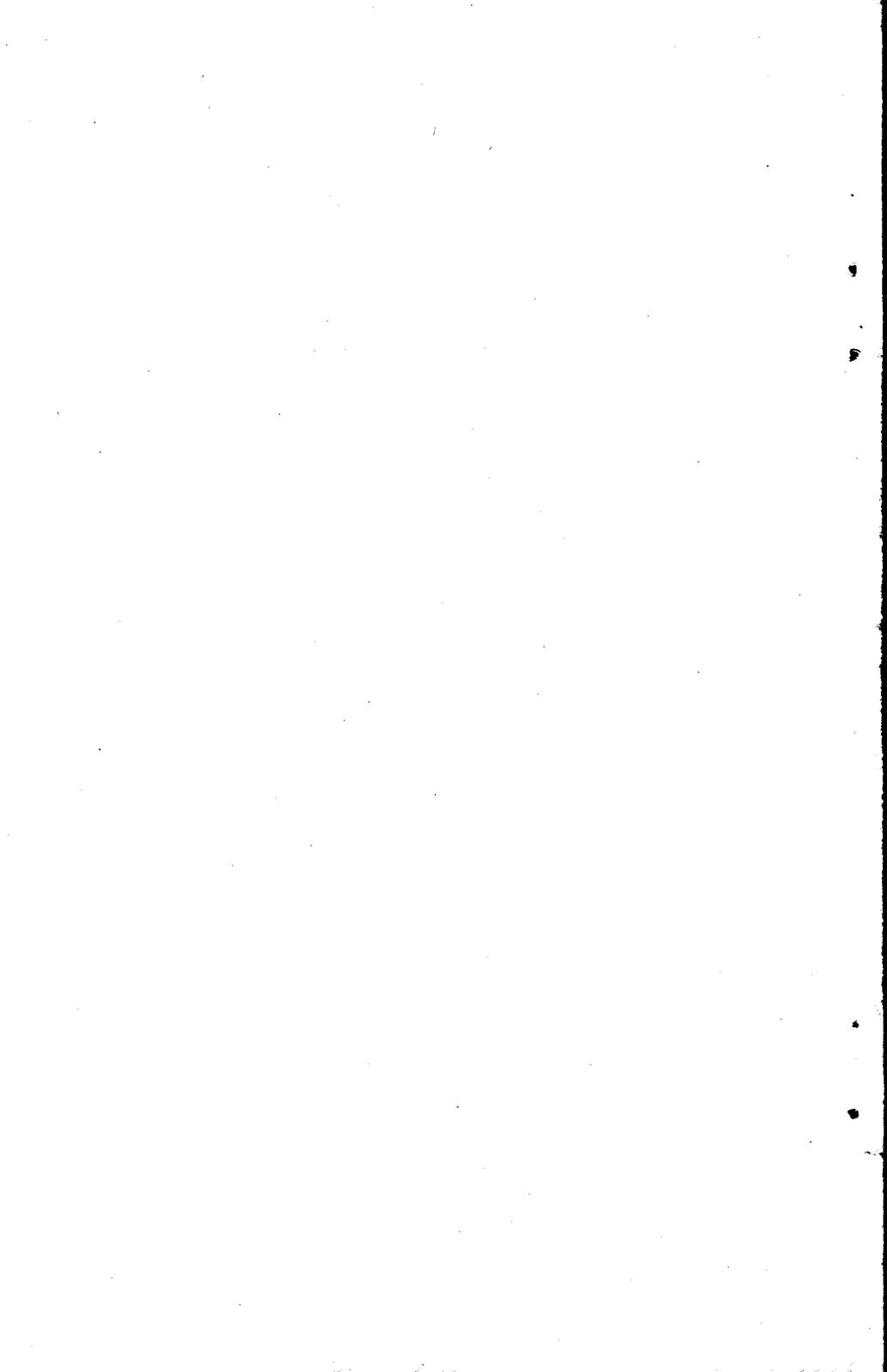

**CALGARY WORKING PAPERS
IN LINGUISTICS**

Number 19 Winter 1997

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FOREWORD

The editors of this issue, Ana Pasquini, Lorna Rowsell and Laura Catharine Smith, are pleased to present the nineteenth issue of the *Calgary Working Papers in Linguistics* published by the Department of Linguistics at the University of Calgary. The papers contained in this volume represent works in progress and as such should not be considered in any way final or definitive.

This issue of *CWPL* includes papers from both the University of Calgary and abroad. We are pleased to present three guest submissions in this edition. Moreover, three articles from this year's collection have been presented at conferences or colloquia in Canada, the United States, and Europe. The articles in this journal are organised into three subfields: phonology, language acquisition, and syntax.

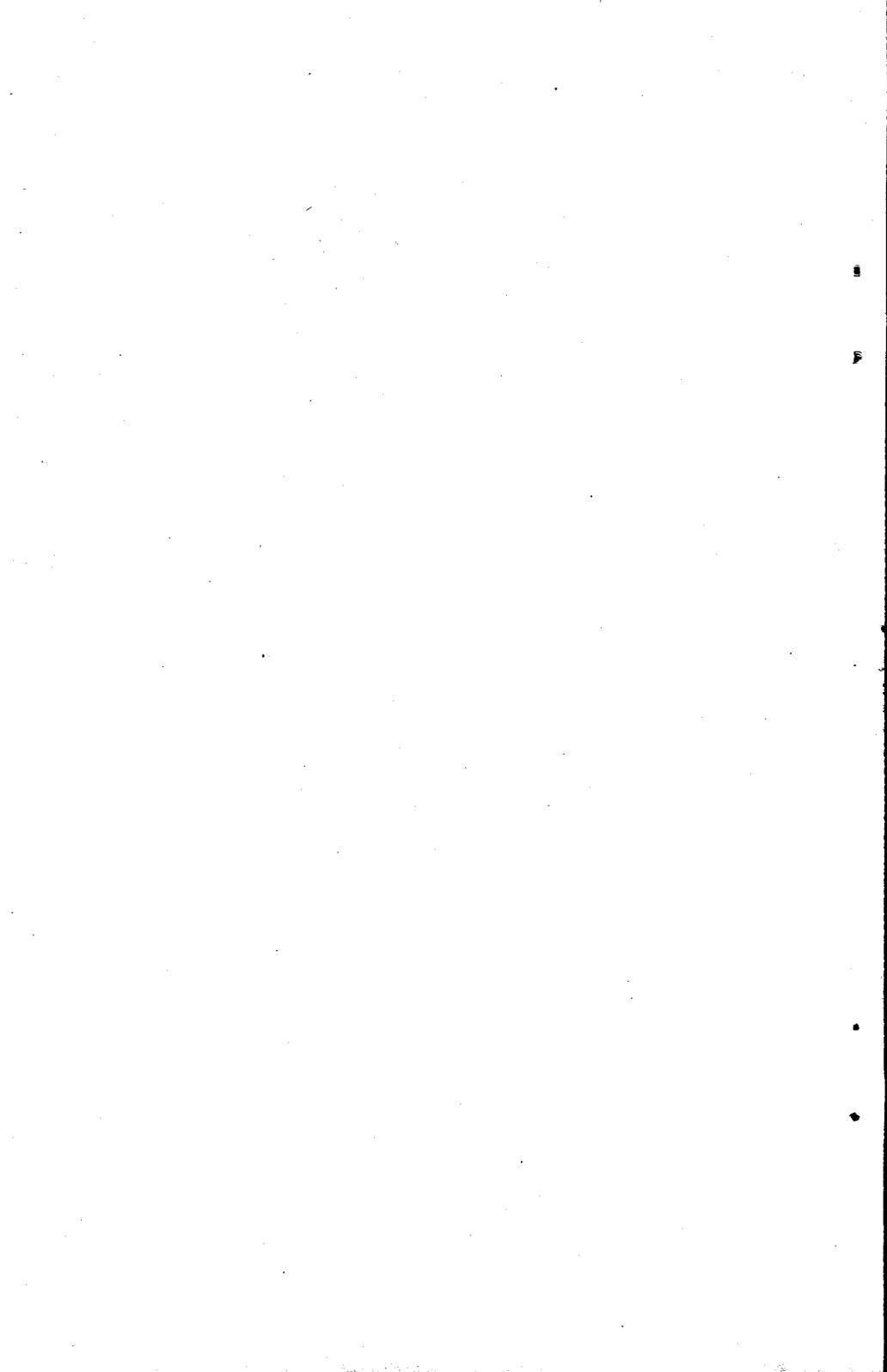
In Alain Thériault's phonology paper, he proposes a declarative analysis of onset maximisation which constrains syllable strings. This work stems from research at the Université de Montréal leading to a syllable parser of Montreal French. It was presented at the Holland Institute of Generative Linguistics at Leiden University in July 1996. In our second phonology paper, Erica Thrift examines Munster Irish stress which differs markedly from stress patterns found in other Modern Irish dialects. She applies the Word Tree Reversal rule as part of her explanation of the data.

