ut'u]
(21) [tsólasɛn χáda k'ʲádaju]
(23) [muwida bibibəgwanəm laχ pa:tiʔɛs steisi. mitsi steisiʔɛχa**(#da)** bibibəgwanəm.
k'is mitsaχa nəmukw bəgwanəma]
(25) [gʲaχλida dagʷəda χʷaʔnalax]
(26) [dùχʷaλáλɛn χa dágʷəda χʷanalax]
(27) a. [k'ijós bəgwánəm]
b. [k'isóχ bəgwánəm]
(29) [wíʔlaʔmoχda tsitsítsedaχə mítsaχwoχ(da) ginánem]
(30) [wíʔlaʔmida tsidak yákantamaχa bəgwánəm laχa bijáʔilas]
(31) a. [lɪmóχ jáʔxidoχda]
b. [jiχoχda k'is mitsatsu]
c. [t'saʔja nukwoχda]

Mistaken identity: Boas's dilemma and the missing Kwak'wala copula[*]

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This paper examines the syntax and semantics of Kwak'wala equative sentences, and proposes that the predicates in these sentences are equative copulas, and not pronouns or demonstratives as traditionally categorized (Boas et al., 1947). Although they do have person and location features, this is not their truth-functional or at-issue contribution to the meaning of the sentence. Instead, they exhibit person and location agreement with their subjects, and this agreement has been confused with their denotation. I then consider the syntactic account of Anderson (1984), and detail some of the problems that arise when we take these sentences to have a relative-clause based structure. When we adjust this account to avoid these problems, what results is a structure compatible with modern proposals for the structure of copular sentences (Moro 1997; 2006).

1 Introduction

Kwak'wala, a Northern Wakashan language of British Columbia, has a long history of scholarship concerning it (e.g. Boas, 1893, 1900, 1911; Boas et al., 1947; Grubb, 1997; Levine, 1977, 1980, 1984; Anderson, 1984; Chung, 2007; Nicolson and Werle, 2009), but also a somewhat uneven one. Some phenomena in the language have received much attention, but concerning many other phenomena the literature is sporadic or nonexistent.

In this paper, I examine how Kwak'wala equative sentences are constructed, and attempt to determine what the components of these sentences are. What emerges is a robust copular structure that has not to my knowledge been studied in detail, in large part because the classic work on the language (Boas et al., 1947) had asserted that the language lacks copulas altogether.

In particular, this paper focuses on the syntax and semantics of the predicates in these sentences, *nugwa*, *su*, *ga*, *yu*, and *he*, traditionally categorized as "verbal pronouns" or "demonstrative predicates" (Boas et al., 1947; Anderson, 1984). In describing the "independent series" of pronouns in Kwak'wala, Boas (1947) found a series of five roots that appeared to him to be pronouns but always showed up in the sentence-initial position reserved for predicates.[1]

	Nógwa'a̲m Síwid	I am Siwid.
	Só'a̲m Síwida̲s	You are Siwid.
(1)	Gad Síwida̲k	He here is Siwid.
	Yud Síwidox̲	He near you is Siwid.
	Hed Síwide	He near him is Siwid.

The structure of the sentences in (1) appeared to be one in which *Siwid* is an argument and {*nogwaa̲m*, *soa̲m*, *gad*, *yud*, and *hed*} are the predicates. This distribution was troubling to Boas, because

[*]This paper was made possible only through the time, patience, and expertise of my consultants, the support of my advisors Henry Davis, Lisa Matthewson, and Michael Rochemont, and the help of all my co-investigators. The research was funded by the "Explorations in the Grammar of Kwak'wala" grant from the Jacobs Research Funds. This paper is a revision of my Qualifying Paper defended on December 14, 2010; although my analysis of the data differs somewhat in this version, the overall argumentation and conclusions remain substantially the same. All data is from my own fieldwork unless otherwise noted.

[1]In these examples, I have updated the orthography used by Boas (1947) to be closer to modern usage while retaining his segmental analysis, which differs somewhat from modern standards (Grubb, 1997).

Kwak'wala otherwise is very consistent about what can and cannot appear in this initial predicative position:

> "The first and second persons seem to be built up of *n* for the first and *s* for the second, an element *o*, and for the first person, the suffix *ga* (after *o*, *gwa*). It seems, however, quite against the spirit of the language that *n* and *s* should appear as stems in first position." (p. 257)

That is to say, a series of apparent pronouns is appearing in a clausal position that only predicates should occupy. The traditional solution to this dilemma is that these are one-place predicates with meanings of something like *to-be-me*, *to-be-you*, *to-be-this-one*, *to-be-that-one*, and *to-be-that-one-yonder*, by direct analogy to Kwak'wala's nominal predicates (e.g. *busi*, "to-be-a-cat") and wh-predicates (*ạngw*, "to-be-who").

This account is adequate for some of the most textually frequent data, but it runs into both syntactic and semantic problems when applied to the whole range of equative structures. I will argue instead that these five roots are the realizations of an equative copula, and that they differ in form due to suppletive agreement with their subject.

2 Overview of Kwak'wala syntax

Kwak'wala exhibits VSO word order; clausal predicates (whether verbal, nominal, or of some other type) occur clause initially, directly followed by their subjects. Other arguments — direct and indirect objects, benefactives, and locative PPs — follow in a fairly strict order.

(2) Hạ'm-x'id =ux̲w=da bạdiy=ạx̲ =x̲wa siłạm.
$_V$eat-CHANGE [$_S$ =D2=DET cougar=VIS] [$_O$ =ACC.D2 snake]
'The cougar ate the snake.'

When preceded by verbal auxiliaries, the subject may follow an auxiliary (almost always the first) as in (4) rather than the main predicate (3).[2]

(3) Higa='ạm weł wạx̲-'id =**ux̲w** **Masaki=x̲** =x̲a ṫisạm.
only=FOC can carry-CHANGE [$_S$ =**D**2 **Masaki=VIS**] =ACC rock
'Only Masaki can carry the rock.'

(4) Higa='m **=ux̲w** **Masaki=x̲** weł wạx̲-'ida =x̲a ṫisạm.
only=FOC [$_S$ =**D2** **Masaki=VIS**] can carry-CHANGE =ACC rock
'Only Masaki can carry the rock.'

The class of predicates contains not just verbs (2-4), but nominal predicates (5) and adjectival predicates (6). Even WH-elements (7) exhibit in Kwak'wala the distribution of predicates (Anderson, 1984).

(5) **Dagwạda**=tł=ạn.
doctor=FUT=1
'I am going to be a doctor.'

(6) **'Walas** =ux̲w gukw=ạx̲ =s Masaki.
big [$_S$ =D2 house=VIS =OBL Masaki]
'Masaki's house is big.'

[2]These auxiliaries might, at least for some elements traditionally classed as "auxiliaries", be the matrix predicate of their clause, taking a clausal or TP argument containing the main predicate of the sentence.

(7) **Angw** =i=da lotɬ=e' =xa ḳutala?
who [$_S$ =D3=DET get=INVIS =ACC fish]
'Who caught a fish?' (Lit: 'The one who got a fish is-who?')

The arguments of a predicate are introduced by "determiner strings", complex series of determiner-like enclitics indicating the arguments' case, location, definiteness, and visibility (Chung, 2007; Nicolson and Werle, 2009). In (6), for example, we find *gukw* ("house") specified as medially located and visible, whereas in (7) *lotɬ* ("receive, receiver") is marked as distally located and not visible.

The location marker deserves particular attention. In Kwak'wala, 3rd persons are systematically distinguished according to whether they are PROXIMAL, MEDIAL, or DISTAL. PROXIMAL arguments are generally within arms' reach of the speaker, and MEDIAL marking is used for most anything in sensory range or in the immediate speech context (Levine, 1980; Berman, 1982). DISTAL marking is primarily used for entities that are not present, including entities that do not yet exist, abstract entities like names or reasons, and entities whose location is unknown to the speaker. I will follow Nicolson and Werle (2009) in labeling these categories D1, D2, and D3.

(8) Ga='m =an 'wap **ga=da**.
be.D1=FOC =1POSS water D1=DET
'This (right here) is my water."

(9) Ṭsow=an =xa =sa gwada la **=x=uxw Hannah**.
give=1 =ACC =OBL quarter PREP **=ACC=D2 Hannah**
'I gave a quarter to Hannah (sitting over there).'

(10) Ma'ɬ-ukw **=i sasam=e' =s Henry**
two-CLASS **=D3 child=INVIS =OBL Henry**
'Henry has two children (not present).' (Lit: 'The children of Henry are two.')

A five-way {1, 2, D1, D2, D3} paradigm is pervasive throughout Kwak'wala grammar – for example, the pronominal and agreement systems show a five-way distinction, and so do (as will be seen) the predicates in equative sentences and clefts.

The NP may be (and often is) missing from the DP, as in (8), leaving a sequence of particles like *=Ø=i=da* (nominative 3rd person distal definite), *=x=uxw=Ø* (accusative 3rd person medial), etc. These function as pronouns and demonstratives, referring back to previous entities in the discourse, referring to ostensively designated entities, etc.[3]

Almost any predicative stem in Kwak'wala may serve either as the clausal predicate or, with the appropriate determiners, as an argument, meaning "the one that Xs". The latter structure is very frequent in sentences in which the clausal predicate is nominal or a WH-element; in (7) above, merely adding the appropriate determiner string to the root for "receive" results in "the one who received".

3 Predication and equation

As we have seen above, nouns (5) and adjectives (6) may directly serve as sentential predicates without the need for a copula. Sentences like these are likely one of the reasons no one has heretofore examined copulas in Kwak'wala: they did not seem to exist. Boas notes the non-existence of "to be" at the very outset of his monumental grammar: "As in other languages that lack the defining verb 'to be' (as in 'it is a man'), the distinction between noun and verb offers difficulties, because every noun may also be predicative" (Boas et al., 1947, p. 205).

"It is a man", however, illustrates only one of the uses of *to be*; all that the sentences in (5-6) establish is that *predicative* sentences require no copula. In addition to predicating properties of entities ("I

[3] A few case/person combinations have special forms, the major one being the 1st accusative *gaxan*.

am American", "The house is big", etc.), copulas also serve to identify two entities (Russell, 1972; Higgins, 1973; Adger and Ramchand, 2003; Mikkelsen, 2005), as in "Clark Kent is Superman" or "Darth Vader is my father".[4]

Although predicative and equative sentences in English appear, at least on the surface, to have a similar structure, we find in Kwak'wala two rather different constructions:

(11) *Context: We're talking about what we're going to be when we grow up.*

Kitɬ-inuxw=tɬ =a̲n.
catch.fish-expert=FUT =1
'I'm going to be a fisherman.'

Context: Two brothers are playing at being fisherman and fish. One is going to play the fisherman, and the other the fish, but they can't agree on who gets to be the fisherman and who has to settle for being the fish.

Nugwa=tɬ =i kitɬ-inuxw=tɬ.
be.1=FUT =D3 catch.fish-expert=FUT
'I'm going to be the fisherman.'

If we examine $e = e$ sentences in Kwak'wala, a robust pattern emerges that does not very much resemble the predicative structures in (5-7). Sentences that assert the identity of two entities canonically consist of two DPs, either of which may under certain circumstances be left out, and in the predicate position one of five dedicated roots *nugwa*, *su*, *ga*, *yu*, and *he*, corresponding to one of the five deictic categories and agreeing in deixis with one of the DPs (ordinarily the second).[5]

(12) Ga='m =a̲n wayas =ga Sarah.
be.D1=FOC [$_{DP1}$ =1POSS sweetheart] [$_{DP2}$ =D1 Sarah]
'Sarah is my sweetheart.'

(13) Yu='m =a̲n wayas =ux̲w Sarah.
be.D2=FOC [$_{DP1}$ =1POSS sweetheart] [$_{DP2}$ =D2 Sarah]
'Sarah is my sweetheart.'

(14) He='m =a̲n wayas =i Sarah.
be.D3=FOC [$_{DP1}$ =1POSS sweetheart] [$_{DP2}$ =D3 Sarah]
'Sarah is my sweetheart.'

If both DPs are present, and the predicate and second D2 do not agree, the sentence is rejected, or judged not as good as a sentence where they do:

(15) *Ga=d =as 'wap =ux̲w.
be.D1=DET [$_{DP1}$ =2POSS water] [$_{DP2}$ =D2]
Intended: 'This is your water.'

[4]Many authors, such as Mikkelsen (2005), make much finer distinctions between "predicational", "specificational", "equational", and "identificational" sentences. Since I am concerned here with the most elementary questions of sentence structure (such as "Is this a copula?" and "What is the subject?"), I am going to conflate specificational, equational, and identificational as "equative", with acknowledgment that later and more sophisticated investigation may find important syntactic and semantic differences between them.

[5]In many sentences this root is followed by a focus particle *='m* or an element *=d* of uncertain function. In the same way that DISTAL *he* most likely comes from the DISTAL deictic marker *=i*, *hed(a)* (be.D3) is I think likely to have come from its definite counterpart *=i=da*. What it is doing synchronically, however, is unclear; for many sentences it would difficult to maintain that it is still a definite determiner. *=d* is much more frequent in clefts than in canonical equative sentences.

These predicates look to be historically related to their corresponding pronoun/determiners – as Boas (1947) notes they are built up out of the same segmental material – but are not synchronically identical.

(16)

Person/Location	Predicative form	Corresponding pronominal/determiner form
1	/*nugwa*/	/=*an*/
2	/*su*/	/=*as*/
D1	/*ga*/	/=*ga*/
D2	/*yu*/	/=*uxw*/
D3	/*he*/	/=*i*/

It is important to note that although called "verbal pronouns" or "pronominal predicates", "pronoun" is used here in the sense that they exhibit apparent person features in a paradigm isomorphic to pronouns; they are not "pronouns" in the sense that they can be used as pro-forms for NPs or DPs. This stands in contrast to pronoun-like equative elements in other Northwest languages, such as Straits Salish (Shank, 2003) or St'át'imcets (Lillooet Salish) (Thoma, 2009), which can be shown in other contexts to act as ordinary pronouns. Attempting to use one of these "verbal pronouns" in an ordinary pronominal position (such as an argument to a verb or complement of a preposition) leads to ungrammaticality:

(17) Ṫsow =an/*nugwa =xa =s(a) =uxw/*yu la=x(a) =uxw/*yu.
give =1 =ACC =OBL =D3 PREP=ACC =D3
'I gave that to Hannah.'

Equative sentences exhibit a somewhat unexpected word order: in ordinary verbal sentences, the first DP is always the subject, but by various criteria it is the second DP in a canonical equative sentence that seems to be the subject, even though it does not usually come first. As noted above, it is the second DP that agrees with the predicate, and like other subjects never lacks overt deictic specification.