The Language Acquisition section is comprised of three papers. John Archibald and Teresa Vanderweide account for differences in L2 acquisition of syllable structure. Their model of L2 syllabification is based on a phonological minimal sonority distance parameter. The results included in this paper have been presented at the 1996 Alberta Conference on Linguistics (ACOL) and at the 1996 Second Language Research Forum in Tucson, Arizona. Two complementary papers investigate the differential substitution of interdentals by learners of English. Laura Catharine Smith's paper argues that the learner's L1 feature geometry plays a significant role in the failure of the learner to acquire the L2 segments. The possible error phones can be accounted for based on the differences in the L1 and L2 feature geometry. Teasdale finds that the articulatory characteristics of /s/ in the L1 determine which segment will be substituted for the English interdental fricatives. This research was also presented at ACOL in October 1996.

Our two syntax papers are guest submissions. Galia Alexandrova from the University of Ottawa argues that perception verbs in Bulgarian, Greek and Spanish allow for double-object subcategorisation frames comprising a phrasal object and a finite clausal complement. A comprehensive Theory of Control is argued to account for the data. This paper was presented at the Annual Conference of the CLA at Brock University in May 1996. Our second submission comes from Marta Jevenois at the University of Southern California. Jevenois examines null object constructions in Standard Spanish.

We are extremely grateful to Vi Lake for all her help in the set-up of the publication. We would also like to thank Martina Sherrington for help provided during the preliminary preparation of this year's volume and for the mailing out of our issues. The editors are also indebted to the Graduate Students' Association who kindly provided a grant for the production of this year's volume. Naturally, thanks to all those who contributed papers, without which there would have been no issue at all.

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CALL FOR PAPERS

Calgary Working Papers in Linguistics is an annual journal which includes papers by faculty and students in Linguistics and related disciplines, both at the University of Calgary and elsewhere.

The editors would like to encourage all readers to submit papers for future publication. The deadline for submission of papers is August 30 in order to meet the publication date. The editors would like contributions on 3 1/2" Micro Floppy Disks (preferably formatted for Microsoft Word for Macintosh version 5 or higher). We further request that the submissions follow the Style Sheet provided at the end of the journal. All submissions should be camera-ready. Page numbers should not be included on the front of the papers, but should be lightly printed on the back of the pages in pencil. Authors should submit their papers to the address listed below. The editors reserve the right to return papers for revisions if they do not conform to the Style Sheet as outlined at the end of the journal. Appearance of papers in this volume does not preclude their publication in another form elsewhere.

Any correspondence should be sent to the address below:

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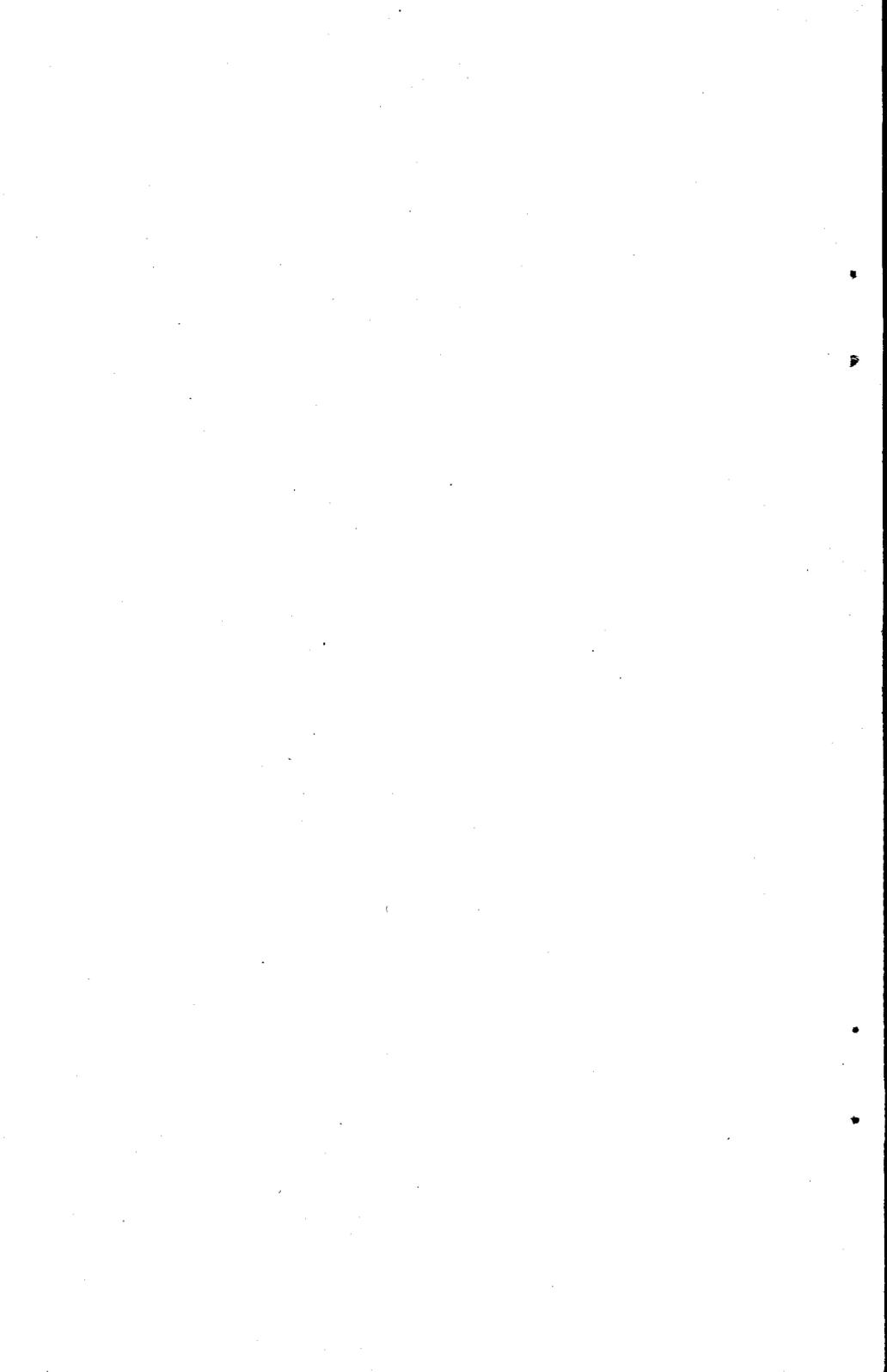


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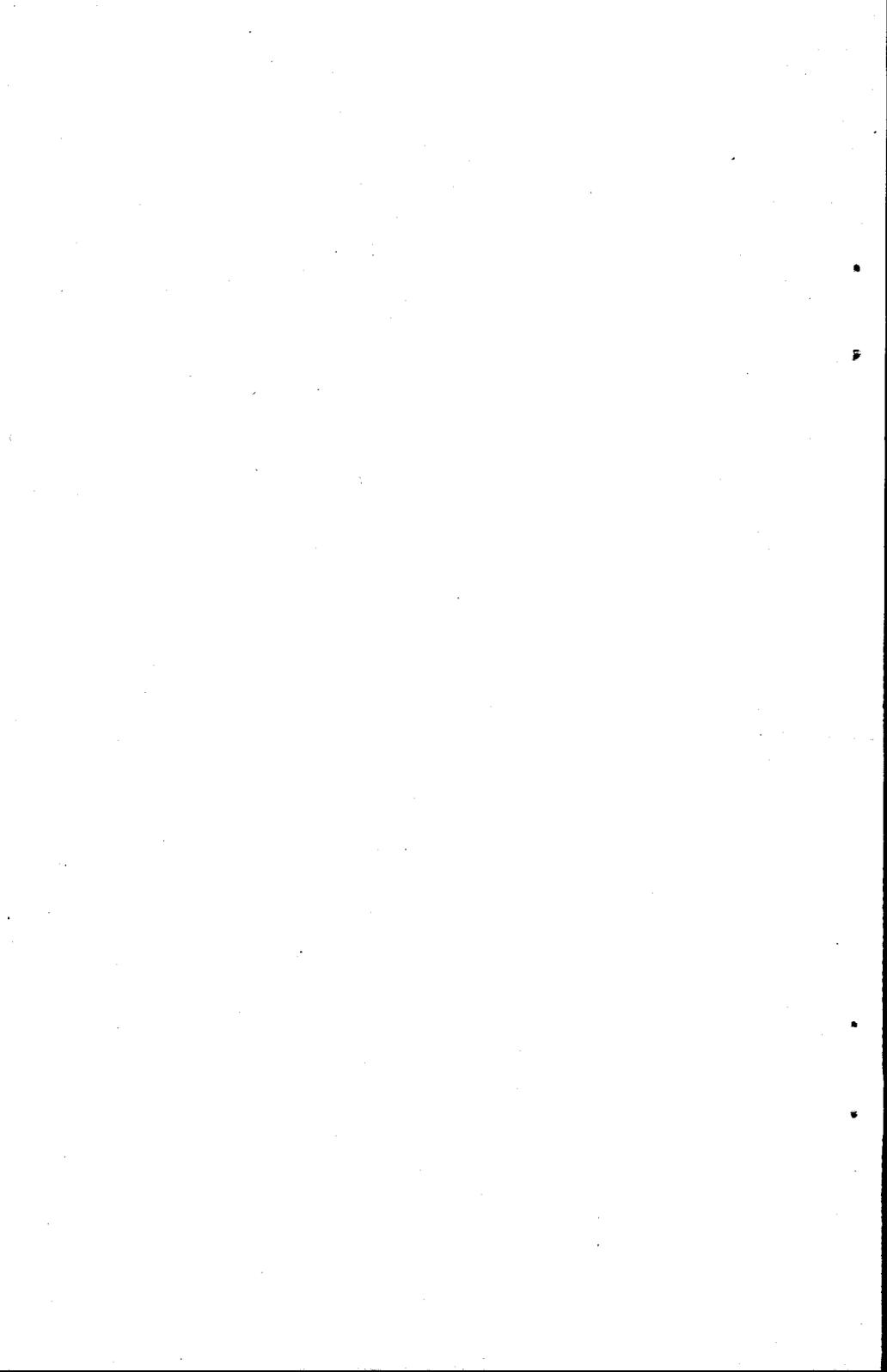
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A Declarative Approach to Onset Maximisation

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Université de Montréal

Abstract

A consonantal cluster is sometimes structurally ambiguous according to the phonotactic grammar of French. Actually, a maximum of consonants must be associated to the onset of the right-hand syllable. '*Marbré*' is syllabified as /mar-bre/, not */marb-re/. In Declarative Phonology, Onset Maximisation must be realised by means of unification, not by a resyllabification process that modifies a pre-specified structure. In this paper, I propose a declarative analysis of onset maximisation in the form of a constraint on syllable strings.