When ordinary verbal sentences have 1st or 2nd subjects, the subject is expressed through agreement enclitics rather than as an overt lexical DP. Similarly, when equating a 1st or 2nd person to another entity, the second DP does not occur and the person information is conveyed solely through the agreement on the predicate.[6]

(18) Nugwa='am Patricka.
be.1=FOC [$_{DP1}$ Patrick]
'I'm Patrick.'

(19) Su='am k̓ap̓-id-sa'w=s.
be.2=FOC [$_{DP1}$ cut.with.scissors-CHANGE-PASS=2POSS]
'You're the one who got a haircut.'

In general, any sentence may be missing the second DP, and where one would expect a pronominal subject, often is. That is, like ordinary Kwak'wala sentences, equative sentences may have a full DP subject (13), a pronominal subject (20), or no subject at all (21).

(20) Yu='m =an wayas =uxw.
be.D2=FOC [$_{DP1}$ =1POSS sweetheart] [$_{DP2}$ =D2]
'She [over there] is my sweetheart.'

[6] We can test, when one of the two DPs is missing, whether it is the first or second by the behavior of the deictic determiners; we will see below that the first DP will either have or lack a D3 determiner under specific circumstances.

(21) Yu=’m =a̲n wayas.
be.D2=FOC [$_{DP1}$ =1POSS sweetheart]
‘She [over there] is my sweetheart.’

Overall these properties argue for the second DP being the subject of these sentences. Like a subject, it always exhibits a nominative case determiner string, is frequently dropped when it would be pronominal and in the 1st and 2nd persons does not occur at all, and is the element that conditions a person alternation on the predicate.

The first DP, on the other hand, often does not show any deictic determiner, and when it does, it need not agree with the predicate. For example, when identifying an entity with a future entity, the first DP is specified as category D3 regardless of the category of the predicate (or subject):

(22) Nugwa=’a̲m=tł =**i** **ła̲wa̲na̲m=tł=e’** **=s=ux̲w**.
be.1=FOC=FUT [$_{DP1}$ **=D3** **husband=FUT=INVIS** **=OBL=D2**]
‘I will be her husband.’ (Lit: ‘I will be the future-husband of her-over-there.’)

The occurrence or non-occurrence of this deictic marker is predictable. When the non-subject DP is present, has D3 deixis, and immediately follows either these predicates or the focus-related enclitic *=ʼm*, the expected determiner clitic *=i* does not appear. We can determine its presence, however, if another clitic like *=tł* (future tense) or *=xa̲ʼ* (additive focus) intervenes in between *=ʼm* and *=i*, as in (22, 24).[7] Since in most situations these additional clitics do not intervene, however, it is the usual case that *=i* does not occur, which is among the reasons the equative structure of these sentences remained unnoticed.

(23) Su=’a̲m Pat=s.
be.2=FOC Pat=2
‘You’re Pat.’

(24) *Context: We are putting on* Romeo and Juliet.

Su=’a̲m=tł =i Romeo=s.
be.2=FOC=FUT =D3 Romeo=2
‘You will be Romeo.’

Kwak’wala clefts appear to consist of equative sentences with the DPs in the opposite order, and with the non-subject DP (now second) lacking its determiner (26). The syntactic structure of these remains unclear; it is possible that the structure is similar to an extraposition account of clefts (along the lines of Percus (1997)) where the erstwhile “first” DP is represented by a pronoun (possibly this *=d*, or possibly absent according to the restrictions above) and a remnant is extraposed rightward.

(25) *Context: Various animals threw a party, and one partygoer is asking another who brought various things.*

A̲ngw =i=da ga̲x̲-e’ =s=ux̲w=da ha̲’me’y=ex̲.
who [=D3=DET come-INVIS =OBL=D3=DET food=VIS]
‘Who brought the food?’ (Lit: ‘The one who came with the food is-who?’)

(26) Yu=d =ux̲w=da ga̲la ga̲x̲ =sa ha̲’me’y=ex̲.
be.D2=DET? [$_{DP2}$ =D2=DET bear] [$_{DP1?}$ come =OBL food=VIS]
‘It was the bear who brought the food.’

[7] The reasons for this are unclear, but we can note the same seeming lack of *=i* in agreement patterns; when *=i* would be expected as “agreement” after the first auxiliary, it does not occur if *=ʼm* immediately precedes it.

Clefts are frequent, although not obligatory, in response to questions, and the remnant is often left out when it consists entirely of given information:

(27) Yu=d =uxw=da ga̲la.
be.D2=DET? [DP_2 =D2=DET bear]
'It was the bear.'

Sentences consisting only of the predicate are thus possible, when DP2 is *pro* and DP1 is given; predicate-only sentences like *Nugwa'a̲m* ("I am") or *Yu'a̲m* ("He/she/it is") are not infrequent question answers and *He'a̲m* ("That's it!") a common exclamation. Lack of one of the two DPs is very frequent; in most contexts, one of the DPs will be already present in the discourse. The frequent lack of one of the two DPs in textual material is among the reasons the equative nature of these predicates remained unnoticed; for example, out of the dozens of equative sentences in Boas (1947), only a handful have two full DP arguments.

I propose that these predicates are fundamentally *copular*: that they exist as a "linking" element to equate two DPs. The primary reason for this is their distribution – they occur in every equative sentence, and whenever they occur, the context always seems to be equative: that there is some entity or set of entities with which the subject is being identified.[8] In a merely predicative context such as (29) – when the subject is just a member of a set, rather than the unique or maximal individual – the equative sentence is inappropriate:

(28) *Context: In a particular group of people, I am the only one that has a car.*

Ka-nukw=a̲n.
car-have=1
'I have a car.'

Nugwa='a̲m ka-nukwa.
be.1=FOC car-have
'I'm the one with a car.'

(29) *Context: I am among the many people that have cars.*

Kanukwa̲n.
#Nugwa'a̲m kanukwa.

Furthermore, we will see below that semantic tests each pick out the identity content of the sentence, rather than its locational content, as the truth-conditional at-issue meaning.

4 Demonstrative predicates

The conventional account of the syntax of these sentences comes from Anderson (1984). In this account, the predicates *ga*, *yu*, and *he* are fundamentally *demonstrative* – that is, they express *to-be-this-one*, *to-be-that-one*, etc.[9]

[8] It is not the case that each such sentence is *translated* as an English equative sentence. Since an equative sentence entails its predicative counterpart – "I am the one with a car" entails "I have a car" – it is sometimes the case that a predicative translation is used for an equative sentence, and vice-versa.

Nonetheless, an equative English translation is usually used for Kwak'wala equatives. When a predicative sentence is set aside a sentence that differs minimally in the insertion of *nugwa*/*su*/*ga*/*yu*/*he*, the latter sentence is almost always given a "...is the one that..." translation. Boas et al. (1947, p. 258) lists a number of such sentences, each one given a translation along the lines of "...is the one that...", "... is what...", etc.

[9] Anderson's account does not consider the 1st and 2nd person *nugwa* and *su*, but we could easily extend his account to them.

The concept of "demonstrative predicates" in Kwak'wala is intended as a direct parallel to the behavior of Kwak'wala WH-elements. English question words exhibit the distribution of Ds – they occur as arguments, resist further determiners (*"the which book"), etc. Kwak'wala question words, on the other hand, appear to be predicates (Anderson, 1984); we can see this in the direct parallelism between the question and answer pair in (30-31).

(30) ’Matsatł =i lodł-anam =s=uxw Masaki?
what [$_S$ =D3 receive-NMZ =OBL=D2 Masaki]
'What did Masaki get?' (Lit: 'That received by Masaki is-what?')

(31) Busi =uxw lodł-anam =s=uxw Masaki.
cat [$_S$ =D2 receive-NMZ =OBL=D2 Masaki]
'Masaki received a cat.' (Lit: 'That received by Masaki was-a-cat.')

Anderson's (1984) demonstrative predicates are meant to parallel the question words exactly: in the same way that the Kwak'wala word for "who" (*angwa*) is really "to-be-who" and "what" (*'ma*) really "to-be-what", the Kwak'wala words for "this", "that", and "yon" are meant to be "to-be-this", "to-be-that", and "to-be-yon".

Anderson therefore proposes a question-like structure for these sentences, in which everything that follows the demonstrative predicate is a kind of relative clause, sometimes headless, which acts as the subject of the predication. This structure is particularly apt for clefts such as (26) – in this sentence, *gaxsa hag'me'yex* ("came with food") would be the relative clause that modifies *=uxwda gala* ("the bear"), and together these would serve as the subject of *yu* ("to be that"). It would therefore be more literally rendered as "The bear who brought the food is that one."

This structure serves adequately for clefts and reduced clefts, and since they are conversationally frequent as answers to questions this structure thus succeeds in covering much of the naturally occurring data. When he considers what I am calling "canonical" equative sentences, however, Anderson's account runs into several difficulties. For one, many of the things we would have to consider subjects lack the expected determiners:

(32) Angw =i=da ka-nukw=e'?
who [$_S$ =D3=DET car-have=INVIS]
'Who has a car?' (Lit: 'The one that has-a-car is-who?')

(33) Nugwa='am ka-nukwa.
be.1=FOC [$_{S?}$ car-have]
'I'm the one with a car.' (Proposed lit: 'The one that has-a-car is-me.')

(34) Angw =uxw=da bagwanam?
who [$_S$ =D2=DET man]
'Who's that man?' (Lit: 'That man is who?')

(35) Yu='am Masaki.
be.D2=FOC [$_{S?}$ Masaki]
'He's Masaki.' (Proposed lit: 'Masaki is-that-one.')

We expect, if *kanukwa* and *Masaki* are subjects, for them to exhibit determiners like any other subject – like, in particular, the subjects of (32) and (34) with which they are claimed to be parallel. Anderson suggests that this is because relative clause subjects along the lines of *kanukwa* in (33) lack an appropriate AGR head, but we see a relative clause subject in (32) with exactly the expected determiners. It is also awkward to extend the same reasoning to (35) – i.e., that *Masaki* lacks determiners because it is a relative clause.

Instead, the lack of the determiner in these sentences seems to stem from the predictable (albeit lacking a principled explanation) lack of a determiner on non-subjects following certain morphemes (in this case *'ạm*). It is not merely the presence of *'ạm* causing this; when *Masaki* is more clearly a subject, as in (4), we find the expected determiner.

As noted above, it is the second DP that shows subject-like properties. We can see therefore a systematic contrast between the dropped *pro* sentence in (35) and the reduced cleft in (36):

(36) Yu=’m =uxw Masaki.
be.D2=FOC [$_{DP2}$ =D3 Masaki]
‘It was Masaki (who did something).’

Also, Anderson’s account encounters some difficulty with the order of constituents. Kwak’wala relative clauses ordinarily have a HEAD-RELATIVE order, which works fine for a “cleft”-type sentence like (37). For a standard equative sentence like (38), however, Anderson is compelled by his analysis to take this as an internally-headed relative clause (IHRC) (Anderson, 1984, p. 34). He notes, however, that IHRCs are not grammatical anywhere else in the language, which raises the difficult question of why they are grammatical only when they are the subjects of these demonstrative predicates.

(37) He=’m =i Hannah dulowa.
be.D3=FOC [$_{RC?}$ =D3 Hannah win]
‘It’s Hannah who won.’ (Proposed lit: ‘Hannah who won is-that-one-yonder.’)

(38) He=’am dulow =i Hannah.
be.D3=FOC [$_{IHRC?}$ win =D3 Hannah]
‘It’s Hannah who won.’ (Proposed lit: ‘Hannah who won-is-that-one-yonder.’)

We can note, in addition, some semantic difficulties with taking either *=i Hannah dulowa* or *dulowi Hannah* as being in a HEAD/RELATIVE relationship. We expect appositive content – whether it be in a relative clause structure, an attributive adjective structure, or two DPs in apposition to each other – to project through negation (Potts, 2005), and it does not otherwise appear that Kwak’wala violates this cross-linguistic expectation. If the two equated elements in an equated sentence (like *=ạn wayas* and *=uxw Sarah* in (13)) were indeed equated by apposition, whether this be through a relative-like structure or any other way, we would expect that their identity would survive negation. In other words, if (13) were really “My sweetheart Sarah is that one”, we would expect its negation to mean “My sweetheart Sarah is not that one”.

(39) K̇i’s =an yu wayas =uxw Sarah.
not =1POSS be.D2 sweetheart =D2 Sarah
‘Sarah isn’t my sweetheart.’

We see however that it is the identity meaning, rather than the deictic specification, that is targeted by negation; the deictic content of *yu* – that Sarah is currently present – projects through. This is, I think, the result that we want in any case: *=uxw Sarah* already specifies the presence of Sarah, and if negation targeted the deictic content of *yu* it would result in a deictic clash. In general, that the predicate continues to agree with the subject even under negation suggests that the predicate is not independently offering deictic content, but simply exhibiting agreement.

Stepping back for a moment, from a purely “engineering” point of view it would be strange if the only way a language had to assert the identity of two entities is to presuppose this identity and then talk about where the relevant entity is. It would in fact leave a serious expressive gap in the language: if a language’s only way of expressing identity projects through negation, then that language would not have any means of *denying* identity.

An appositive account of these equative sentences is also made less plausible by their behavior in

questions. The *at-issue* content of a sentence is that content that answers the question under discussion, and we expect appositive content to be *not-at-issue* (Roberts et al., 2009; Potts, 2005). The sentences we are examining, however, are used primarily to answer questions of identity, rather than location, making it unlikely that their identity meaning is achieved through *not-at-issue* means:

(40) *Context: We're predicting the results of a talent competition.*

Angw =i=da dulo-tɬ=e'?
who =D3=DET win-FUT=INVIS
'Who will win?'

(41) He='am=tɬ =i Ruby.
be.D3=FOC=FUT =D3 Ruby
'It'll be Ruby!'

If we take the demonstrative or locational meaning of the predicate to be its *at-issue* meaning, we get inappropriate results regarding question-answering. If *yu* means anything like TO-BE-FAR-AWAY-OR-ABSENT or TO-BE-THE-ONE-WHO-IS-FAR-AWAY-OR-ABSENT, then the answer in (41) is not actually answering the question in (40) ("Who will win?" #"Ruby is elsewhere!").

In all, the semantic tests above argue against an account in which the primary truth-functional contribution of the predicate is deictic or demonstrative and the identity meaning is some manner of projected content. Rather, we find the opposite: that the truth-functional *at-issue* meaning of these sentences is the identity meaning, and the deictic or demonstrative content is at best a *not-at-issue* projective meaning.[10]

Anderson's syntactic account is not, however, irreconcilable with these data, so long as we abandon phrases like *dulowi Hannah* being internally-headed relative clauses and serving as clausal subjects. Although this is an unusual order for a *relative* clause, it is not unusual for a *clause*, where the more predicative element being first is entirely expected. Likewise, although taking it to be a subject of *he* is somewhat problematic, there is no obstacle to it being its complement.