Résumé

Un groupe consonantique est parfois structurellement ambiguü selon la grammaire phonotactique du français. En fait, un maximum de consonnes doit être associé à l'attaque de la syllabe de droite. '*Marbré*' est syllabifié /mar-bre/, non */marb-re/. En phonologie déclarative il faut réaliser la 'Maximisation des attaques' par unification, et non pas par une 'resyllabification', modifiant une structure préalablement spécifiée. Je propose ici une analyse déclarative de la maximisation des attaques, qui prend la forme d'une contrainte sur l'enchaînement des syllabes.

1. Introduction

Starting from the assumption that syllable structure is predictable, a system allowing a string of segments to be associated to this structure is necessary. Many systems have been proposed during the last twenty five years. One of the problems these theories faced was the division of consonantal clusters. Some authors, (Kahn 1976, Stériade 1982, Clements et Keyser 1983, Levin 1985 to name just a few) proposed a rule approach to syllabification. The second rule stipulates that intervocalic clusters are to be divided according to the Onset Maximisation Principle. This principle will associate a maximum of segments to the onset of the following syllable. This association must respect the language phonotactics. As simple as this solution may seem, it is not so simple to explain to a computer.

Since January 1995, Professor John Reighard of Université de Montréal, my colleague Jocelyn Gagnon and I have been working on a parser that associates a syllable structure to a string of characters representing the phonemes of a lexical entry. This parser is described within the Declarative Phonology (DP) framework, as proposed by Scobbie (1991 and 1993). DP is based on a formalism already in use in a family of syntactic and semantic models (GPSG, HPSG, LFG, FUG and others). The formalism is based on attribute-value structures, and is used in a framework in which the only operation allowed is unification. This declarative

framework is thus a challenge to phonology where objects have been traditionally described procedurally, by specifying a construction and/or destruction algorithm 'transforming' a phonological representation into a phonetic representation.

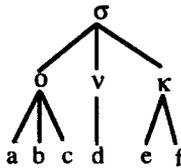
This paper is divided as follows:

- description of objects (the representation of information)
- the definition and description of the theoretical framework
- associated problems of onset maximisation
 - the Reighard-Gagnon-Thériault parser
 - the solution I propose in the DP framework
- conclusion

2. The description of objects (the representation of information)

I will assume here that the syllable is a three level multibranching structure in which each branch can be multibranching. The maximum number of branches allowed is prescribed by the phonotactics of the language described. In French, a maximal syllable is composed of a three branch onset, a single branch nucleus and a two branch coda (fig. 1)

fig. 1¹



As to French phonotactics, a description could be made in terms of re-write rules. This 'phonotactic grammar' (1) with its phonotactic constraint (2) is largely inspired by the one Yves-Charles Morin (personal communication) proposed.²

- (1) $\sigma \rightarrow (o) v (\kappa)$
 $o \rightarrow ([-\text{son}, +\text{cont}, +\text{cor}] C ([+\text{son}, -\text{nas}])$
 $v \rightarrow V$
 $\kappa \rightarrow (r) C^3$
 (C = any [-voc] segment)

¹σ= syllable, o= onset, v= nucleus and κ= coda. "a,b...f" represent segments.

²Morin's grammar includes a compulsory "rime" tier containing the nucleus and the optional coda. He also provides for a double nucleus in case of 'light' diphthongs such as the [wa] in *trois* [trwa]

³ Morin's grammar allows an optional "s" right of "C". In Thériault (1996) I argue for a strategy of consistent onset maximisation that assigns a different structure to "s" in that position.

(2) A few phonotactic constraints⁴

1. If [CL] ₀, then C = [-cont] or [-son, -cor]

(i.e. if a liquid is the second of a two member onset cluster then the first is a stop or a labial fricative)

2. If [Cl] ₀, then C ≠ [-son, -cont, +cor]

(i.e. if the second of a two member onset cluster is /l/ then the first is non coronal: that is, *tl-, *dl- are ungrammatical onsets)

3. The theoretical framework

3.1. DP (Declarative Phonology)

Since the early 1990's, many scholars such as James M. Scobbie, Steven Bird or T. Marc Ellison have proposed approaching phonology with unification-based theory⁵. In the declarative approach, a phonological object (phoneme, syllable, etc.) is a set of constraints. These constraints are to be expressed in a declarative language (non-procedural), they are non-destructive and non-conflicting. The phonological information is expressed in terms of partial information structures (also known as feature structures or attribute-value structures) on which unification is the only admissible operation. Since DP is monostratal, there are no derivations, nor does it allow for a level where a phonotactically incorrect form could arise, awaiting repairs as in the Constraints and Repair strategies theory (Paradis 1988, Singh 1990).

Since DP is a framework, it needs a theoretical base on which to work. The theoretical base used here is the theory of Syllabic Templates (Selkirk, 1982). I also use the Rule Approach to Syllabification (Kahn 1976, Stéride 1982, Clements and Keyser 1983, Levin 1985), to describe the syllable structure.

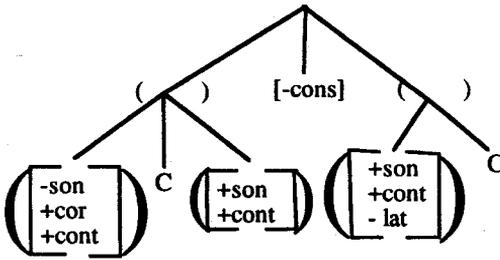
3.2 The Syllabic Template theory

In the Syllabic Template theory, all nodes under the SYLL (syllable) node must contain only permissible elements according to the phonotactic (1) grammar. This theory provides a test to determine whether the distribution of segments corresponds to the phonotactics of the language. If the template test fails, then the string cannot be syllabified. The phonotactic grammar (1) of French gives the following template (fig. 2).

⁴ These are the most obvious constraints. It is clear that more are needed, such as the ones that would describe the environment of the nasal consonants.

⁵ This approach was named Constraint-based Phonology by Bird (1990) while Scobbie (1991) used the expression Declarative Phonology.

fig. 2



3.3. The Rule Approach to Syllabification

The Rule Approach to Syllabification can be described as in (3) for many languages such as French⁶.

- (3) (i) associate all vocalic segments to the NUC (nucleus) position
- (ii) associate a maximum of non-vocalic segments preceding the nucleus to the ONS (onset) position of the same syllable
- (iii) associate all remaining segments to the CODA (coda) position of the preceding syllable.

The main advantage of the rule approach is that it introduces the notion of onset maximisation (3 ii).

4. Onset maximisation

Onset maximisation assigns a maximum number of segments to the onset of the following syllable (even if this syllable doesn't have a nucleus)⁷. A strict application of the maximal onset principle removes any structural ambiguity in consonantal clusters. For example, a word like *marbré*, Eng. 'marbled', has an ambiguous cluster /rbr/ since it can be syllabified in two different ways (4) according to the phonotactic grammar.

⁶The details of this description do not necessarily apply to all languages. English, for example, allows non-vocalic segments in certain nuclei.

⁷What is traditionally called extrasyllabic segments, in French at least, appear only in word initial or word final position, and conform partially to normal rules of syllabification. Since initial and final appendices are structurally and distributionally identical to a coda (initial appendix) and to an onset (final appendix) I argue in Thériault (1996) that those segments are in fact part of "nucleus-free" syllables that are allowed only at the beginning or at the end of a word. A word is thus a set of at least one nuclear syllable (a syllable with a nucleus) that can be preceded and/or followed by a nucleus-free syllable.

- (4) a /mar·bre/⁸
 b /marb·re/

The maximal onset principle selects (4 a) as the correct form since a maximum of segments must be associated to the onset of the following syllable. Onset maximisation also prevents an onset-free syllable from being preceded by a syllable in which a segment is associated to the coda. For example the word *manie*, Eng. 'fad', can also be syllabified in two different ways (5).

- (5) a. /ma·ni/
 b. /man·i/

Again, both forms are accepted by the phonotactic grammar although only (5 a) is acceptable in French.

It may seem easy to apply onset maximisation, since all one needs to know is the phonotactic grammar. From a declarative point of view however, it is not so simple. Before introducing the difficulties related to cluster division in DP, I will succinctly present the Reighard-Gagnon-Thériault parser.

4.1 The Reighard-Gagnon-Thériault parser

The parser we are currently developing allows a string of characters, representing a lexical entry's phonemes, to be associated to a syllabic structure and to give a phonetic representation corresponding to Montréal French. In addition to the syllabifier the parser contains different modules that give surface representations containing the phonological characteristics of French (vowel lengthening and tension, accent setting, diphthongisation, etc).

The parser is built within a Prolog program in which we apply the classical technique of differential lists associating strings of phonemes (the lexical entries) to syntagmatic structures (the syllabic structure). The latter are defined by the phonotactic grammar (1).

The first module we developed was the syllabifier since many phonotactic constraints are associated with properties of the syllable. A syllable is defined as a triplet (6):

- (6) SYLL(ONS(o.o'.o''.r),NUC(n.r'),CODA(k.k'.r''))

To this structure are applied constraints specifying the segmental structure of each of the constituents, exactly as provided for by the phonotactic grammar (1). A lexical entry is represented as a list of phonemes, and the differential list technique amounts in fact to a left-to-right scan, associating sublists of the list of phonemes to legal syllable positions. However, since the legal syllable positions are defined only in terms of individual syllables, the parser returns all possible grammatical associations, including, for lexical entries such as [marbre] and [mani], (4 a and b) and (5 a and b).

⁸ The '' identifies the syllable cut.

From the point of view of the structure of individual syllables, the system is in effect restricted to those syllable structures defined by the phonotactic grammar. One of its interesting features is therefore that it can distinguish between grammatical and ungrammatical syllables. What is needed in addition, obviously, is the maximal onset constraint, in order to rule out (4 b) and (5 b).

In Declarative Phonology, onset maximisation has to be realised by unification. A "re-syllabification" that modifies a previously specified structure is unacceptable. Phonemes have to be unified to a structure.

4.2 A solution

Onset maximisation prevents two things: (i) an empty onset preceded by a coda containing one (or two) element(s) such as (5 b) and (ii) an onset preceded by a coda in which the last element could have been parsed in the following onset such as (4 b). These two conditions can be summarised into one condition (7).

- (7) The last element of a coda can not be an admissible element of the following onset.

This condition, for a cluster composed of the string x,y,z , can be expressed in form of logic as in (8).

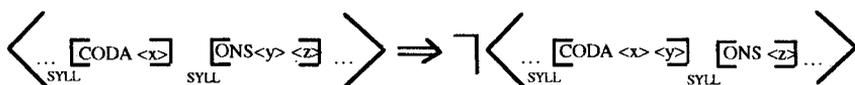
(8)

$\langle \dots \text{CODA}(x) + \text{ONS}(y,z) \dots \rangle \rightarrow \neg \langle \dots \text{CODA}(x,y) + \text{ONS}(z) \dots \rangle$
 (where '+' indicates linear precedence)

This condition prevents a cluster from being syllabified twice. If a string of segments, containing the segments x, y, z where x and z are optional and z is not necessarily the last element of the cluster, can be syllabified as follows: $\text{SYLL}[\text{CODA}(x)] \text{SYLL}[\text{ONS}(y,z)]$ then it can not be syllabified: $\text{SYLL}[\text{CODA}(x,y)] \text{SYLL}[\text{ONS}(z)]$.

In a declarative analysis, onset maximisation takes the form of a constraint on a string of syllables, not on the syllables. The condition presented in (8) applies to a list of syllables and can be expressed in a DP formalism as follows (fig. 3).

fig. 3



This constraint on syllable strings within a word applies between every pair of elements within a string. Every pair of syllables has to correspond to the phonotactic grammar and to the constraint. That is, for a list of syllables a.b.c.d.nil. each pair [a.b], [b.c] and [c.d] has to obey to the constraint. This implies the identification of every pair of syllables and of every last element of the first syllable of the pair. The construction of an admissible onset demands that this last element is to be incorporated to the already existing material included in the onset.

5. Conclusion

This approach to onset maximisation allows for an interesting treatment of traditionally called "extrasyllabic" material, which in French is limited to word initial and word final appendices. By applying onset maximisation to all consonant clusters, I can eliminate distinctions such as Word-Initial-Onset vs. Word-Internal-Onset, and Word-Final-Coda vs. Word-Internal-Coda⁹. The elimination of such distinctions allows a simplification of the syllable description since syllable positions are attributed in a consistent manner. Since a word initial appendix in French is a coda, and a word final appendix is an onset, only two kinds of syllables need to be defined, those that have a nucleus and those that do not. This distribution is ensured by another constraint on syllable strings, limiting non nuclear syllables to initial and final positions in the string of syllables.

The formalism associated to a phonology that allows only the addition of information and disallows destructive procedure or the manipulation of phonological forms (rule ordering or constraint ranking) is still quite recent but it opens the door to a more transparent description by the use of a metalanguage independent of the described objects.

Acknowledgements

This paper is a modified version of the presentation I gave at the Student Conference in Computational Linguistics in Montreal in June 1996. This English version was presented at the Holland Institute of Generative Linguistics (HIL) at Leiden University in July 1996. I would like to thank Prof. John Reighard for his constant assistance and suggestions. Of course, I remain responsible for any errors, theoretical or formal, that could have slipped into this paper.

⁹Such distinctions can be found in Bird and Klein (1994: 31).

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A Reanalysis of Munster Irish Stress

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University of Calgary

ABSTRACT

Munster Irish exhibits stress patterns unlike other Modern Irish dialects. Rather than landing word-initially, primary stress occurs anywhere within the first three syllables of a word (Stress Window). Munster Irish is a quantity sensitive language, demonstrated by the attraction of main stress to heavy syllables. According to Doherty (1991), these patterns can be explained through the application of Bimoraic Trochees. I find that the data is better accounted for using a version of the metrical foot as proposed by Hammond (1986): the Revised Obligatory Branching foot. In addition to iambic-like foot construction, I propose the creation of a Word Tree Reversal rule. Evidence for this analysis comes from the assignment of primary stress to the second heavy syllable, when two heavy syllables occur contiguously. The application of Hammond's model in conjunction with the Word Tree Reversal rule provides a solid explanation for the Munster Irish data.

1.0 Introduction

Munster Irish is unique among the various dialects of Irish. Unlike other Irish dialects, Munster Irish does not exhibit initial stress. Instead, stress assignment follows specific patterns, related to syllable weight. In §2.0, I describe the most prevalent stress patterns of Munster Irish and a few exceptional forms. I explain Doherty's model (1991), and its advantages and disadvantages (§3.0). The application of Bimoraic Trochees in his model proves unsatisfactory for several reasons (§3.4). I investigate the implementation of iambic feet to explain stress assignment in Munster Irish and find this type of model inadequate also (§4.0). However, I apply Hammond's Revised Obligatory Branching theory (ROB) (1986) with the notion of the iambic foot and argue that the ROB explains significant portions of the Irish data left unaccounted for in Doherty's framework. I conclude that an iambic-type approach is necessary to explain the Munster Irish data and that Hammond's ROB foot provides a satisfactory foundation for the structure of the metrical foot.

2.0 Description of Munster Irish

In order to clarify the issues relevant to creating an adequate model of stress assignment in Munster Irish, I provide a brief description of the data. Syllables with a long vowel or diphthong are considered heavy. Codas are irrelevant when determining syllable weight. The second syllable of a word receives primary stress if it is heavy¹, regardless of the weight of other syllables.

- (1) a. [asé:ntixt] *easontaiocht* 'disagreement' (D²)
 b. [fí:rhi:] *fiafriaghe* (Br)
 c. [jəir'i:d'i:] *d'éirighdis* (Br)

Otherwise, stress falls on the leftmost heavy syllable.

- (2) a. [mí:nt'ərhə] *muinteartha* 'related' (D)
 b. [ú:də̀rəs] *ughdarás* 'authority' (D)
 c. [tun'kəri:] *tuinnceiri* (Bl)

In the absence of any heavy syllables within the first three syllables of the word, stress the initial syllable.

- (3) a. [njáməhəx] *neamhmaithmheach* (Br)
 b. [áləgar] *algar* 'heated talk' (D)
 c. [ím'i'əkà:n] *imleacán* 'navel' (D)

Secondary stress is assigned inside or outside the first three syllables. It falls either on heavy syllables subsequent to the main stress or, when primary stress occurs word-finally, on initial syllables.

- (4) a. [əkil'i:] *aclaidhe* 'athletic' (D)
 b. [pətəxán] *potachán* (Bl)

¹ Exceptions to this generalization are found in Breatnach (1947), however, they usually involve special forms including: ordinals, the word *pátrún* [pátru:n] and disyllabic verbal forms ending in a long termination. I consider these forms lexical exceptions.

² Initials next to the Irish examples provide the source of the data. (D) indicates Doherty (1991), (Bl) is Blankenhorn (1981), (Br) is Breatnach (1947) and so on. Note that data taken from Breatnach (1947) is missing translations due to the fact that English glosses were not provided.

- | | | | |
|----|--------------|-----------------|----------------------|
| c. | [mʰiarəkà:n] | <i>méaracán</i> | 'thimble' (D) |
| d. | [gùəgadá:n] | <i>guagadán</i> | 'unsteady thing' (D) |

Syllables containing /ax/ are problematic in Munster Irish. When in second position of a word lacking heavy syllables, /ax/ receives primary stress. If /ax/ occurs anywhere else within a word, it does not receive main stress.