Making these two changes to Anderson's account leads us to something very much like modern accounts of copular syntax, in particular the small-clausal accounts by Moro (1997; 2006), in which the two DPs form a small clause complement of a copular predicate.

5 A small-clause proposal for the syntax of Kwak'wala equatives

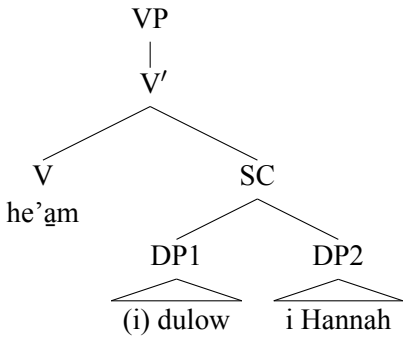
Given the order of the basic Kwak'wala sentence, in which the subject must be the first argument, the order of constituents in a Kwak'wala equative sentence can be surprising, since the apparent subject is often not the first DP constituent after the predicate. This is particularly apparent in those sentences like (22) or (12-14), where the first DP is introduced by an overt determiner string, a hallmark of argumenthood.

A small-clause analysis of the relationship between these DPs, however, allows us a way out of this apparent violation. If we follow Moro (1997; 2006) or Adger and Ramchand (2003) in taking the relationship between these DPs to be fundamentally predicative, then the subject DP is not necessarily the "second" argument of anything: it is the *first* argument of the first, predicative DP. The apparent word-order anomaly reported by Anderson (1984, p. 34) is also rendered less mysterious: the two elements exhibit Kwak'wala's expected PREDICATE-ARGUMENT order.

I therefore propose a small-clause copular model, roughly following Moro (1997):

[10]This projective content is not exactly a *pre*supposition in the sense of Stalnaker (1973), since there is no apparent requirement that the deictic meaning already be in the common ground; we could describe it instead as a sort of conventional implicature (Grice, 1989; Potts, 2005).

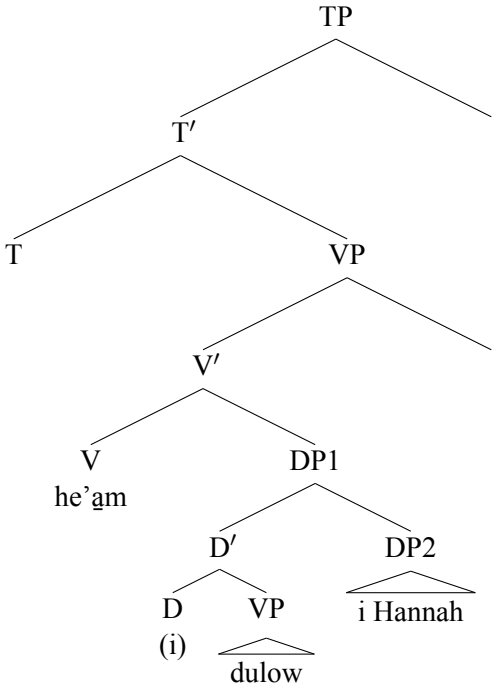
(42)



The exact implementation of the Kwak’wala small clause – what it is a projection of, and how it gets its predicate-first order – remain in the realm of speculation until we have a more thorough understanding of overall Kwak’wala clause structure.

It could be, for example, that Kwak’wala derives its verb-initial order in a manner similar to that proposed by Wojdak (2005) for the Southern Wakashan language Nuuchahnulth: that Kwak’wala is underlyingly a VOS language with rightward movement of objects. In this case, we could implement the small clause as a DP predication, with DP2 either remaining in [SPEC,DP1] or having risen to some higher specifier position (such as that of V or T). In any of these cases, the relative order of DP1 and DP2 would follow from an overall HEAD-SPEC order in the language.

(43)



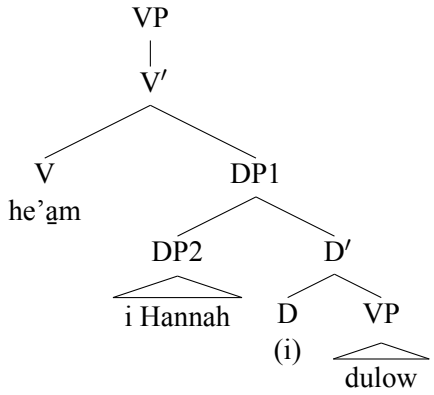
On the other hand, if we derive Kwak’wala’s VSO order from an underlying SVO order, then we have some reason to consider a VP-remnant raising approach. The claim that initial predicates are verbal heads (Emonds, 1980) leads to difficulties in Kwak’wala given that initial predicates may be phrasal (44); this phenomena is likewise found in Irish (Carnie, 1995), Quiaviní Zapotec (Lee, 2000), and Niuean (Massam, 2000).

(44) Ik ganaṉam=dl =i Madeleine.
good child=CONTRA =D3 Madeliene
‘Madeliene, however, is a good child.’

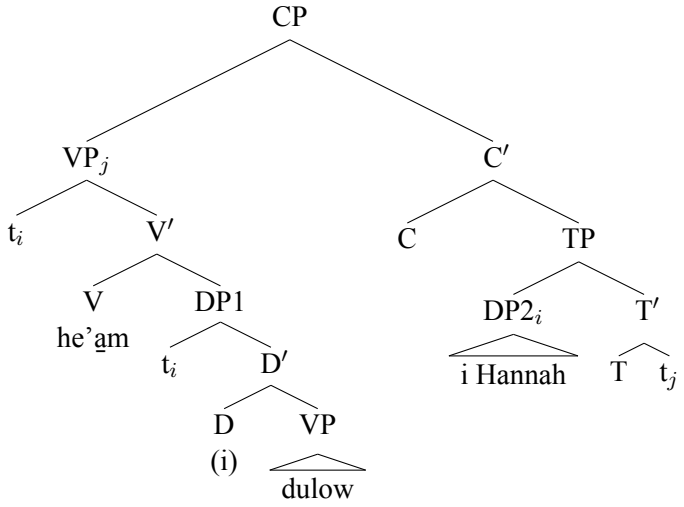
If we consider a derivation of Kwak’wala VSO order in which the remnant of the predicative

projection (be it a VP, NP, AP, etc.) raises to a higher position after its arguments evacuate, then this allows another explanation for the unexpected subject-final word order of the equative. If the first DP is not an argument – if, unlike the second DP, it does not need case – then in a VP-remnant raising account it would accompany the copula to its higher position.

(45) *Proposed copular structure, before movement:*



(46) *Proposed copular structure, at spell-out:*



This account is not entirely unproblematic – like other VP-remnant raising accounts of VSO order, it necessitates the question of why PP adjuncts do not likewise raise before the subject – but it nonetheless provides a principled reason for why DP1 might come first: that it forms a phrasal predicate with the copula, and like other Kwak'wala phrasal predicates, the entire phrase moves to sentence-initial position.

6 Conclusion

I have argued that the problematic predicates *nugwa*, *su*, *ga*, *yu*, and *he* become less problematic when viewed as the realizations of the equative copula, and that the apparently anomalous syntax of such sentences is not unexpected if we take them to be copular sentences.

The traditional view (Boas et al., 1947; Anderson, 1984) stated that these roots were instead a special kind of pronoun or demonstrative, but upon further examination the initial evidence for supposing so is tenuous – merely that they occurred in a paradigm isomorphic to the pronominal paradigms, and correlated with the presence of an entity of the appropriate person/location category. These properties, however, would equally be expected of an element that exhibits subject agreement. These roots ended up classed as pronouns or demonstratives not because this was the most syntactically consistent way of

dealing with them – it was from the beginning acknowledged to be problematic – but because no other compelling account was available at the time. There did not seem to *be* any particular function for them other than to differ by person and location.

This serves to illustrate a particular disconnect between linguists and philosophers. Until perhaps the 1970s, linguists seemed mostly unaware of the predication/equation distinction, whereas philosophers knew of the distinction early but, taking English as their model for human language, did not realize that human languages distinguished them:

> "It is a disgrace to the human race that it has chosen the same word *is* for those two such entirely different ideas as predication and identity – a disgrace which a symbolic logical language of course remedies" (Russell 1919).

We would hope, then, that Russell would consider Kwak'wala a credit to the human race, as it distinguishes systematically between these "entirely different ideas" by letting its predicates predicate without need for any intermediary, and using its *is* for identity sentences alone.

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OCP(voi) and Lexical Stratification in Japanese

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It has been proposed that the Japanese lexicon has at least four strata. However, it is yet to be clarified how these strata are organized in synchronic grammar. Previous psycholinguistic studies, arguing for the psychological reality of lexical stratification, have demonstrated that phonotactic constraints that are specific to a particular stratum interfere with the auditory perception of items from the respective stratum. This study examines whether a phonotactic constraint that is specific to the Yamato stratum, OCP(voi), interferes with the categorization of voicing contrast in Yamato items but not in non-Yamato items.

1 Introduction

It has been proposed that the Japanese lexicon has at least four strata, Yamato(-Japanese), Sino-Japanese, Foreign, and Ideophonic. Although lexical stratification in Japanese derives from the historical origins of lexical items, it is not just a trace of historical events. Items from different strata show some distinctive behaviors in synchronic grammar at different levels, such as phonology, morphology, syntax, and semantics. A major issue in Japanese linguistics is to explain how these strata are organized in synchronic grammar and, if they are forming some sort of sub-grammars, how they are reflected in the linguistic performance of Japanese speakers. In this study, I focus on a phonological aspect of lexical stratification in Japanese and discuss how it could influence auditory perception.

Previous psycholinguistic studies on Japanese, arguing for the psychological reality of lexical stratification, have demonstrated that phonotactic constraints that are specific to a particular stratum interfere with the auditory perception of items from the respective stratum (Gelbart 2005, Gelbart and Kawahara 2007, Moreton and Amano 1999). Following the same line of inquiry, this study examines the stratum-specificity of a phonotactic constraint, OCP(voi) or *Lyman's Law*.

2 Phonological stratification and OCP(voi) in Japanese

According to Ito and Mester (1995), the Japanese lexicon has at least four strata: Yamato(-Japanese) (native morphemes), Sino-Japanese (centuries-old loans from Chinese), Foreign (recent loans from the Western languages), and Ideophonic (sound-symbolic expressions), and each stratum can be characterized by a unique set of phonological properties such as canonical root/word shape, phonotactics, and morphophonological processes. For example, Sino-Japanese roots are maximally bimoraic and predominantly monosyllabic, and they are mainly used in compounds (e.g. *sha* 'auto, vehicle, wheel' in *ba-sha* 'horse cart'). Ideophonic roots are minimally bimoraic, and they are mainly used in reduplicated forms (e.g. *kira-kira* 'glittering'). Ito and Mester (1995) propose three major phonotactic constraints that differentiate these strata (1)[1]. Table 1 summarizes the application of the constraints.

(1)

a. NO VOICED GEM (*DD) "No Voice Obstruent Geminates"
b. NO VOICELESS LAB (*P) "No Singleton /p/"
c. NO NAS-VOICELESS (*NT) "Post-nasal obstruents must be voiced"

[1] Ito and Mester (1995) proposed these constraints within the framework of Optimality Theory. Here, I take them as descriptive labels for the moment and defer any argument on the architecture of OT grammar in Japanese phonology.

Table 1. 3 major stratum-specific phonotactic constraints in Japanese.

	*DD	*P	*NT
Yamato	✓	✓	✓
Sino-Japanese	✓	✓	NA
Ideophonic	✓	NA	✓
Foreign	NA	NA	NA

*DD holds in Yamato, Sino-Japanese, and Ideophonic, but not in Foreign. *P holds in Yamato and Sino-Japanese, but not in Foreign and Ideophonic. *NT holds in Yamato and Ideophonic, but not in Sino-Japanese and Foreign. From these patterns, Ito and Mester argue that the Yamato stratum, consisting of the least marked items, forms the core of the Japanese lexicon and the Foreign stratum, consisting of the most marked items, forms the periphery of the Japanese lexicon. In this core-periphery model, phonotactically legal forms in the lexical core form a subset of phonotactically legal forms in the lexical periphery.

Beside these three major constraints, OCP(voi), also known as *Lyman's Law* when it blocks *Rendaku* (see below), is effective in the Yamato stratum.

(2) OCP(voi) "No more than one voiced obstruent in a morpheme"

Under the effect of this constraint, Yamato roots are not allowed to have more than one voiced obstruent (3.a). OCP(voi) has so-called long distance effect. This means that the distance between co-occurring voiced obstruents does not matter within its domain (3.b)

(3)

a. *toge* 'thorn' **doge*
b. *karada* 'body' **garada*

Rendaku is a morphophonological process in word compounding. Ito and Mester (1995) analyze it as an insertion of one [+voice] feature that marks the morphological status of compounding[2].

(4) *Rendaku*

ama	+	*kaki*	=	*amagaki*
'sweet'	[+voice]	'persimmon'		'sweet persimmon'

Rendaku, however, is blocked when the second element already has a voiced obstruent. If such a compound undergoes *Rendaku*, it will result in the presence of two voiced obstruents in the second element, a configuration that violates OCP(voi).

(5) *Lyman's Law*

a.	*ai*	+	+	*kagi*	=	*aikagi* / **aigagi*
	'matching'		[+voice]	'key'		'spare key'
b.	*onna*		+	*kotoba*	=	*onnakotoba* / **onnagotoba*
	'woman'		[+voice]	'word'		'woman's speech'

[2] It is generally thought that *Rendaku* only applies to Yamato items. However, *Rendaku* takes place with Sino-Japanese roots in limited circumstances (Vance 1996). First, when a Sino-Japanese root follows a Yamato root in a compound, the Sino-Japanese root undergoes *Rendaku* (e.g. *kakure-ka* [hide(YJ)-house(SJ)]→ *kakurega* 'hideout'). Second, some older Sino-Japanese compounds show *Rendaku*, suggesting that *Rendaku* was historically effective in the Sino-Japanese stratum too. Compare two different realizations of the Sino-Japanese root *ti* 'ground' in an older compound *ro-ti* [bare (SJ)-ground (SJ)] → *rodi* 'bare ground' (*Rendaku*) and in a newer compound *hei-ti* [flat (SJ)-ground(SJ)] → *heiti* 'flat ground' (no *Rendaku*). It is also known that some nativized Foreign words undergo *Rendaku*. For instance, an old loan from Portuguese *karuta* 'card' undergoes *Rendaku* in the compound *iroha-karuta* [syllable(YJ)-card(F)] → *irohagaruta* 'syllable playing card'.

The effect of OCP(voi) is clear in the Yamato stratum. However, the generalization that it is strictly Yamato-specific may be questioned. First, the effect of OCP(voi) is hard to be verified in the Sino-Japanese stratum. Since the majority of Sino-Japanese roots are monosyllabic and Japanese syllable structure does not allow any coda consonant other than a moraic nasal, OCP(voi) is vacuously met by those monosyllabic Sino-Japanese roots with a nasal coda.

Second, even though OCP(voi) is violated by many Foreign roots (e.g. *gaido* 'guide'), it still shows some marginal effect in the Foreign stratum. For example, such an effect is observed in a small set of semantically related Foreign words, such as the names of professional baseball teams (e.g. *taigaasu* ***taigaazu*** 'Tigers') (Tateishi 2001, cited in Fukazawa and Kitahara 2005). It is also known that OCP(voi) and *DD together trigger an optional devoicing of geminate voiced obstruents in Foreign roots (Nishimura 2002, cited in Kawahara 2005). The occurrence of geminate voiced obstruents is not prohibited in Foreign roots. However, some tokens of those geminate voiced obstruents are optionally devoiced when they co-occur with another voiced obstruent in the same root (6)[3].

(6)

a. *kiddo* ~ ***kitto*** 'kid' No devoicing
b. *baddo* ~ *batto* 'bad' Optional devoicing

In an experimental study, Kawahara (in press) found that Japanese speakers rate the devoicing of OCP-violating geminates (i.e., geminate voiced obstruents co-occurring with another voiced obstruent) as more natural than the devoicing of non-OCP-violating geminates (i.e., geminate voiced obstruents with no co-occurring voiced obstruent) in Foreign words. Interestingly, he also found that Japanese speakers even rate the devoicing of OCP-violating singleton obstruents as more natural than the devoicing of non-OCP-violating singleton obstruents in Foreign words. Given the phonological generalization that OCP(voi) is defective in the Foreign stratum, these leaking effects are striking and pose a question about how strong the stratum-specificity of OCP(voi) is.

Some aspects of word prosody are sensitive to lexical strata (Kubozono 2006). Accentuation pattern shows an inter-stratum variation. Table 2, based on Kubozono (2006:1141), shows the frequencies of accentuation patterns of trimoraic nouns from different lexical strata in Tokyo Japanese.

Table 2. Accentuation patterns of trimoraic nouns from different lexical strata.

	Accented	**Unaccented**	**Total**
Yamato	644 (29%)	1576 (71%)	2220
Sino-Japanese	2420 (49%)	2519 (51%)	4939
Foreign	724 (93%)	54 (7%)	778

Yamato nouns are predominantly unaccented (70% are unaccented). In contrast, Foreign nouns are predominantly accented (93% are accented). Sino-Japanese are either unaccented or accented (49% are accented and 51% are unaccented). Canonical word shape also shows an inter-stratum variation. Table 3, reproduced from Kubozono (2006:1146), shows the frequencies of word shapes of trimoraic words from different lexical strata in Tokyo Japanese[4].

[3] Ito and Mester (2008) explain this gradient effect by the introduction of an additional stratum 'Assimilated Foreign' where some Foreign items are treated as Yamato items.

[4] Kubozono (2006) uses two labels, 'trimoraic nouns' and 'trimoraic words', but does not make the difference clear. Here, I follow his labeling.

Table 3. Word shapes of trimoraic words from different lexical strata.

	LLL	HL	LH	Total
Yamato	2084 (94%)	112 (5%)	24 (1%)	2220
Sino-Japanese	1110 (22%)	2257 (46%)	1572 (32%)	4939
Foreign	296 (38%)	350(45%)	132 (17%)	778

Yamato words predominantly consist of a string of light syllables (LLL). Note that only 6% of trimoraic Yamato words contain heavy syllables (HL and LH). In contrast, Sino-Japanese words and Foreign words frequently contain heavy syllables. 78% of trimoraic Sino-Japanese contain heavy syllables and 62% of trimoraic Foreign words contain heavy syllables

In sum, lexical stratification in Japanese can be supported by distinctive phonological behaviors of items from different lexical strata. OCP(voi) is a phonotactic constraint that is effective in the Yamato stratum. However, recent studies have questioned the stratum-specificity of OCP(voi) in a strict sense. Particularly, an experimental study by Kawahara (in press) showed that the leaking effects of OCP(voi) in the Foreign stratum are reflected in an aspect of linguistic performance: naturalness rating of the devoicing of voiced obstruents in Foreign words. Naturalness rating, however, is not the only measure through which we can evaluate the psychological reality of abstract knowledge. In this study, I test the stratum-specificity of OCP(voi) by looking at another aspect of linguistic performance: phonetic categorization, which has been known to reflect phonotactic knowledge in a robust way.

3 Phonetic categorization and lexical stratification

In a classic study, Massaro and Cohen (1983) demonstrated that phonetic categorization is influenced by phonotactic status, i.e., whether a cluster is phonotactically legal or illegal. In English, the consonant clusters /sl/ and /tr/ are attested but /sr/ and /tl/ are not. When English speakers hear sounds that are ambiguous between /l/ and /r/, if the sounds are presented in an /s_/ context, their categorization is biased to /l/. In contrast, if the sounds are presented in a /t_/ context, their categorization is biased to /r/. In other words, English speakers' categorization is biased toward the phonotactically legal ends of the /l/-/r/ continuum (7).

(7)

a. /sl/-/sr/ continuum

/sl/_____boundary shift →|_____/sr/
Phonotactically legal Phonotactically illegal

b. /tl/-/tr/ continuum

/tl/_____|← boundary shift_____/tr/
Phonotactically illegal Phonotactically legal

Now, a question is what if a language has different classes of lexical items, and a phonotactic constraint holds in one class but not in the others. In other words, what if the same configuration has a varying phonotactic status, legal or illegal, depending on the class of lexical items in which it appears. Moreton and Amano (1999), applying Massaro and Cohen's paradigm, demonstrated that such a phonotactic constraint has a stratum-specific biasing effect. In Japanese, the word-final long /a:/ is only attested in Foreign words. This can be explained by a constraint that prohibits the occurrence of the word-final long /a:/ in Yamato and Sino-Japanese words. In Moreton and Amano's experiment, when Japanese speakers hear sounds that are ambiguous between short /a/ and long /a:/ in word-final position, if the sounds are presented with [r^{j}] and/or [ç] (sounds that are found only in Sino-Japanese items) in the same carrier non-words, their categorization is significantly biased to the short [a] end. In contrast, when the same sounds are presented with [p] and/or [ɸ] (sounds that are found only in Foreign items) in the same carrier

non-words, their categorization is significantly biased to the long /a:/ end. In other words, Japanese speakers' categorization of the word-final /a/-/a:/ continuum is differently biased depending on the assumed stratal affiliation of the carrier non-words (8).

(8)

a. Sino-Japanese

a]Wd	boundary shift → |	a:]Wd
Phonotactically legal		Phonotactically illegal

b. Foreign

a]Wd	|← boundary shift[5]	a:]Wd
Phonotactically legal		Phonotactically legal

In this study, I examine whether OCP(voi) has a similar stratum-specific biasing effect on the categorization of voicing contrasts in Japanese. If OCP(voi) is Yamato-specific, Japanese speakers' categorization of voicing in obstruents should be biased to the voiceless end when they co-occur with a voiced obstruent in Yamato roots, but not in non-Yamato roots (9).

(9)

a. Yamato

[T_D]Rt/[D_T]Rt	boundary shift → |	[D_D]Rt
Phonotactically legal		Phonotactically illegal

b. Non-Yamato

[T_D]Rt/[D_T]Rt	|	[D_D]Rt
Phonotactically legal		Phonotactically legal

4.1 Experiment

This experiment follows Moreton and Amano's paradigm. The task is forced-choice identification with alternative answers, voiceless or voiced. In each trial, subjects are asked to identify the voicing feature of target sounds from a continuum. The target sounds are presented in different carrier non-words. Moreton and Amano showed that biased categorization is conditioned by the stratal affiliation of carrier non-words, which can be cued by phonological features that occur only in the respective strata. Unfortunately, however, there is no phonological cue that categorically defines carrier non-words as Yamato items. As we saw in section 2, the Yamato stratum is the least marked category in the Japanese lexicon. In other words, what is possible in the Yamato stratum is also possible in other strata and there is no phonological feature that occurs only in the Yamato stratum. The absence of categorical cues forces us to rely on weaker gradient cues. In section 2,we also saw that word prosody shows some inter-stratum variations. Table 4, based on Kubozono (2006), summarizes prosodic patterns of trimoraic words from three different lexical strata. Kubozono (2006) makes two interesting observations. First, trimoraic Yamato words are mostly unaccented while trimoraic Foreign words are mostly unaccented. Second, trimoraic Yamato words predominantly consist of a string of light syllables (LLL) while trimorai Sino-Japanese and Foreign words frequently contain heavy syllables (HL and LH). These observations suggest that unaccented LLL shape may serve as a cue for the Yamato stratum. In Table 4, however, the unaccented LLL shape actually has a fairly large proportion of non-Yamato words; 67.2% are Yamato

[5] Moreton and Amano's experiment also includes a control condition where none of the stratal cues are included in carrier non-words. Interestingly, when compared with the control condition, there is a significant bias to the long [a:] end in the Foreign condition where both ends are phonotactically legal.

words and 32.8% are non-Yamato words. In this experiment, I tentatively take the unaccented LLL shape as a cue for the Yamato stratum. However, it is possible that the Yamatoness of the shape is not strong enough to condition subjects' perception and trigger the expected biasing effect in their phonetic categorization. In contrast, the connection between heavy syllable and non-Yamato words is strong. In this experiment, I take unaccented LH shape as a cue for the non-Yamato strata for two reasons. First, the unaccented LH shape has the smallest proportion of Yamato words. Second, since pitch difference affects the perception of voicing contrast (Fujimura 1971, Haggard et.al. 1970), it is better to use carrier non-words with the same pitch contour in both Yamato and non-Yamato conditions.

Table 4. Prosodic patterns of trimoraic words from three different lexical strata.

		Yamato	Sino-Japanese	Foreign	Total
Accented	HL	65 (3%)	1783 (82%)	326 (15%)	2174
	LH	14 (3.3%)	283 (67.4%)	123 (29.3%)	420
	LLL	563 (45.9%)	389 (31.7%)	275 (22.4%)	1227
Unaccented	HL	47 (8.6%)	474 (86.8%)	25 (4.6%)	546
	LH	10 (0.08%)	1289 (98.5%)	9 (0.7%)	1308
	LLL	1521 (67.2%)	722 (31.9%)	21 (0.9%)	2264

4.2 Stimuli

Stimuli for the experiment were six [T] (voiceless stop) – [D] (voiced stop) continua, consisting of two different places of articulation (coronal and velar) followed by three non-high vowels (/a/, /e/, /o/). Labial place was excluded because the labial voiceless stop /p/ does not occur in the Yamato stratum. High vowels were excluded because they trigger the affrication of coronal stops and create a complication in stimuli re-synthesis. The shape of carrier non-words was determined according to the following criterion. Since OCP(voi), by definition, does not apply across a morpheme boundary, it is necessary that interacting obstruents be within the same morpheme. This criterion was met by avoiding a substring that corresponds to any existing morpheme and potentially introduces a morpheme boundary between the interacting obstruents. For example, this criterion eliminates a shape that has a target sound in the final syllable because the final syllable with a voiced stop could be easily analyzed as a grammatical morpheme like the subject marker *–ga* or declarative ending *–da*, and could introduce a morpheme boundary between interacting obstruents. This criterion also restricts the possible shape of heavy syllables in non-Yamato carrier non-words. Heavy syllables are extremely prevalent in Sino-Japanese roots; the only heavy syllable that does not correspond to any existing Sino-Japanese root is /zun/. In the Yamato condition, carrier non-words were of the shape /CV.zu.ha/. In the non-Yamato condition, carrier non-words were of the shape /CV.zun/.

(10) Stimuli

	Continuum	Vowel	Yamato condition (LLL)	Non-Yamato condition (LH)
1.	[k]-[g]	a	kazuha-gazuha	kazun-gazun
2.	[k]-[g]	e	kezuha-gezuha	kezun-gezun
3.	[k]-[g]	o	kozuha-gozuha	kozun-gozun
4.	[t]-[d]	a	tazuha-dazuha	tazun-dazun
5.	[t]-[d]	e	tezuha-dezuha	tezun-dezun
6.	[t]-[d]	o	tozuha-dozuha	tozun-dozun

Note that the presentation of the target sounds in the initial position can be problematic. Since the phonotactic contexts occur after the target sounds, it is possible that subjects would make a judgment on the identity of the target sounds before hearing the phonotactic contexts. If so, the subjects' responses would not reflect the expected biasing effect of OCP(voi). However, alternative shapes like /zu.ha.CV/ for

the Yamato condition and /zun.CV/ for the non-Yamato condition are also problematic. Since the perception of voicing contrast in the medial position is influenced by the duration of the preceding sound (Lisker 1986), difference in the duration of syllables preceding the target sounds could be a potential confound.

A female native Japanese speaker produced the carrier non-words twice. Table 5 summarizes the measurements of relevant acoustic properties. Voice Onset Time (VOT) is measured from the release of the initial stop to the onset of the voicing of the following vowel. The VOT values of stops in Japanese from other studies are presented in Table 6 for comparison.

Table 5. Mean VOT, C1 burst intensity, and V1 intensity.

	VOT (ms)	C1 burst intensity (dB)	V1 intensity (dB)	Token
/k/	40.67	62.58	77.92	12
/g/	-35	63.17	77.17	12
/t/	25.25	60.08	77.58	12
/d/	-70.5	61.25	76.75	12

Table 6. VOT measurements (ms) in word-initial position from previous studies.

	/b/	/d/	/g/	/p/	/t/	/k/
Shimizu (1993)	-89	-75	-75	41	30	66
Riney et.al. (2007)	NA	NA	NA	30.3	28.5	56.7
Sugito (1996)	NA	-64	-53	NA	35.5	59.5

These studies showed that voiced stops have negative VOT values. However, it is also known that the realization of voiced stops in Japanese may vary between pre-voiced and short lag depending on geographic regions and age groups; short lag is particularly prevalent in the production of older speakers from the northern part of the main island (Takada 2006, 2008). Although the speaker for this study is from the western part of the main island, her production of voiced stops includes some tokens of short-lag sounds (4 tokens of /g/ and 2 tokens of /d/ have positive VOT values). This suggests that the variation may occur within the production of a single speaker[6]. C1 burst intensity (the burst intensity of the target sounds) is measured at the burst of the initial stops. V1 intensity is measured at the mid-point of the following vowels.