- | | | | |
|--------|------------|-------------------|------------------|
| (5) a. | [gʷulkáx] | <i>giolcach</i> | (Br) |
| b. | [kəsáxdəx] | <i>casachtach</i> | (Br) |
| c. | [kógənsəx] | <i>cogansach</i> | 'Protestant' (D) |
| d. | [ʃəxərá:n] | <i>seachrán</i> | 'avoid' (D) |

Munster Irish only assigns primary stress within the first three syllables of a word³. As Doherty (1991) notes, this trisyllabic rule is crucial in stress assignment. Epenthesis occurs in Irish between sonorants and nonhomorganic consonants. In some cases, this process shifts a heavy syllable outside of the first three syllables. This heavy syllable never receives primary stress, even if all other syllables are light.⁴ The following examples are taken from Doherty (1991: 117) (the epenthetic vowel is underlined):

- | | | | |
|--------|---------------------------------------|-------------------|-----------------|
| (6) a. | [gʷubləxə:n] → [gʷú ə ləxə:n] | <i>gioblachán</i> | 'ragged person' |
| b. | [adrəgə:lʰ] → [á ə dərəgə:lʰ] | <i>eadargáil</i> | 'mediation' |
| c. | [imʰlʰəkə:n] → [imʰlʰ ə jkə:n] | <i>imleacán</i> | 'navel' |

³ Gussman (1995) provides evidence that stress may fall outside the first three syllables. He cites three examples:

- | | | | |
|--------|---------------|-------------------|--------------------------|
| (1) a. | [adərəgá:lə] | <i>eadargála</i> | 'mediation-gen.sg.' (G) |
| b. | [arəmkú:lə] | <i>armacúla</i> | 'affectionate-comp.' (G) |
| c. | [imige:nú:lə] | <i>imigéinúla</i> | 'distant-nom.pl.' (G) |

However, these are the only three examples where stress does not land within the first three syllables that I could find. Note that each of these words has an inflectional suffix (in the form of a light syllable) attached. Inflection has been shown to cause stress shift in other languages (Giegerich 1985, Halle & Idsardi 1995). The possible role of inflectional or derivational morphology in Munster Irish stress assignment is beyond the scope of this paper, so I will not take these examples into account in my analysis.

⁴ Stress assignment occurring after epenthesis is in direct contradiction to Ní Choisáin's proposal for vowel epenthesis in Irish (1991). She proposes that stress is a motivating factor in epenthesis, i.e., vowel insertion takes place after metrical structure is assigned. I work from the assumption that epenthesis precedes stress assignment because the heavy syllable never receives main stress when moved outside the first three syllables.

The strong tendency for stress assignment to land on heavy syllables points to a quantity sensitive system. The default stress pattern appears to be trochaic in the case of light syllables (3a,b) and iambic when dealing with groups of heavy syllables. Figure (6) summarizes the possible stress assignment patterns in words with four syllables.⁵

(6)	L L L L	L L L H
	L L H H	L H H H
	L H H L	L H L L
	L H L H	L L H L
	H L L L	H L L H
	H L H L	H L H H
	H H L L	H H L H
	H H H L	H H H H

I look at the different approaches taken to account for Munster Irish stress assignment; both trochaic and iambic accounts are discussed.

3.0 Doherty's Bimoraic Trochees (1991)

3.1 The Analysis

Doherty (1991) proposes the creation of Bimoraic Trochees to explain stress in Munster Irish. In order to explain the tendency of primary stress to land on heavy syllables, this trochaic system is quantity sensitive. A rule of extrametricality and an End Rule supplement the application of feet. Exhaustive footing is not required within this model. Doherty argues that the strengths of his model lie in its explanatory power for the STRESS WINDOW⁶ and secondary stress.

A motivating factor in proposing the trochaic foot is that in the absence of any heavy syllables, the leftmost light syllable receives primary stress; trochaic feet are left-headed. Doherty's trochaic foot is constructed around heavy syllables first. Once heavy syllables are footed, initial syllables are used as the basis for foot construction.

⁵ For ease of explanation, H is used to denote a heavy syllable and L indicates a light syllable.

⁶ Stress Window is the term Doherty uses to refer to the fact primary stress lands within the first three syllables of a word. This term will be used throughout the remainder of the paper.

(7) Foot: BIMORAIC TROCHEE

- (a) Build feet on all heavy syllables.
 - (b) Build one foot in strictly initial position.
- (Doherty 1991: 120)

There are several words for which the trochaic foot is not adequate; words where the first two syllables are heavy, such as [H H H] and [H H L], are problematic. Doherty postulates a rule of extrametricality which states that an initial foot becomes extrametrical when it is “structurally adjacent to another foot” (Doherty 1991: 119).

(8) F → [+ ex]/# ____ F
(Doherty 1991: 119)

- (9) a. H H L → [H] [H] L → <H> [H] L → H H L
[du:ri:dər] → [du:] [ri:] dər → <du:> [ri:] dər → [du:ri:dər]
dúraiodar (Br)
- b. L L H → [L L] [H] → <L L> [H] → L L H
[arəgu:nʲtʲ] → [arə] [gu:nʲtʲ] → <arə> [gu:nʲtʲ] → [arəgu:nʲtʲ]
argúint (Br)

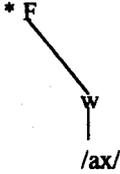
An END RULE states that stress is assigned to the left edge of a word when no adjacency of feet at that edge occurs. Doherty believes that the necessity for the rule of extrametricality is evidence for the foot as a prosodic constituent.

Exhaustive footing cannot occur within this model, otherwise incorrect stress patterns emerge.

- (10) * [H] [L L] [H] L L
* [drʲauŋ] [kídʲə] [drʲáuŋ] kídʲə
dreangcaide ‘small creature’ (D)

To account for the behaviour of the syllable /ax/ in his model, Doherty proposes a ternary weight distinction. When no heavy syllables are present, /ax/ receives primary stress, otherwise it violates TROCHAIC FOOT OPTIMALITY, i.e., /ax/ cannot fill the weak position of a foot.

(11) Trochaic Foot Optimality



(Doherty 1991: 124)

When included in a foot with another light syllable, /ax/ is too heavy to be a nonhead. Realignment of the syllable boundaries takes place and /ax/ becomes the head of a monosyllabic foot.

- (12) [L /ax/] L → L [/áx/] L
[tə^hax] dən^j → tə^h [áx] dən^j *tuilleachtain* (Br)

The trochaic foot model as proposed here has its advantages but I show that the problems with such a framework outweigh its benefits.

3.2 Advantages and Disadvantages to the Trochaic Foot Model

A significant advantage of Doherty's model (1991) is that the Stress Window naturally falls out of this analysis. Primary stress always lands within the first three syllables; no stipulations are required. According to Doherty, secondary stress is also adequately covered within this model. Heavy syllables not receiving main stress are assigned to degenerate monosyllabic feet which receive secondary stress. Light syllables within first and second position are assigned a trochee and get secondary stress.

- (13) a. L L H → [L L] [H] → ˘ L L H
[alətɑ:n] → [alə] [tɑ:n] → [ələtɑːn]
- b. L L L H → [L L] L [H] → ˘ L L L H
[kluhərəkɑ:n] → [kluhə] rə [kɑ:n] → [klúhərəkà:n]

Through implementing Trochaic Foot Optimality, Doherty provides an explanation for the ambiguous behaviour of /ax/. However, there are several problems with applying a quantity sensitive variant of the classical trochaic system.

Although the above analysis justifies a portion of the given data, the model has several shortcomings. Any words beginning with #[H H] exhibit primary stress

on the second syllable, even though the first is heavy. This property of Munster Irish significantly weakens Doherty's motivation for using trochaic feet. Doherty accounts for problems like the one just discussed by positing an extrametricality rule. This rule does not fall out of the analysis but is created to make up for the inadequacies of the trochaic foot.

The model requires exhaustive footing to account for secondary stress (13a,b). On the other hand, nonexhaustive footing supports appropriate primary stress assignment (10). Both mechanisms cannot exist concurrently within the same model without causing significant problems.

In order to better justify /ax/ as being heavier than other 'light' syllables, more data needs to be collected to determine the conditions under which it receives secondary stress. If /ax/ receives secondary stress when it follows primary stress in a word, then it is behaving like a heavy syllable and Doherty's position is supported. Unfortunately, such data is difficult to come by. I have only found two examples of /ax/ receiving secondary stress⁷, neither one follows primary stress.⁸ Since the trochaic foot proves problematic, I look at the possibility of using iambic feet to explain Munster Irish stress.

4.0 Applying the Iambic Foot to Munster Irish

4.1 Motivation for Using the Iambic Foot

The pattern #[H H] provides strong motivation for right-headed feet, i.e., iambic feet. If the presence of iambic feet is assumed, then the behaviour of /ax/, considered unique under the trochaic foot model, is explicable. Since /ax/ is located in the head position of an iambic foot when it surfaces in the second syllable, it is expected to receive primary stress. At the same time, /ax/ is less likely to bear main stress if it occurs in first or third position; this prediction is borne out by the data.

⁷ One example was found in Doherty (1991), *seachrán* [šaxarán]. The second example was provided by Edmund Gussmann in a personal communication, *imeachtai* [imãxtú:]. The latter example is discussed further in §5.3.