Using Praat (Boersma and Weenink 2011), VOT was manipulated to produce 9 steps in each continuum. Given the observation that voiced stops may be either pre-voiced or short lag in Japanese, in order to obtain a finer transition between two categories with a constant rate of change in VOT, short lag was used to represent the voiced end of the continuum. As we will see in the results, this choice does not necessarily increase the proportion of voiceless responses. For the velar stop, VOT was shortened from 45 ms to 5 ms (5 ms per step). For the coronal stop, VOT was shortened from 21 ms to 5 ms (2 ms per step). These values were chosen somewhat arbitrarily with a reference to the measurements presented above and my own auditory impression. Since the focus of this study is a possible boundary shift in phonetic categorization, in order to obtain a fine-grained responses around a boundary area without increasing the number of stimuli too much, all the steps are set to have a certain degree of ambiguity; the VOT values of voiceless categories are relatively shorter than what have been reported and the VOT values of voiced categories are positive values (i.e., short lag). Ideally, a pilot experiment is necessary to determine the VOT values of the expected boundary area (cf. Coetzee 2008). Due to limitations in time and resources, however, I relied on my own auditory impression. First, I made up a wider continuum with clear end-point tokens. I picked up one step that sounded the most ambiguous and set it as the mid-point (step 5) of the continuum. Then, I increased and decreased VOT with a constant rate to get to step 1 and step 9 respectively.

[6] It is also possible that this variability derives from the unnaturalness of producing non-words.

Stimuli re-synthesis was done in the following steps. First, the stop burst (5 ms) and aspiration noise (40 ms for the velar stop and 16 ms for the coronal stop) were taken from the recordings of naturally produced voiceless-end tokens. The intensity of the stop burst was scaled at 60 dB and the intensity of the aspiration noise was scaled at 50 dB. Then, the aspiration noise was cut down to the values set for each step. Vowels after the target consonants were taken from the recordings of naturally produced voiced-end tokens. This is because the initial position of vowels after voiceless stops has a noticeable breathy phonation and it gives a strong impression of voicelessness that could override the inherent voicing cues in the target consonants. Vowels after voiced stops, however, usually have a noticeable F1 transition that gives a strong impression of voicing. As it turns out, this choice seems to have contributed to a larger proportion of voiced responses in the results. The first 100 ms of the vowels were extracted and were spliced after the aspiration noises. The intensity of the vowel segments was scaled at 70 dB. The pitch of the vowel segments was adjusted to be 180 Hz with a flat contour. The synthesized syllables were spliced into two types of carrier non-words, /_.zu.ha/ (Yamato) and /_.zun/ (non-Yamato).

4.3 Procedure

The experiment was designed with E-Prime. Each session consisted of one practice block and four test blocks. A practice block consisted of 24 trials in a randomized order (step 1 and 9 tokens of 6 continua from both conditions). No feedback was given in the practice block. Yamato and non-Yamato conditions were tested in separate blocks. Each condition was tested twice. Each test block consisted of 54 trials in a randomized order (9 steps and 6 continua from one condition). The order of test blocks was systematically alternated from subject to subject. One half of subjects took the Yamato-first experiment (Yamato – Non-Yamato – Yamato – Non-Yamato) and the other half took the Non-Yamato-first experiment (Non-Yamato – Yamato – Non-Yamato – Yamato). In each trial, subjects heard an audio stimulus, a carrier non-word that contains a target sound from a continuum. At the same time, two answers that represent the end-point tokens of the continuum were visually presented in a written form (in *Hiragana* writing) on a computer screen. Then, subjects decided which of the answers matches the audio stimulus they heard. Subjects were told that they have a limited amount of time (3 sec) to make a decision.

4.4 Subjects

16 native Japanese speakers (11 females and 5 males) were recruited in Vancouver. The age of the subjects varies from 19 years old to 45 years old. The birth place of the subjects is widely distributed. Most subjects have lived in English-speaking countries for more than five years. One subject who grew up as a bilingual speaker of Japanese and English is excluded from the analysis.

4.5 Results

The proportions of voiceless responses are compared between the Yamato and non-Yamato conditions. Figure 1 shows the overall results. The first thing to note is that the overall proportion of voiceless responses is much smaller than that of voiced responses. Note that step 1 tokens still get a substantial number of voiced responses; more than 30% of the step 1 tokens are categorized as voiced in both conditions. With respect to a difference between the Yamato and non-Yamato conditions, there does not seem to be a noticeable difference. A one-sample t-test was performed on differences in the proportion of voiceless responses at 9 steps. The mean difference (Yamato – Non-Yamato) is 0.4 % and it is not significant at all ($t(8) = 0.504$, $p=0.62$). The overall results suggest that there is no significant biasing effect of OCP(voi) in the categorization of voicing contrasts in Japanese.

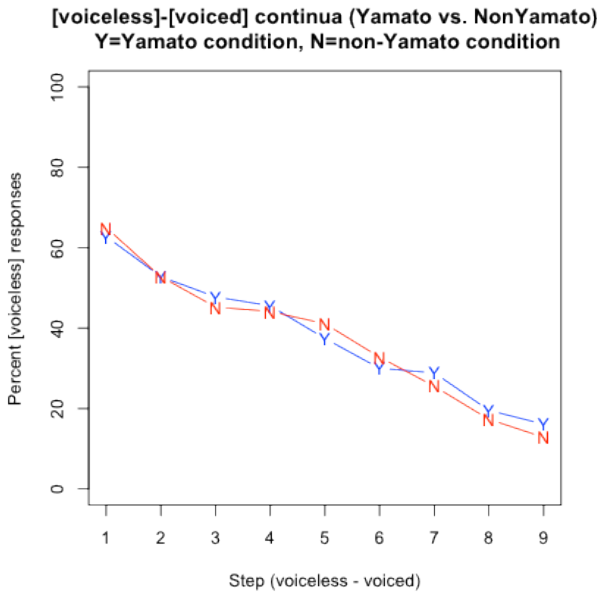

Figure 1. Overall results.

Figure 2 shows the results from the first and second halves of an experiment. Remember that each condition was tested twice. Here, the first blocks mean the first run of both conditions, and second blocks mean the second run of both conditions. 8 subjects took the Yamato-first experiment and 7 subjects took the non-Yamato-first experiment. Interestingly, the proportion of voiceless responses increases from the first blocks to the second blocks. In the Yamato condition, the mean increase is 10.6 % and it is statistically significant ($t(8)=6.625$, $p=0.0001$). In the Non-Yamato condition, the mean increase is 16.5 % and it is statistically significant too ($t(8)=6.585$, $p=0.0001$).

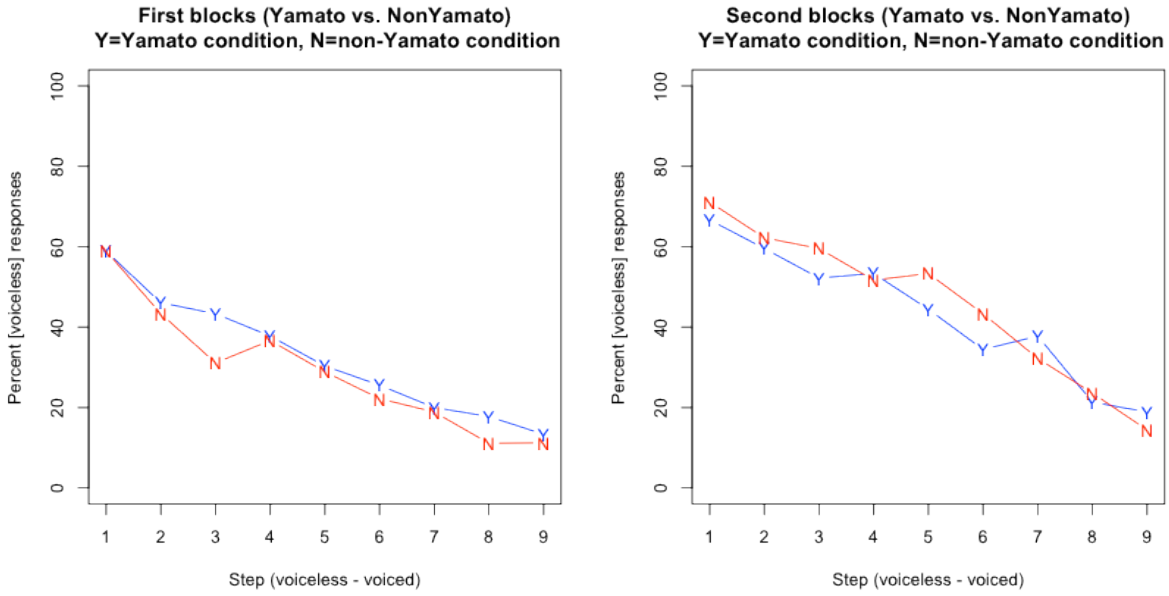

Figure 2. First blocks and Second blocks

Within the first blocks, the mean difference in the proportion of voiceless responses between the Yamato and Non-Yamato conditions (Yamato – Non-Yamato) is 3.4%, and the difference is significant

(t(8)=2.683, p=0.027). Within the second blocks, the mean difference between the Yamato and Non-Yamato conditions (Yamato – Non-Yamato) is -2.5 %, but the difference is not significant (t(8)=-1.3913, p=0.201). The change from the first blocks to the second blocks is striking. In the first blocks, the proportion of voiceless responses is higher in the Yamato condition. This follows the pattern predicted by the theory of phonotactic bias. In contrast, in the second blocks, even though the difference is not significant, the proportion of voiceless responses is higher in the Non-Yamato condition. This is contrary to the pattern predicted by the theory of phonotactic bias.

Figure 3 shows further details of the results from the first and second blocks. Solid lines represent the results from the subjects who took the Yamato-first experiment, and dashed lines represent the results from those who took the Non-Yamato-first experiment. One interesting observation is that the responses are quite variable in the first blocks, but become less variable in the second blocks. Another thing to note is that the subjects who took the Yamato block first give more voiceless responses than those who took the Non-Yamato blocks first in the first runs. This difference, however, disappears in the second runs.

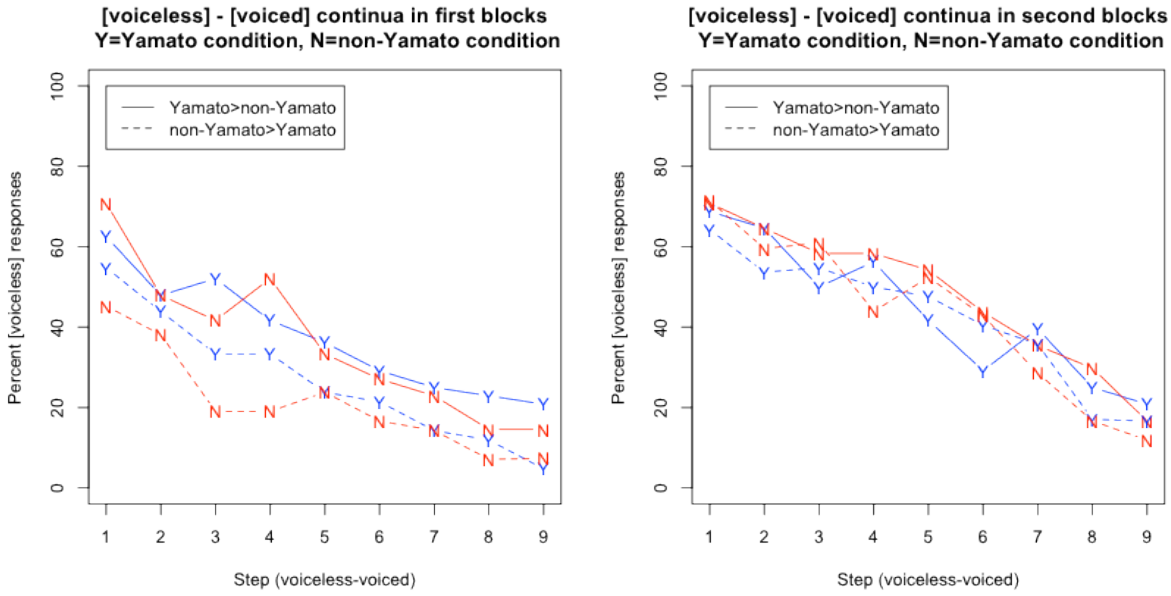

Figure 3. First blocks (the first run of both conditions) and Second blocks (the second run of both conditions)

These observations suggest that there is a certain change in subjects' performance from the first blocks to the second blocks. One possible explanation is that subjects become more trained in the latter half of their session. This is probably reflected in a change in reaction time. Reaction time becomes significantly shorter in the second blocks: 1032 ms in the first blocks and 980 ms in the second blocks (two-sample t-test: t(3228)=3.679, p=0.0002). Remember that stimuli are very similar to each other; they are basically identical to each other except for the target consonants and the following vowels in each block: /CV.zu.ha/ or /CV.zun/. Moreover, the target consonants are in initial position and the phonotactic contexts are occurring after the target sounds. From these points we can imagine that once subjects understand the nature of trial as the identification of the initial sounds, they would become more focused on the target sounds without paying much attention to the phonotactic contexts that come after. This is probably reflected in the facts that responses become less variable and reaction time becomes shorter in the second half of a session. If such a task effect explains the change in the subjects' performance, it would be worthwhile to look at the results from the first blocks in more detail.

Within the first blocks, the subjects who took the Yamato-first experiment gave a higher proportion of voiceless responses in the Yamato condition. The mean difference (Yamato – Non-Yamato) is 1.4 % but it is not significant (t(8)=0.631, p=0.54). Similarly, the subjects who took the Non-Yamato-

first experiment gave a higher proportion of voiceless responses in the Yamato condition. The mean difference (Yamato – Non-Yamato) is 5.6 % and it is significant ($t(8)=2.783$, $p=0.02$).

Figure 3 also suggests that the subjects who took the Yamato-first experiment gave more voiceless responses than those who took the Non-Yamato-first experiment. A two-sample t-test is performed on the proportions of voiceless responses from the first block of the Yamato-first experiment (first-Yamato sample) and the first block of the Non-Yamato-first experiment (first-Non-Yamato sample). The mean percent voiceless response of the first-Yamato sample is 37.58%, and the mean percent voiceless response of the first-Non-Yamato sample is 21.18%. The difference between these two samples is significant ($t(15.796)=-2.5325$, $p=0.022$). Another two-sample t-test is performed on the proportions of voiceless responses from the second block of the Yamato-first experiment (second-Non-Yamato sample) and the second block of the Non-Yamato-first experiment (second-Yamato sample). The mean percent voiceless response of the second-Non-Yamato sample is 26.83 %, and the mean percent voiceless response of the second-Yamato sample is 36.11 %. The difference between these two samples, however, is not significant ($t(15.622)=0.267$, $p=0.277$).