⁸ Due to the rarity of /ax/ appearing after primary stress, this may not be an issue to look at too carefully. Further data could be collected to determine whether in a sequence such as [L H H] secondary stress appears on the last H, or a stress clash occurs. In the latter case, the last H does not receive secondary stress. If Munster Irish does not allow stress clash, then even if /ax/ is considered heavy, it may not receive secondary stress when adjacent to primary stress. When looking for data, only words with at least one syllable separating /ax/ and the syllable bearing main stress can be included.

- (14) a. [tə^haxdən] → [tə^háx][dən] *tuilleachtain* (Br)
 b. [fámənx] → [fámə́][nəx] *feamnach* 'seaweed' (D)
 c. [gubələxam] → [gúbə́][ləxam] *gioblachán* 'unkempt person' (G)

Munster Irish has many properties of a quantity sensitive language and stress is frequently attracted to heavy syllables within a word. Substantial research by Hayes (1985) shows that languages sensitive to syllable weight are almost always iambic: "prominence contrasts based on duration lend themselves to iambic grouping while prominence contrasts based on intensity lend themselves to trochaic grouping" (1985: 430). Trochaic feet are usually present in languages that are quantity *insensitive*. The following examples (15a,b,c) show that Munster Irish stress is weight sensitive:

- (15) a. [ʃg^hima:lhə] → [ʃg^himá:l][hə] *sgimeálta* 'skimmed' (D)
 b. [tranhómə] → [tranhó:m][ə] *tránhnóna* 'afternoon' (D)
 c. [sbələxə] → [sbələ́x][ə] *spealacha* 'scythes' (D)

Since vowel length determines syllable weight and syllable weight influences stress assignment, it is reasonable to assume that Munster Irish requires iambic footing.

4.2 The Inadequacies of Iambic Footing in Munster Irish

Problems arise with the application of traditional iambic feet. Looking more closely at the HAYESIAN ASYMMETRIES, "[r]ight headed (iambic) parses do not permit a heavy syllable to occupy the dependent position" (Kenstowicz 1994: 587), a significant problem arises. Munster Irish does not exactly fit into the characterization of a quantity sensitive language as illustrated by sequences like #[H H]. Under iambic footing, main stress in such a grouping surfaces as:

- (16) H H X⁹ → [H] [H] X → * H H X
 [o:ga:nəx] → [o:] [ga:] nəx → * [ó:ga:nəx] *ógánach* (BI)

Sequences of [L L L] are problematic as well:

⁹ Indicates either a heavy or light syllable.

- (17) L L L → [L L] [L] → * L L L
 [kl^hahⁱiniⁱfi:]¹⁰ → [kl^hahⁱ] [ni] fi: → * [kl^hahⁱiniⁱfi:]
 cleathinisi 'odds and ends' (Br)

Munster Irish needs a system sensitive to the weight of the head; nonheads are not important. Primary stress falls on a heavy syllable, otherwise it defaults to the initial syllable. The traditional iambic foot only takes the nonhead into account. Phonological processes typical of iambic (IAMBIC LENGTHENING) and trochaic (TROCHAIC SHORTENING) languages (Kenstowicz 1994) do not take place in Munster Irish. A model using traditional iambic footing is inadequate due to the nature and number of problems associated with it. After looking at strict notions of trochaic and iambic footing, I investigate an alternative analysis of the metrical foot (Hammond 1986) and apply it to Munster Irish.

5.0 Hammond's Revised Obligatory Branching Parameter

5.1 Hammond's Model of the Metrical Foot

Doherty (1991) addresses Hammond's model when investigating the stress system of Munster Irish but quickly dismisses it as inadequate. Doherty argues that this model cannot satisfactorily explain the Stress Window or secondary stress. However, the REVISED OBLIGATORY BRANCHING PARAMETER explicates a significant amount of data. The three major types of feet, as defined by metrical theory, include quantity-sensitive feet, quantity insensitive feet and QUANTITY DETERMINED feet (or OBLIGATORY BRANCHING (OB) feet) (Kager 1995: 371-372). The last type is similar to the quantity sensitive foot but has restrictions on what constitutes a head or a nonhead. Hammond (1986) argues that the Obligatory Branching foot is too constraining and proposes a construction where only the content of a head is restricted. The REVISED OBLIGATORY BRANCHING (ROB) foot replaces the OB foot in Hammond's model. In an ROB foot, a head must be a heavy syllable, whereas a nonhead can be either heavy or light. The only impermissible foot is [L L]. Unlike Doherty's theory, the implementation of the ROB foot entails exhaustive footing; leftover syllables are assigned to degenerate feet. Hammond uses *n*-ary word trees and constructs them on the roots of feet. Word trees are left- or right-headed. After applying the ROB foot to Munster Irish, I show that it explains more data than Doherty's theory (1991).

¹⁰ The fourth syllable in *cleathinisi* is heavy. It is outside the Stress Window, so we will ignore it in this footing.

5.2 Application of ROB to Munster Irish

Since Munster Irish exhibits primary stress on the second syllable of a word, even when the first is heavy, I assume a right-headed obligatory branching foot. Using some of the examples cited earlier, the right-headed foot can apply without positing a rule of extrametricality. At word level, a left-headed structure is created. Both levels are constructed from left to right¹¹.

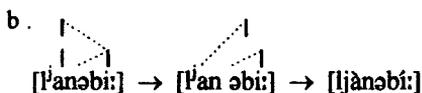
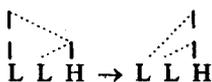
(18)

- a. [du:ri:dər] → [du:ri:d ə̀r] → [du:ri:dər] *dúraitodar* (Br)
- b. [asenti:xt] → [ase:nt i:xt] → [asé:nti:xt] *easontaíocht* (D)
- c. [kʰahʰini:ʃi:] → [kʰahʰini ʃi:] → [kʰáhʰini:ʃi:] *cleathinísí* (D)
- d. [ku:mpo:rdi:] → [ku:mpo:rdi:] → [ku:mpó:rdi:] *Cúmpórdai* (D)
'Holy Spirit'
-

All of the words receive correct stress patterns when assigned ROB feet and word trees. *Cleathinísí* (18c) exemplifies how the Stress Window is addressed within the parameters set by Hammond's theory. Since words are left-headed, primary stress is never assigned outside the first three syllables. The two levels also assist in predicting secondary stress. Examples (18b) and (18c) both predict secondary stress correctly, i.e., falling on a heavy syllable subsequent to main stress. Contrary to Doherty (1991), the Stress Window falls out naturally and secondary stress is handled effectively within this framework. The syllable /ax/ is handled as a ternary weight distinction in this model, too. When /ax/ appears in the absence of heavy syllables, it outweighs light syllables, then /ax/ becomes the head. Heavy syllables outweigh /ax/ when they appear within the same word and it is treated as a light syllable.

¹¹ | designates the head (strong) node, while : designates the nonhead (weak) node. The lower trees are foot level while the ones just above them are the word trees.

(21) a. Word Tree Reversal¹²



The second consequence is not as critical. Overproduction of secondary stress occurs in some words. The patterns [L L L] and [H L L] emerge with two secondary stresses; [H H L] and [L H L] emerge with a secondary stress on the last syllable.

(22)

- a. [mi:nʲərɸə] → [mi:nʲərɸə] → [mí:ntʲərɸə] *muinteartha* (D)
 'related'
- b. [kʲaŋgəʲtʲə] → [kʲaŋgəʲ tʲə] → [kʲaŋgəʲtʲə] *ceangailte* (D)
 'tied'
- c. [imʲiʲəkə:n] → [imʲ iʲəkə:n] → [imʲiʲəkà:n] *imleacán* (D)
 'navel'
- d. [tra:thnə:nə] → [tra:thnə:nə] → [tra:thnó:nà] *tráthnóna* (D)
 'afternoon'

Words like (22d), [H H L], where secondary stress is next to primary stress, exist in Munster Irish. Gussmann (personal communication) cites *imeachtai* [imàxtí:] as one example. Most of the data collected involves only primary stress; far less is known about the assignment of secondary stress. The rules stated in (§2.0) only

¹² As Andrew Carnie pointed out (personal communication), the Word Tree Reversal predicts a violation of the Stress Window in words of the structure [L L H H]. I found only one word exhibiting this syllabic pattern, *imigéiniúil* 'affectionate' [imʲigʲénu:ʲ] (Gussman 1995). This word could be listed as a lexical exception or the Word Tree Reversal rule may be restricted to words of the form [L L H]# (i.e., the heavy syllable is the last in the word). Either alternative does not pose a significant problem for my analysis.

describe where secondary stress must appear. Whether or not it falls anywhere else is not addressed. Since I have no evidence to the contrary, I assume that more than one secondary stress can occur within a word. The application of Hammond's ROB feet has two significant problems but with the proposed Word Tree Reversal rule and insufficient evidence regarding the nature of secondary stress, this model handles all of the available data.

7.0 Conclusion

In comparison to other dialects of Irish, Munster Irish undergoes complex and unique stress assignment. After briefly describing the data from Munster Irish (§2.0), I scrutinized Doherty's classical trochaic system with a quantity sensitive twist (1991) (§3.0). Along with other flaws within the model, the existence of a quantity sensitive trochee is implausible. Hayes (1985) shows that all trochaic systems are quantity insensitive. The possibility of traditional iambic footing was explored but was also proven inadequate (§4.0). Munster Irish requires a foot sensitive to the weight of a head, while the content of its nonhead is not crucial. Traditional iambic feet are too restrictive for the nonhead and not constraining enough for the head. Hammond (1986) proposes an entirely different type of foot. The Revised Obligatory Branching foot restricts heads to heavy syllables while nonheads are light or heavy. In conjunction with the Word Tree Reversal rule I proposed, ROB accurately predicts assignment of primary stress within the Stress Window (§5.0). Secondary stress falls out of this model as well. Although Doherty dismisses Hammond's ROB feet as unsatisfactory, this model accounts for more data than previous theories, with fewer constraints.

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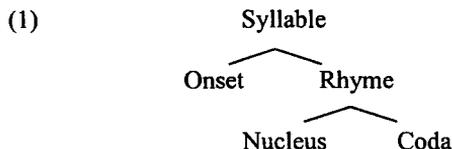
Second Language Syllable Structure: Phonological Government and Typological Universals

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Second language learners commonly modify the syllable structure of their L2 words to match the syllable patterns found in their L1 words. Broselow and Finer (1991) propose a phonetically based minimal sonority distance parameter to account for their Korean subjects difficulties with English onset clusters. In contrast, Eckman and Iverson's (1993) claim that typological universals are sufficient to account for second language learner behavior. We propose a model of L2 syllabification based on a phonological minimal sonority distance parameter using derived sonority and phonological government. We argue that the acquisition of English onset clusters is linked to the acquisition of phonological contrasts and that similar to child language acquisition, a phonological contrast must first be acquired before it can be used as part of an onset cluster. This model both accounts for L2 errors and has the potential for telling us something about the mental representations of second language learners.

Introduction

In this paper, we investigate aspects of the acquisition of syllable structure by second language learners. We show that the behaviour of the second language learners can be explained using a model of segmental structure and phonological government in which segments with more structure cause greater difficulty than segments with less structure. We adopt the model of syllable structure shown in (1).



Languages vary according to whether syllabic nodes can branch. As well, it has long been noted that there are constraints on the sequences of segments that can occur in a syllable. One common pattern is that the sonority peak of a syllable is at its centre while sonority decreases towards the margins. A common phenomenon in second language learning involves modifying an L2 word so that it fits the L1 syllable structure. Broselow and Finer (1991) use the Sonority Sequencing Generalization (or Sonority Hierarchy) to account for the behaviour of Korean subjects acquiring English syllable structure. They draw on the notion of minimal sonority distances (MSD). Eckman and Iverson (1993), on the other hand, suggest that we do not need sonority distance to explain what second language learners are doing. They seek to improve upon Broselow and Finer's account of why Korean speakers learning English do what they do using typological universals rather than sonority distances.

In this paper, we will argue that a phonologically-defined notion of MSD will explain the performance of the learners in a way that Broselow and Finer's phonetically based MSD will not. We will also suggest that the typological view does not explain the behaviour of glides; nor does it have anything to say about the mental representations of second language learners.

The paper first discusses both Broselow and Finer's and Eckman and Iverson's approaches to L2 syllabification and then presents our explanation using derived sonority and phonological government. The conclusion discusses second language learners' access to universal grammar.

Previous Approaches to L2 Syllabification

Broselow and Finer

Broselow and Finer (1991) look at the acquisition of onset clusters in syllables. They adopt the sonority hierarchy shown in (2).

- (2) Obstruents - Nasals - Liquids - Glides - Vowels
 Least Sonorous Most Sonorous

They assign a sonority value to each class which allows them to determine a sonority distance of allowable clusters. They adopt the sonority scale shown in (3).

(3)	<u>Class</u>	<u>Value</u>
	Stops	1
	Fricatives	2
	Nasals	3
	Liquids	4
	Glides	5

So, a language with a MSD of five would only allow single consonant clusters. A language with a MSD of four would allow non-branching onsets consisting of stop-glide sequences. A language with a MSD of three would allow non-branching onsets consisting of either stop+glide or stop+liquid sequences. They conceive of this pattern as resulting from the setting of a multi-valued MSD parameter. The most restrictive parameter setting (MSD=5) generates the least marked set of elements: no onset consonant clusters. The less restrictive parameter settings generate the more marked onset clusters. On the basis of positive evidence, the parameter could be reset.

Broselow and Finer investigated 24 native speakers of Korean and 8 native speakers of Japanese. All subjects were called high intermediate in their English proficiency. Broselow and Finer had their subjects produce words with the initial clusters shown in (4).

(4) [pr], [br], [fr], [by], [py], and [fy]

Given the sonority scale in (3), Broselow and Finer assume the markedness relationships shown in (5).

(5) Less Marked More Marked
 Cy Cr
 pC bC fC

Therefore, [py] should be the least problematic cluster and [fr] the most difficult, since [py] clusters require a more restrictive setting of the MSD parameter than do [fr] clusters. (6) provides some of the relevant facts about Korean and English phonology (6)

(6)

<u>Korean</u>	<u>English</u>
Branching Onsets NO	Branching Onsets YES
Minimal Sonority Distance 5	Minimal Sonority Distance 3
No [p]/[f] distinction; has labial stops No off glides Three stop series (fortis, lenis, aspirated)	
[r] Elsewhere	
/r/ <	
[l] V__	
([r] is in the onset and [l] is in the coda)	

So, Korean speakers learning English must determine that English onsets may branch and they must reset the MSD parameter to a less restrictive setting to allow stop+liquid onsets.

The chart in (7) presents the error rates for each individual consonant cluster (for the Korean speakers) as well as the total error rates (for the Korean speakers), and by and large, supports Broselow and Finer's predictions.

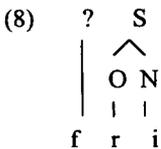
(7)

	py	pr	by	br	fy	fr
1. Total Errors	1/288	1/287	5/288	11/288	13/288	18/286
in %	2	2	10	22	27	37
2. Errors (--> CV)						
Epenthesis	0	0	1	8	0	0
(CCV -->CVC)						
Deletion	1	1	4	3	5	6
(CCV --> CV)						
Total	1	1	5	11	5	6
3. Errors in Manner						
Initial Replacement	0	0	0	0	8 (p)	11 (p)
						1 (b)
Medial Replacement	0	0	0	0	0	0
Total	0	0	0	0	8	12

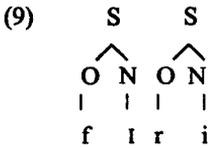
	Cy	Cr	pC	bC	fC
4. Total Errors (/864)	19	30	2	16	31
5. Errors (-->CV)	11	18	2	16	11
6. Errors in Manner	8	12	0	0	20

Broselow and Finer argue that clusters not sanctioned in the L1 as well as universal markedness effects account for the differential error patterns seen in (7). For example, Korean doesn't allow either [p] or [b] clusters, yet we see that [p] clusters cause less difficulties than [b] clusters. This difference can be explained using the MSD parameter and provides evidence for the inclusion of voicing in sonority hierarchies. If voiced stops are more sonorous than voiceless stops, then the sonority distance between [p] and [r] is greater than the sonority distance between [b] and [r]. Therefore [pr] clusters are less marked.

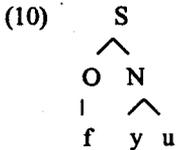
When we look at the different repair strategies for Cy versus Cr clusters, we notice an interesting pattern that is unexplained in Broselow and Finer's analysis. With one exception, when the second member of a cluster is a glide, epenthesis is not triggered. In other words, subjects may well break up a Cr cluster by inserting an epenthetic vowel, but not a Cy cluster. As shown in Broselow (1988), epenthesis can be a repair strategy triggered by unsyllabified consonants. Consider the initial syllabification of the word 'free' in (8).



Since, Korean does not allow branching onsets, the initial consonant in (8) is left unsyllabified. This may trigger an epenthetic vowel, resulting in the well-formed L1 syllable structure in (9).



However, if glides are part of a complex nucleus, and not a complex onset, as has been argued for Korean (Kim-Renaud,1978), then the glide would not trigger epenthesis as there is no unsyllabified consonant. This can be seen in the syllabification of the word 'few' shown in (10).



Since, as shown, in the data presented in (7), glides do not normally trigger epenthesis, we assume that in Korean, glides are analyzed as part of the nucleus rather than as part of the onset.

Finally, Broselow and Finer note that if L2 learners were simply transferring their L1 parameter settings to the L2, they would treat all clusters as if they were L1 clusters. However, we have seen that they treat clusters differently in a way which is consistent with predictions made by minimal sonority distances. In other words, they treat more marked clusters differently than less marked clusters. Broselow and Finer's view, then, is that second language learners have access to UG, but that the starting point of their acquisition is the transfer of their L1 settings.

Eckman and Iverson

Eckman and Iverson (1993) provide a re-analysis of Broselow and Finer's data. They argue that typological universals rather than minimal sonority distances are all that is needed to explain the performance of Broselow and Finer's subjects. Eckman and Iverson assume the markedness relationships in (11).