In sum, the overall results show that there is no significant difference in the proportion of voiceless responses between the Yamato and Non-Yamato conditions. This suggests that there is no discernible biasing effect of OCP(voi) in the categorization of voicing contrast in Japanese. However, when we look at the details of the results, we see some indications of a strong task effect. First, subjects' responses become less variable in the latter half of a session. Second, reaction time becomes significantly shorter in the latter half of a session. If the monotonicity of stimuli and the positional effect of the target sounds have induced the subjects to focus on the target sounds without paying much attention to the phonotactic contexts, it would account for some part of the changes observed in the results. Some post-hoc analyses of the results from the first half of the experiment show that subjects gave more voiceless responses in the Yamato condition. This follows a pattern predicted by the theory of phonotactic bias; Japanese speakers' categorization of voicing contrast is biased to the voiceless end in OCP-violating (Yamato) contexts. Moreover, the subjects who took the Yamato-first experiment gave more voiceless responses than those who took the Non-Yamato-first experiment in their respective first blocks. This also follows a pattern predicted by the theory of phonotactic bias. Given the effect of possible task effect, the difference between first-Yamato sample and first-Non-Yamato sample is particularly suggestive.

5 Conclusion

Does OCP(voi) interfere with the perception of voicing contrasts in the Yamato items? Unfortunately, the results of the experiment are not clear enough to give a conclusive answer to the question. The overall results suggest that there is no biasing effect of OCP(voi). However, the data also suggest that a strong task effect might have interfered with the subjects' performance. Some post-hoc analyses suggest that there is a possible biasing of OCP(voi) in early blocks in an experimental session. If we take the overall results to be reliable, how can we account for the absence of the expected biasing effect? The first possibility is that the stratum-specificity of OCP(voi) is not strong enough to trigger a biasing effect in phonetic categorization. The second possibility is that the gradient phonological cue for the stratal affiliation of the carrier non-words is not strong enough to condition subjects' perception in one stratum or the other. Remember that the correlation between the LLL shape and the Yamato stratum is weak; only 60% of the words belonging to the Yamato stratum in the Japanese lexicon have the LLL shape. If this is true, one way to solve the problem is to use non-phonological cues. As was mentioned in the introduction of this paper, lexical stratification in Japanese is supported by the distinctive behaviors of lexical items at different levels, including phonology, morphology, syntax, and semantics. Since the Yamato stratum is the phonologically most unmarked category in the Japanese lexicon, there is no phonological feature that occurs only in the Yamato stratum. Therefore, what clearly defines the Yamatoness of Yamato items may be found at other levels or modules of grammar. For example, verb roots are basically Yamato items. In contrast, Sino-Japanese and Foreign items are mostly nouns. This distinction between the Yamato and Non-Yamato strata in terms of lexical category is much more robust than the gradient phonological cues used in this study. If we take the results from the first blocks to be reliable and assume that the stratum-specificity of OCP(voi) is still strong enough to be reflected in phonetic categorization, a better chance of seeing its effect more clearly would be found in an experiment

where the stratal affiliation of carrier non-words is cued by non-phonological cues. This will be on the agenda for future research.

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A preliminary study of intonation in Kwak'wala

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This paper presents a preliminary study of intonation in Kwak'wala, a northern Wakashan language spoken on northern Vancouver Island and the adjoining mainland of British Columbia. While there are an increasing number of studies on intonation in neighboring Salish languages (Caldecott 2009, Jacobs 2007, Koch 2008, Oberg 2007), intonation in Wakashan languages has been understudied (Hofmann 1984) and there is no previous study of intonation in Kwak'wala. This paper first discusses the basic components of prosodic structure and then examines an aspect of semantics-phonology interface: deaccentuation of discourse-given material.

1. Introduction

Intonation refers to the linguistically structured distribution of suprasegmental features, particularly tonal features, at the phrase and sentence levels. This study takes Autosegmental-Metrical (AM) theory of intonational phonology as an analytical framework (Liberman 1975, Pierrehumbert 1980, Ladd 2008). In this theory, the intonation of an utterance is represented by a sequence of tonal features: pitch accent and edge tone. Pitch accent is associated with a prominent position or a stressed syllable within a prosodic category and edge tone is associated with an edge of a prosodic category. A basic tenet of AM theory is a clear distinction between stress and pitch accent. Stress is an abstract property of individual syllables, which is determined by various principles of prosodic organization, while pitch accent is a prominence-lending pitch movement. Metrical theory of stress assumes a hierarchically organized prosodic structure and the projection of stress from a lower prosodic category to a higher prosodic category (Liberman and Prince 1977, Halle and Vergnaud 1987, Hayes 1995). AM theory takes a higher prosodic category and assigns a pitch accent to a stressed syllable within the category and/or an edge tone to an edge of the category. Therefore, in order to understand the intonation of a given language, we need to understand its stress system and prosodic structure.

Semantic inputs also play an important role in intonational phonology. It is known that focus and information structure affect intonation (Ladd 1980). For example, in-situ focus is marked by pitch prominence in English. Cross-linguistically, however, connection between focus and pitch prominence is not universal (Zerbian 2006). Discourse-givenness, on the other hand, may be marked by deaccentuation in English. Cross-linguistically, however, the deaccentuation of discourse-given material is not universal (Ladd 1990, 2008).

The goal of this paper is to present a preliminary study of intonation in Kwak'wala. The outline of the paper is as follows. In section 2, I present an analysis of prosodic structure and default intonation. In section 3, I examine the deaccentuation of discourse-given material.

2. Prosodic structure in Kwak'wala

Prosodic structure is a hierarchically organized structure of prosodic categories. This study follows a widely accepted model of prosodic structure originally proposed by Selkirk (1986, 1995a). This model assumes a set of cross-linguistically well-attested prosodic categories: utterance, intonational phrase, phonological phrase, prosodic word, foot, and syllable[1].

[1] In the literature, there is disagreement on the number and the labeling of categories between prosodic word and intonational phrase. For example, it has been proposed that Japanese has two types of phonological phrase: an accentual phrase that serves as the domain of accentuation and an intermediate phrase that serves as the domain of catathesis (Beckman and Pierrehumbert 1986). Beckman and Pierrehumbert (1986) argue that the distinction is

Constituency of prosodic categories is defined in both the phonology and the syntax-phonology interface. In phonology, prosodic categories serve as the domain of various phonological events such as sandhi rules, phrasal stress, and accentuation. In the syntax-phonology interface, it is assumed that prosodic categories higher than the prosodic word are derived through a syntax-phonology mapping. Table 1 presents a set of cross-linguistically well-attested correspondence relations between prosodic categories and syntactic constituents.

Table 1. Prosodic categories and corresponding syntactic constituents (Selkirk 2005:29)

Prosodic categories	**Syntactic constituents**
Intonational phrase (IPh)	Syntactic root node, Comma phrase
Phonological phrase (PPh)/Major phrase (MaP)	Maximal projection of lexical category (XP)
Phonological phrase (PPh)/Minor phrase (MiP)	Syntactically branching constituent
Prosodic word (PWd)	Morphosyntactic word

2.1. Kwak'wala word stress

An analysis of Kwak'wala word stress proposed by Zec (1988, 1995) has gained a certain popularity in the phonological literature (Hayes 1995, Kirchner 2007, 2009, Struijke 1998). According to her analysis, stress falls on the leftmost syllable with a long vowel or the rightmost syllable if there is no such syllable in the word. Despite its popularity, it has been pointed out that Zec's analysis crucially relies on the controversial assumption that vowel length is contrastive in Kwak'wala (Bach et al 2005). Even though many studies assume that vowel length is contrastive in Kwak'wala (Bach 1975, Grubb 1969, Kirchner 2007, 2009, Struijke 1998, Wilson 1986, Zec 1988, 1995), no study has shown a minimal pair that clearly supports the assumption. Other studies claim that vowel length is not contrastive in Kwak'wala (Bach et al 2005, Kalmar 2003).

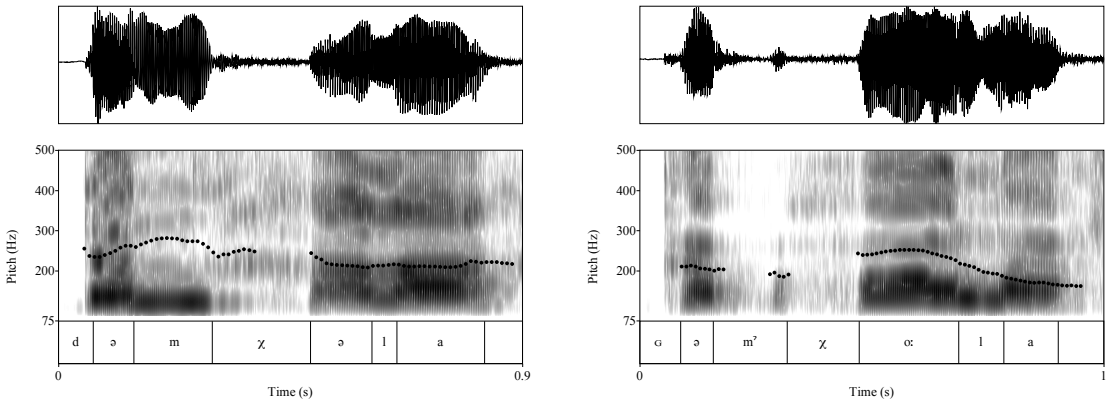
Another issue is the treatment of schwa. Zec's analysis treats schwa as an inherently short (mono-moraic) vowel because of its unstressability. However, this treatment is driven by her analysis of stress system and the controversial assumption on vowel length. Other studies claim that schwa is non-moraic in Kwak'wala (Bach et al 2005, Kalmar 2003)[2]. Comparative data show that a syllable with a schwa nucleus in Kwak'wala corresponds to a syllable without a vocalic nucleus in Oowekyala, another northern Wakashan language, suggesting that schwa in Kwak'wala diachronically developed from an epenthetic nucleus. Lincoln and Rath (1980) even claim that in Kwak'wala synchronic phonology a rhyme with a schwa nucleus and a plain sonorant coda is underlyingly a syllabic sonorant.

Kwak'wala has two types of sonorants, plain sonorants /m, n, l, y, w/ and glottalized sonorants /m', n', l', y', w'/, and it is known that a syllable with a schwa nucleus and a plain sonorant coda is stressable while a syllable with a schwa nucleus and a glottalized sonorant coda is not (Zec 1988, 1995). Figure 1.a shows the spectrogram of a plain sonorant /n/ in coda position following a schwa nucleus in /dən.χə.la/ 'singing' where the plain sonorant has a stable voicing throughout its production. Figure 1.b, in contrast, shows the spectrogram of a glottalized sonorant /m'/ in coda position following a schwa nucleus in /ɢəm'.χo.la/ 'left-handed' where the glottalized sonorant has a very weak voicing. Note that in Figure 1.a the first syllable is stressed and its F0 peak is aligned with the coda sonorant rather than the schwa nucleus. This suggests that the sonorant coda, not the schwa nucleus, is serving as a tone-bearing unit.

In sum, the Kwak'wala stress system is better restated as follows. Stress falls on the leftmost moraic syllable or the rightmost syllable if there is no moraic syllable in the word. 'Moraic syllable' refers to a syllable with a non-schwa nucleus or a plain sonorant coda.

applicable to English but the realization of the former category is less clear in English. One weakness of Beckman and Pierrehumbert's model is that it does not provide an explicit account of another crucial aspect of prosodic structure, syntax-phonology interface.

[2] This argument follows the spirit of an analysis presented by Shaw et.al. (1999) for the Musqueam Salish stress system. See references cited in Shaw et.al. (1999) for a general discussion on the non-moraicity of schwa.



(a) Plain sonorant /m/ (b) Glottalized sonorant /m'/

Figure 1. Plain and glottalized sonorants in coda position

2.2 Phonological phrasing

An issue in syntax-phonology mapping in Kwak'wala is the treatment of clitics that introduce an apparent misalignment between the syntactic phrase and the phonological phrase. Kwak'wala is known for its complicated system of deictic marking (Boas 1947, Anderson 2005, Chung 2007). These markers encode various semantic distinctions in different dimensions: case, location, determiner, visibility, and time. What is relevant to the current discussion is that case markers, locative markers, and determiners behave like enclitics; i.e. they are syntactically related to the material to their right but phonologically dependent on the material to their left. See the following example.

(2)

həm-xʔid-uχ-da	bədi-χa	g^{w}əsu
eat-Rec.Past-Loc(near 2nd)-Det	cougar-Case(accusative)	pig

'The cougar (near 2nd person) ate a pig'

The basic word order of the Kwak'wala sentence is VSO. In this example, the locative marker /-uχ/ and the determiner /-da/ of the subject noun are phonologically attached to the preceding verb. Similarly, the case marker /-χa/ of the object noun is phonologically attached to the preceding subject noun. According to Zwicky (1985), clitics and their phonological host form a prosodic word. The phonological dependency of Kwak'wala deictic markers on their phonological host is confirmed by the fact that they participate in various word-internal phonological events such as word stress assignment.

A problem arises when we build phonological phrases above prosodic words. Deictic markers form a syntactic constituent with the material to their right and a phonological constituent with the material to their left. It introduces an apparent misalignment between syntactic constituents (XP) and phonological phrases (Figure 2).

```
(                                   )IP
(                )(          )(     )PPh
(                )(          )(     )PWd
həm'-xʔíd -uχ-da  bədí -χ$^{w}$a  g$^{w}$əsú
[V          [XP          ][XP          ]]
```

Figure 2. Misalignment between XP and PPh

One way to deal with this problem is to assume that the misalignment is an epiphenomenon of a requirement for the left-edge alignment of a phonological phrase and a lexical XP, Align(PPh, L; XP^{Lex}, L). This analysis follows Lexical Category Condition in syntax-phonology mapping (Selkirk 1995a, Truckenbrodt 1999). According to the Lexical Category Condition, mapping constraints apply to lexical

elements and their projections, but not to functional elements and their projections. This analysis predicts that in a basic VSO sentence the subject noun and the following clitics may form a prosodic word and a phonological phrase, and the object noun may form a prosodic word and a phonological phrase. However, it leaves the phonological phrasing of the verb and the following clitics somewhat unclear. If we assume that VSO word order is derived through verb raising (c.f. Carnie 1995), Align(PPh, L; XP^{LEX}, L) does not apply to the verb because there is no lexical XP in this domain (Figure 3). Alternatively, if we assume that VSO word order is derived through VP raising (c.f. Lee 2006), Align(PPh, L; XP^{Lex}, L) applies to the verb and forms a phonological phrase in this domain (Figure 4). A separate study is needed to understand the derivation of the basic word order in Kwak'wala.

( )IP	( )IP
( )( )PPh	( )( )( )PPh
( )( )( )PWd	( )( )( )PWd
həm-xʔíd -uχ-da bədí -χʷa gʷəsú	həm-xʔíd -uχ-da bədí -χʷa gʷəsú
[V [XP [NP]][XP [NP]]]	[[VP][XP [NP]][XP [NP]]]
Figure 3. Phonological phrasing with V raising	Figure 4. Phonological phrasing with VP raisin

2.3. Default intonation

By default intonation, I mean the intonation of an all-discourse-new sentence without contrastive focus. Here, I present some acoustic data on default intonation in Kwak'wala. The data presented here are extremely limited and their analyses are impressionistic rather than strictly analytical. However, they at least give us a rough idea of what default intonation in Kwak'wala looks like.

Since pitch is a relative measure, I consider F0 prominence or excursion from a declination line rather than absolute F0 value. Declination is a gradual F0 lowering that takes place throughout the production of an utterance (Cohen and t'Hart 1967). It is largely due to the decrease in sub-glottal air pressure throughout the production (Collier 1975). Here, the declination line, or a straight line that represents the rate of declination, is taken to be a reference to measure the degree of local F0 prominence at different points in the utterance (Pierrehumbert 1980; Liberman and Pierrehumbert 1984; Ladd 1984, 1993). There are various methods to calculate the rate of declination. Here, I adopt a method that uses a linear regression technique; i.e. the declination rate is determined from the slope value of the least squared regression line of all the F0 values of an utterance (Lieberman et al. 1985).

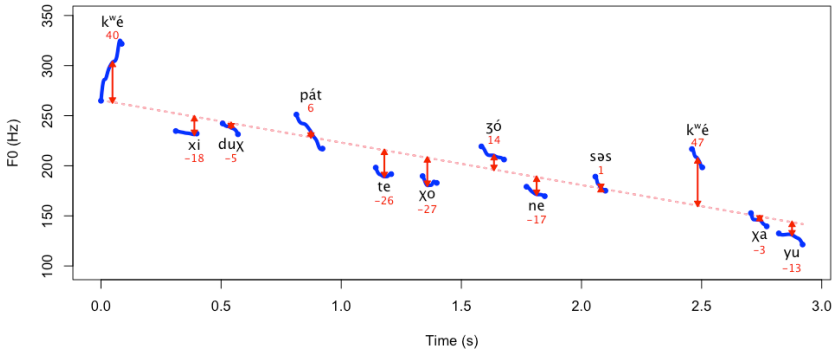
10 time-normalized sample F0 values were measured at each vowel in a sentence. Then, all the F0 values were used to calculate the declination line of the sentence. A potential confound that affects the measurement of F0 is pitch perturbation. Pitch perturbation here refers to the effect of pre-vocalic consonant types on the pitch of the following vowel. It is well known that vowels following voiced obstruents begin with a relatively lower F0 than the same vowels following voiceless obstruents (Hombert 1975). The data examined here are not controlled in terms of pre-vocalic context. To reduce the effect of pitch perturbation, consonant-vowel transitions were factored out of the analysis. However, determining where a transition ends is not an easy task. For the current analysis, I took the point where the vowel becomes relatively stable in terms of formant configuration and/or intensity as the end of a transition.

Once the declination line was calculated for a sentence, absolute F0 values were converted into values of excursion from the declination line. Then, one representative excursion value was chosen at each vowel according to the following criteria: (1) if the F0 contour of a vowel had a clear peak or valley: i.e., if the maximum excursion value is at least 10% higher than either end point excursion value, or if the minimum excursion value is at least 10% lower than either end point excursion value, the maximum excursion value or the minimum excursion value was chosen respectively: (2) if the F0 contour of a vowel did not have a peak or valley, the mid-point excursion value was chosen. Since it is not clear what aspects of acoustic measurements play a major role in the perception of pitch prominence in Kwak'wala (e.g. absolute F0 level or F0 movement), the representative excursion value should be taken as a tentative measurement.

Elicitation was done with various storyboards. The sentences analyzed here were elicited with the first drawing of each storyboard. This means that they are expected to be all-discourse-new sentences.

After showing a drawing that depicts a scene, the researcher asked the native speaker to describe the scene in Kwak'wala. The researcher used English to ask questions. The use of English in elicitation potentially influenced the speaker's production in Kwak'wala. A separate study will be needed to evaluate how much the use of English in elicitation affects the speaker's production in Kwak'wala.

Figure 5 shows the F0 contour and the phonological phrasing of an all-discourse-new sentence, /kʷéχidoχ páteχo ʒónəsas kʷéχayu/ 'Pat hit John with his bat'.



(kʷéχiduχ)(páteχo)(ʒónəsas)(kʷéχayu) PPh

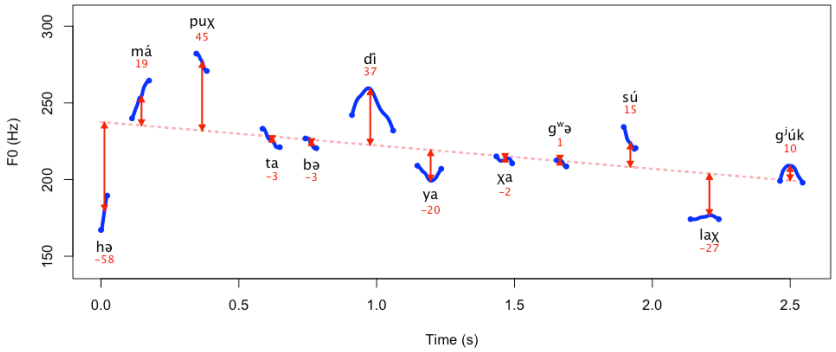
kʷeχ-xʔid-uχ	pat-χo	ʒon-s-as	kʷeχayu
hit-Rec.Past-Loc	Pat-Case	John-Case-Poss	bat

'Pat hit John with his bat'

Figure 5. F0 contour of /kʷéχiduχ páteχo ʒónəsas kʷéχayu/

The dotted line represents the declination line of the sentence. The number at each vowel is the representative excursion value (Hz) of the vowel. The first thing to note is that stressed syllables are aligned with an F0 prominence. This suggests that stressed syllables are associated with a high tone (H*). Stressed syllables, except for the first one, have a falling contour, and an F0 drop from a stressed syllable to the following unstressed syllable is often noticeable. This suggests that the high tone is followed by a low tone (+L). The first stressed syllable has a rising contour. This suggests that there is a low tone at the beginning of the sentence or the left edge of the intonational phrase (%L).

Figure 6 shows the F0 contour and the phonological phrasing of another all-discourse-new sentence, /həmápuχta bədíyaχa gʷəsú laχ gʲúk/ 'The cougar is eating a pig in a house'.



(həmápuχta)(bədíyaχa)(gʷəsú laχ)(gʲúk) PPh

həm-ap-uχ-ta	bədí-ya-χa	gʷəsu	la-χ	gʲuk
eat-Taste-Loc-Det	cougar-ʔ-Case	pig	PP-Case	house

'The cougar is eating a pig in a house'

Figure 6. F0 contour of /həmápuχta bədíyaχa gʷəsú laχ gʲúk/

What is interesting here is that the stressed syllable in the verb is not aligned with an F0 prominence. One possible explanation for this misalignment is a peak delay due to the presence of a pre-tonic unstressed syllable. Note that the initial unstressed syllable has an extremely low F0. It might be the case that this extremely low F0 onset causes a delay of F0 peak in the subsequent syllables. Also note that the second and third phonological phrases have a pre-tonic unstressed syllable but do not show such a peak delay. The extremely low F0 and the subsequent peak delay at the beginning of the sentence are probably due to the presence of a boundary low tone (%L) on an unstressed syllable.

2.4. Summary

In Kwak'wala, word stress falls on the leftmost moraic syllable or the rightmost syllable if there is no moraic syllable in the word. 'Moraic syllable' refers to a syllable with a non-schwa nucleus or a plain sonorant coda. Phonological phrasing in Kwak'wala is largely determined by a constraint that requires the left-edge alignment of a phonological phrase and a lexical XP, Align(PPh, L; XP^{Lex}, L). A stressed syllable is associated with a pitch accent (H*+L) in each phonological phrase. An intonational phrase is marked by boundary tones (%L and probably L%).

3. Semantics – phonology interface

3.1. Focus/information structure and intonation

Semantic input is an important component of intonational phonology. It is well known that focus and information structure affect intonation. In English, in-situ focus is marked by a pitch prominence (Jackendoff 1972, Selkirk 1995b, Ladd 1980). Cross-linguistically, however, connection between focus and pitch prominence is not universal. Zerbian (2006, Chapter 1) presents a comprehensive overview of different focus-marking strategies. According to her classification, there are three major domains of focus marking: prosody, morphology, and syntax. Even within the domain of prosody, pitch prominence is not the only way to mark focus. In some languages, focus is marked through phonological phrasing. A well-known case is the rephrasing and the subsequent deaccentuation of post-focus material (Kanerva 1990 for Chichewa and Nagahara 1994 for Japanese). In languages like Italian, focus is marked by a pitch prominence, but the nuclear pitch accent has a fixed position and focused material is moved to the prominent position (Zubizarreta 1998).

Another important semantic input to intonational phonology is information structure, particularly the contrast between discourse-newness and discourse-givenness. In English, discourse-given material is deaccented (Chafe 1974, Halliday 1967, Ladd 1980, Vanderslice and Ladefoged 1972). However, it is known that languages like Spanish and Romanian strongly resist the deaccentuation of discourse-given material (Cruttenden 1993, Ladd 1990). Ladd (1980) also points out that the deaccentuation of discourse-given material is structurally conditioned. It is particularly prevalent in the post-focus domain.

Here, the notion of focus should be clarified. According to Jackendoff (1972), focus introduces a set of information that yields a true proposition when it substitutes an appropriate variable in the semantic representation of presuppositional set (λx Presupps(x)). Rooth (1992) elaborates the Jackendoff's idea within the framework of Alternative Semantics. According to Rooth, a sentence with focused material (marked by F) has two semantic values: an ordinary semantic value and a focus semantic value. The focus semantic value of a sentence is "the set of alternatives from which the ordinary semantic value is drawn or a set of propositions which potentially contrast with the ordinary semantic value" (Rooth 1992:76).

(4)
[Mary]F likes Sue
Ordinary semantic value: ⟦[Mary]F likes Sue⟧o = {like(m,s)}
Focus semantic value: ⟦[Mary]F likes Sue⟧f = {lile(xm s)|x∈E} where E is the domain of individuals.

One discourse context where focus is relevant is a Wh-question and answer pair. According to Hamblin (1973), the semantic value of a Wh-question is a set of propositions and each proposition is the denotation

of a possible answer. In terms of Alternative semantics, the focus semantic value of an answer to a Wh-question is a proper superset of the ordinary semantic value of the question (Rooth 1992).

(5)

⟦Who likes Bill⟧o = {like(x,b)|x∈E∧person(x)} where E is the domain of individuals

⟦[John]F likes Bill⟧o = {like(x,b)|x=John}

⟦[John]F likes Bill⟧f = {like(x,b)|x∈E} where E is the domain of individuals

There are two major types of focus: presentational focus and contrastive focus. Presentational focus is used to introduce discourse-new information, and it is typically found in an answer to a Wh-question (Gussenhoven 2007) (see the above example). Contrastive focus, in contrast, is used to highlight the contrast between alternatives that are available in the common ground of discourse, and it is typically found in a corrective statement like *Mary stole the cookies. No, [Peter]F stole the cookies*[3] (Krifka 2007). It is known that the distinction between presentational focus and contrastive focus is reflected in prosody in English (Selkirk 2002), and it plays a crucial role in a current model of the semantic-phonology interface (Féry and Ishihara 2009, Selkirk 2008). In this model, discourse newness and presentational focus are treated as prosodically unmarked categories and contrastive focus and discourse givenness are treated as prosodically marked categories. In other words, discourse-newness and presentational focus are realized with default intonation while contrastive focus and discourse-givenness are realized with a derived intonation; the pitch range of the phrase that contains contrastively focused material is expanded (Stress Focus) and the pitch range of the phrase that contains discourse-given material is compressed (Destress Given) (Figure 9).

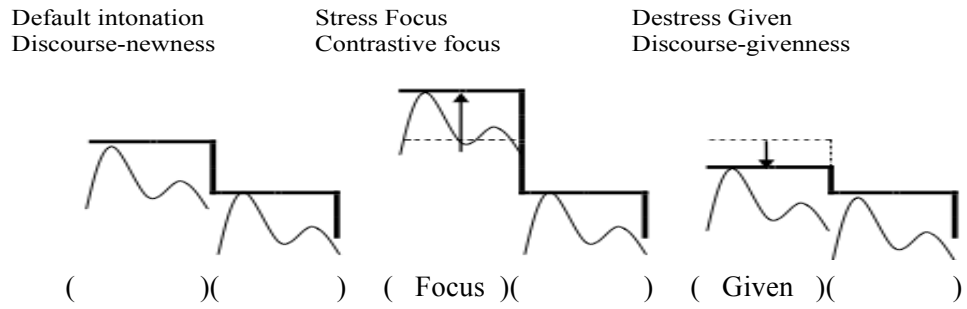


Figure 9. Stress Focus and Destress Given

When we look at Wh-question and answer pair in the light of this model, it predicts that presentationally focused material in the answer is realized with default intonation and discourse-given material, or the presupposition repeated in the answer, triggers Destress Given. This study examines whether Destress Given is observed in Kwak'wala. Since it has been known that the deaccentuation of discourse-given material is particularly prevalent in post-focus domain, this study examines post-focus Destress Given.

[3] A similar distinction was made by Kiss (1998) between information focus and identificational focus. Information focus 'conveys new non-presupposed information without expressing exhaustive identification performed on a set of contextually or situationally given entities' (Kiss 1998:246). Identificational focus, in contrast 'represents a subset of the set of contextually or situationally given elements for which the predicate phrase can potentially hold; it is identified as the exhaustive subset of this set for which the predicate phrase actually hold' (Kiss 1998:245). If we apply Kiss's proposal to the distinction between presentational focus and contrastive focus, it leads us to a question whether presentational focus and contrastive focus are analyzed in the same way in Alternative semantics. As Kiss's definitions suggests, while identificational focus requires alternatives from which particular entities are exhaustively identified, information focus does not necessarily require such alternatives; they merely conveys discourse-new non-presupposed information. If so, Wh-question and answer pairs discussed above do not necessarily invoke alternatives unless they are explicitly expressed as in a case like *Who likes Bill, John or Mary? –* [*John*]F *likes Bill*. Krika (2006:33) treats the difference between these two cases in terms of the difference between open alternatives (open focus) and closed alternatives (closed focus).

3.2 Predictions

In order to examine post-focus Destress Given in Kwak'wala, I compared two different focus constructions: subject focus and object focus. Subject focus was elicited as an answer to a subject Wh-question and object focus was elicited as an answer to an object Wh-question. Since the basic word order is VSO in Kwak'wala, in a subject focus construction, the discourse-given object noun that occurs after the focused subject noun would undergo deaccentuation.

(6) Subject focus construction

Q ʔəngʷi həmapuχ gʷəsu
'Who is eating a pig?'

A (həmápuχ)([bədí]F yaχa)↓(gʷəsú)↓ post-focus Destress Given
'A cougar is eating a pig'

In contrast, in an object focus construction, the discourse-given subject noun that occurs before the focused object noun would not undergo deaccentuation.

(7) Object focus construction

Q m'atsaɬoχ həmaptsowas bədi[4]
'What is a cougar eating?

A (həmápoχ)(bədíyaχa)([gʷəsú]F) No post-focus Destress Given
'A cougar is eating a pig'

3.3 Elicitation

Each session consisted of fifteen trials, four test trials and eleven filler trials. In each trial, a drawing that depicts a scene was shown to a native speaker, and the researcher asked a Wh-question, subject Wh-question or object Wh-question, in Kwak'wala. Test trials were grouped into pairs for a comparison. In each pair, elicited answers shared the same verb, subject noun, and object noun, but differed in focus (Table 2).

Table 2.Target answers and context questions

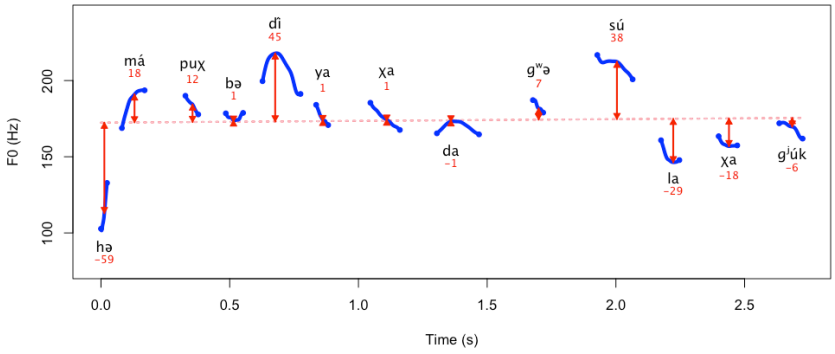
Pair	Focus	Context question and target sentence	Tokens
1	Subject	ʔəngʷi həmapuχ gʷəsu laχa guk 'Who is eating a pig in a house?' həmápuχ bədíyaχa gʷəsú laχa gúk 'A cougar is eating a pig in a house'	3
	Object	m'atsaɬuχ həmaptsowas bədi laχa guk 'What is a cougar eating in a house?' həmápuχ bədíyaχa gʷəsú laχa gúk 'A cougar is eating a pig in a house'	3
2	Subject	ʔəngʷi həmapuχ k'utɬa laχa atɬi 'Who is eating a fish in the forest?' həmápuχ bədíyaχa k'útɬa laχa átɬi 'A cougar is eating a fish in the forest'	3
	Object	m'atsaɬuχ həmaptsowas bədi laχa guk 'What is a cougar eating in a house?' həmápoχ bədíyaχa k'útɬa laχa gúk 'A cougar is eating a fish in a house'	2

[4] This question is actually in passive voice. In Kwak'wala, while subject nouns can be clefted without any morpho-syntactic operation, the clefting of non-subject nouns always requires the nouns to have moved up to the subject position via passivization (Levine 1980, Anderson 1984). This applies to the formation of object Wh-questions. Therefore, this question literally means 'What is eaten by a cougar in the house?'

A prepositional phrase was added after the VSO string in order to avoid the effect of final F0 lowering. Four tokens of each target answers were recorded. However, some of the tokens were discarded because of their 'unnatural' characteristics such as an extremely long pause or laughter.

3.5 Results

Figure 10 shows the F0 contour of a sentence with object focus. Square bracket with F indicates a focused material. In this figure, a stressed syllable is aligned with an F0 prominence in each phonological phrase, except for the last one. Since the last phonological phrase contains a discourse-given material and occurs in the post-focus domain, the reduced F0 suggests the occurrence of post-focus Destress Given. However, the F0 prominence of the sentence-final prepositional phrase shows a large amount of variation irrespective of focus construction. Moreover, the speaker's voice often gets very creaky towards the end of an utterance and it makes the measurement of F0 in that position difficult. Therefore, the current analysis focuses on the VSO string.



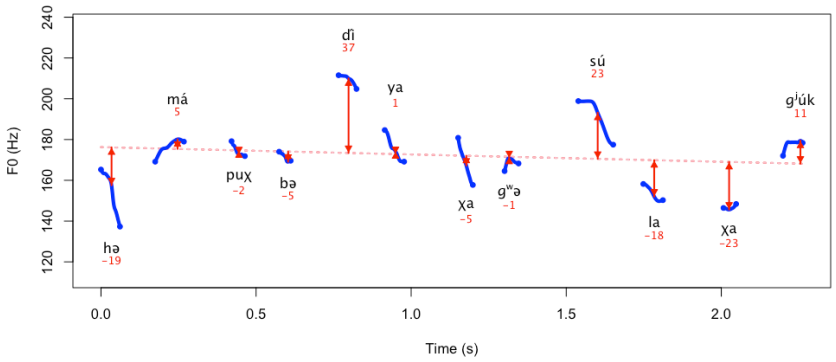
(həmápoχ)(bədíyaχada)([gʷəsú]F laχa)(gúk) PPh

həm-ap-oχ	bədi-ya-χa-da	gʷəsu	la-χa	guk
eat-?-Loc	cougar-?-Case-Det	pig	PP-Case	house

'A cougar is eating the pig in a house'

Figure 10. Object focus

Figure 11 shows the F0 contour of the same sentence with subject focus. In this figure, a stressed syllable is aligned with an F0 prominence in each phonological phrase. However, the F0 prominence of the verb is much more reduced than that of Figure 10. In the post-focus domain, there is a downtrend in F0 contour from the focused subject noun to the post-focus discourse-given object noun. The same trend is observed between the pre-focus discourse-given subject noun and the focused object noun in Figure 10. However, the degree of downtrend is larger in Figure 11. This suggests the occurrence of post-focus Destress Given. Another point to note is the presence of the determiner /da/ before the focused object noun in Figure 10. Two tokens of object focus construction contain the determiner before the focused object noun. A recent study argues that the determiner /da/ functions as an ostention marker that might serve as a focus marker as well (Black 2011). In this study, even though the occurrence of /da/ is not consistent, when it occurs, it occurs with a focused object noun. Interestingly, it does not occur with focused subject nouns in the data examined here.



(həmápoχ)([bədí]F yaχa)(gʷəsúlaχa)(gúk) PPh
həm-ap-oχ bədi-ya-χa gʷəsu la-χa guk
eat-?-Loc cougar-?-Case pig PP-Case house
'A cougar is eating a pig in a house'

Figure 11. Subject focus

Table 3 and Figure 12 show the summary of the quantitative analysis. Table 3 shows mean F0 excursion values (Hz) at three different positions: verb, subject noun, and object noun, in two different focus constructions.

Table 3. Mean F0 excursion values (Hz) in subject focus and object focus

	Verb	Subject noun	Object noun
Object focus	2.53 (N=5, sd=15.47)	35.69 (N=5, sd=8.78)	41.83 (N=5, sd=8.98)
Subject focus	19.04 (N=6, sd=12.00)	38.75 (N=6, sd=7.98)	33.80 (N=6, sd=10.28)

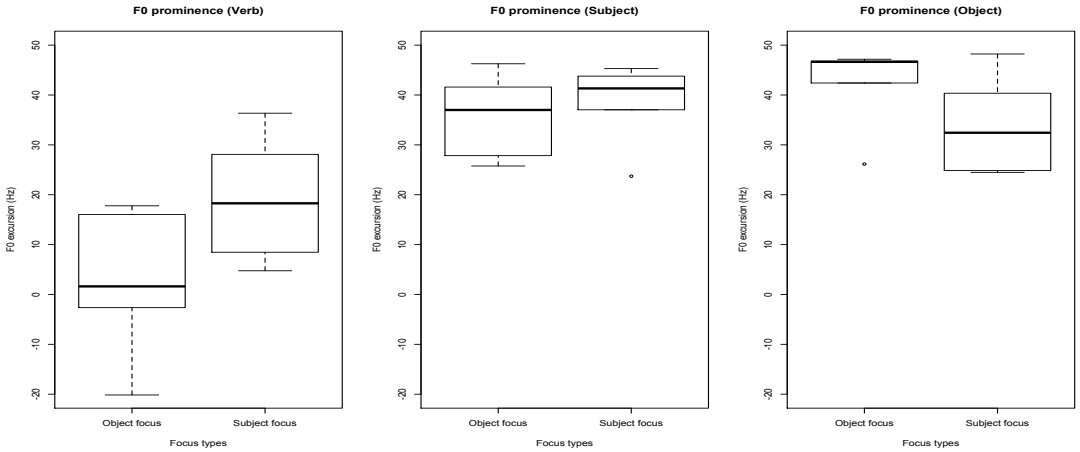


Figure 12. Differences in F0 prominence

The first thing to note is that the verb has a noticeably smaller F0 excursion in the object focus construction. Since the verb is always discourse-given in both focus constructions, Destress Given does not explain the difference. The subject noun has a similar F0 excursion in both focus constructions. The object noun has a smaller excursion in subject focus construction. These last two observations seem to follow the prediction that post-focus discourse-given material is deaccentuated. Two-sample t-tests were performed between the mean F0 excursion values in two different focus constructions. The results show that there is a weakly significant difference at verb position (t = 1.9475, df = 7.507, p-value = 0.0897), but

no significant difference at subject noun position (t = 0.5982, df = 8.269, p-value = 0.5657) and object noun position (t = -1.3826, df = 8.959, p-value = 0.2003).

These results do not support the observation made above. However, the data still shows an interesting pattern. If we focus on the global F0 contour, there is a clear difference between the two focus constructions. In the object focus construction, the global F0 contour shows a continuous rise from verb to object noun. In contrast, in the subject focus construction, the global F0 contour rises from verb to subject noun and then falls to object noun (Figure 13).

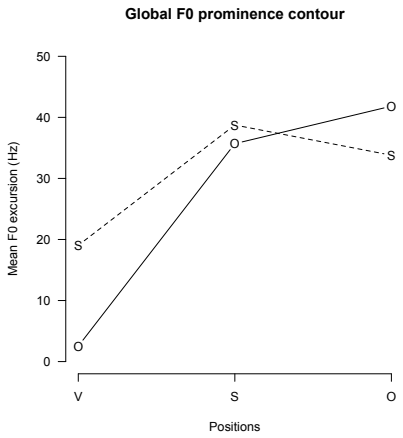


Figure 13. Global F0 prominence contour in subject focus (S) and object focus (O) constructions

Table 4 summarizes the differences in F0 excursion between subject noun and object noun in the two different focus constructions.

Table 4. Differences in F0 prominence between subject noun and subject noun

	Mean F0 excursion difference (Object-Subject) (Hz)	Tokens
Object focus	-4.95	5
Subject focus	6.14	6

A two-sample t-test was performed on the mean F0 excursion differences between the object focus and subject focus constructions, and the results showed that the difference is weakly significant (t = 1.65, df = 8.68, p-value = 0.1343).

3.6 Discussion

Despite their small number, the data examined here show some interesting patterns or tendencies. First, there is a difference in global F0 contour between object focus and subject focus constructions. In the object focus construction, the F0 contour rises from verb to object noun. In contrast, in the subject focus construction, the F0 contour rises from verb to subject noun, then falls to object noun. A possible analysis of these patterns is that the post-focus discourse-given object noun is deaccented while the pre-focus discourse-given subject noun is not. This follows the prediction made by post-focus Destress Given. Another interesting observation is that the F0 prominence of verb is more reduced in the object focus construction than in the subject focus construction. Since the verb is always discourse-given in both conditions, Destress Given alone does not explain the difference. A possible analysis of these patterns is rephrasing in the pre-focus domain. In the object focus construction, phonological phrases in the pre-focus domain (verb and subject noun) are collapsed into a single phonological phrase, and a pitch accent is reassigned to the rightmost stressed syllable of the new phonological phrase. As a result, the verb loses its F0 prominence. In contrast, in the subject focus construction, since there is only one phonological phrase in the pre-focus domain (verb), such a rephrasing does not take place. Impressionistically, this

analysis nicely accounts for the difference between Figures 10 and 11. It is worth examining the validity of such an analysis in future research.

4. General summary

In section 2, I briefly discussed word stress, phonological phrasing, and default intonation in Kwak'wala. Word stress falls on the leftmost moraic syllable. 'Moraic syllable' refers to a syllable with a non-schwa nucleus or a plain sonorant coda. If there is no moraic syllable in a word, stress falls on the rightmost syllable. Phonological phrasing in Kwak'wala is largely determined by a constraint that requires the left-edge alignment of phonological phrase and lexical XP, Align(PPh, L; XP^{LEX}, L). This study, however, left open the question of phonological phrasing in the sentence-initial verb domain. Default intonation is derived by the assignment of a pitch accent (H*+L) to a stressed syllable in each phonological phrase and the assignment of edge tones (%L and probably L%) in the intonational phrase.

In section 3, I examined post-focus Destress Given in Kwak'wala. I compared two different focus constructions, object focus and subject focus. The data examined in this study showed some interesting patterns. First there is a difference in the global F0 contour between object focus and subject focus constructions. In the object focus construction, the global F0 contour rises from verb to object noun. In contrast, in the subject focus construction, the global F0 contour rises from verb to subject noun, then falls to object noun. These patterns follow the prediction made by post-focus Destress Given. Second, there is a significant difference in the F0 prominence of the verb between the object focus and subject focus constructions. The F0 prominence of the verb is more reduced in the object focus construction than in the subject focus construction. A possible analysis of these patterns is rephrasing in pre-focus domain. However, we need to look at more data before making any generalization.

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