- | | | | |
|------|-------------------|--------------------|----------------------|
| (11) | <i>Marked</i> | <i>relative to</i> | <i>Unmarked</i> |
| | fricatives | | stops |
| | voiced stops | | voiceless stops |
| | voiced fricatives | | voiceless fricatives |

Eckman and Iverson interviewed four native Korean speakers, four native Japanese speakers, and three native Cantonese speakers. These subjects were intermediate or high intermediate in their English proficiency. All subjects were recorded in casual conversations and the transcripts analyzed for occurrences of onset clusters. Eckman and Iverson set the threshold of success to be eight percent correct on a minimum of five attempts. The tables in (12) provide the raw data for each Korean speaker. The number on the left of the solidus indicates the number of correct versions of the target cluster; the number on the right the number of attempts. The clusters in **bold** indicate the clusters that were not attempted five times, while the clusters in *bolded italics* indicate those clusters that fell below threshold accuracy.

(12)

Table 1: YK Korean		
Markedness		
Least		Most
pr/pl 86/93	br/bl 10/10	py 0
pr/pl 86/93	fr/fl 28/28	
tr 9/9	dr 6/6	tw 0/5
tr 9/9	θr 13/13	
kr/kl 4/4	gr/gl 16/16	kw/ky 1/2

Table 2: DP Korean		
Markedness		
Least		Most
pr/pl 43/46	br/bl 31/21	py 2/2
pr/pl 43/46	fr/fl 8/8	
tr 34/34	dr 6/6	tw 3/4
tr 34/34	<i>θr</i> 8/15	
kr/kl 4/4	gr/gl 15/15	kw/ky 7/7

Markedness		
Least		Most
pr/pl 20/20	br/bl 10/10	py 1/4
pr/pl 20/20	fr/fl 12/12	
tr 12/12	dr 11/11	tw 6/10
tr 12/12	θr 7/8	
kr/kl 9/9	gr/gl 0	kw/ky 5/5

Markedness		
Least		Most
pr/pl 22/24	br/bl 14/14	py 2/2
pr/pl 22/24	fr/fl 7/7	
tr 9/9	dr 2/3	tw 1/1
tr 9/9	θr 4/4	
kr/kl 9/9	gr/gl 9/9	kw/ky 3/3

While Eckman and Iverson were seeking to validate implicational universals, and thus only investigated the patterns of individual learners, we have pooled the data in an attempt to get a picture of how their subjects were behaving as a group. The data given in (13) is a composite chart of the four Korean speakers.

(13)	p+liquid 171/183	t+liquid 64/65	k+liquid 26/26
	b+liquid 65/65	d+liquid 25/26	g+liquid 40/40
	f+liquid 55/55	θ+liquid 32/40	
	p+y 5/8	t+w 10/20	kw/ky 1/2

Eckman and Iverson claim that all that is necessary to account for the subjects' behaviour are the typological universals shown in (14)

- (14)
1. Voiced Stop + Sonorant > Voiceless Stop + Sonorant
 2. Voiced Fricative + Sonorant > Voiceless Fricative + Sonorant
 3. Voiceless Fricative + Sonorant > Voiceless Stop + Sonorant

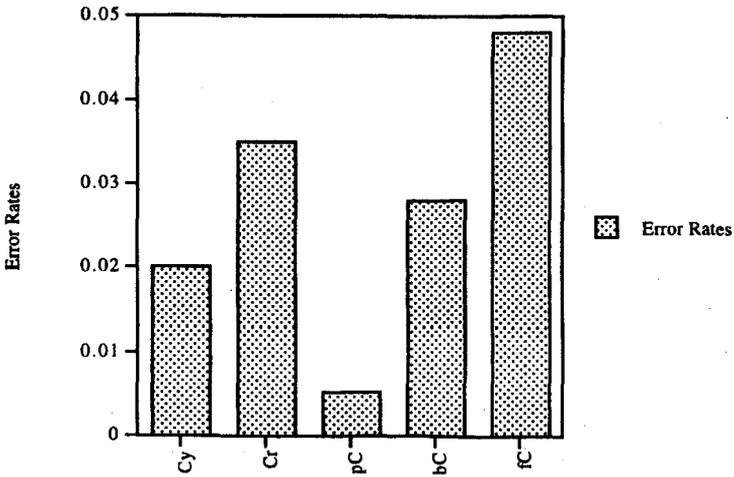
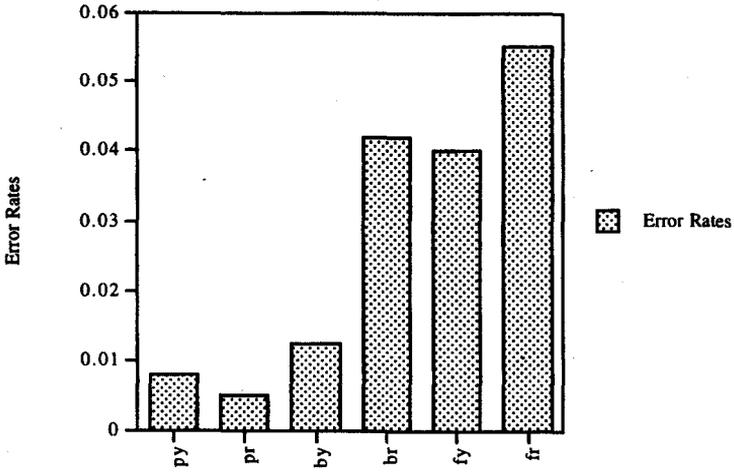
For the most part, they claim that the data support the theory. In 92% of the cases, the markedness predictions were upheld. While we would not necessarily disagree with this claim, we would argue that typological universals lack any explanatory value in terms of learner behaviour. They merely describe a pattern and have nothing to say about the mental representation of the learners (insofar as the learners are likely to be aware of the universals in question).

In addition, as the data in (12) and (13) illustrates, glide clusters were more problematic for these learners than the liquid clusters. Eckman and Iverson do not inform us as to the type of errors that the subjects made on these clusters. The typological approach, itself, has nothing to say about this differing behaviour between glide and liquid clusters.

Differences between the Studies

Before we discuss our phonological approach based on derived sonority and government, it is important to note two differences between the studies just discussed. First, the Broselow and Finer subjects were much worse on b-clusters than p-clusters, while the Eckman and Iverson subjects were marginally worse on the p-clusters. Second, the Broselow and Finer subjects made more errors on the C-liquid clusters than on the C-glide clusters, while the Eckman and Iverson subjects performed worse on C-glide clusters than on the C-liquid clusters. As it stands, we are currently unable to explain the differences between the populations (both are claimed to be intermediate to high intermediate in proficiency). Nor do there seem to be any non-phonological reasons (e.g. lexical frequency or morphological structure). It is worth noting, though, that the overall error rates are exceedingly low, and should force us to question whether we are witnessing ceiling effects in this analysis. The graphs shown in (15) for Japanese and Korean subjects should make this clear.

(15)



Finally, we also feel that the fact that both studies accepted any production of a liquid (either [l] or [r]) as acceptable may have missed an important source of information. Recall from (6), that unlike English, Korean lacks an /l/ / /r/ distinction. Our view is that learning to produce this distinction is not merely a matter of phonetic implementation (after all Korean has both sounds at the phonetic level), but rather is a matter of acquiring the appropriate mental representation based on the contrast in the sound system. It is highly likely that some of the subjects have acquired this distinction, while others have not. By mixing these populations, we might well have mixed performance for, as we shall see, we feel that there is a connection between acquiring the structure of English /l/ and producing consonant clusters containing [l].

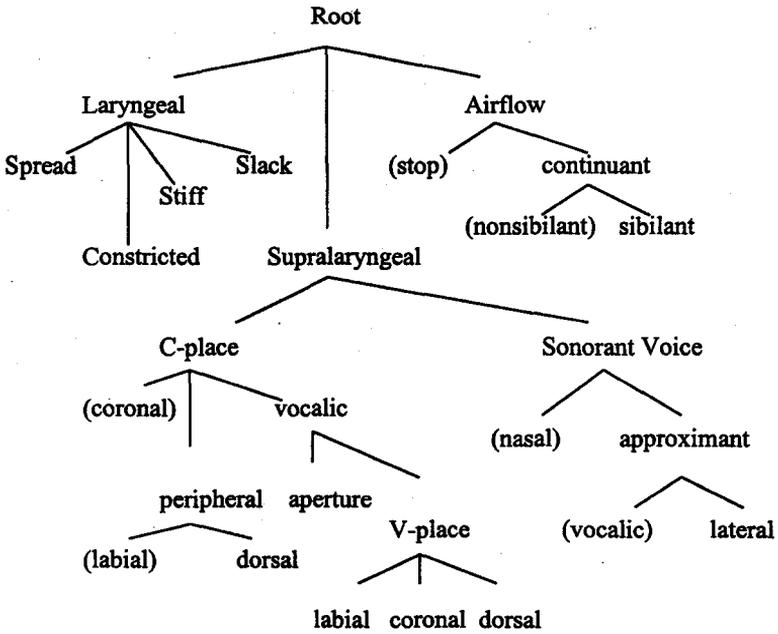
Syllabification based on derived sonority and phonological government

We propose that the behaviour of the Korean subjects can be accounted for within a model of hierarchical segment structure which treats sonority as a phonological construct derived from the complexity of segmental representations. This model has the potential of telling us something about the mental representations of the subjects, and links their acquisition of segments to the acquisition of the phonological inventory. Ultimately, there are still some things that we cannot account for due to the conflicting data of Broselow and Finer's and Eckman and Iverson's studies. We will first discuss the two important aspects of our model: derived sonority and phonological government, and then discuss how these can account for the acquisition of syllable structure by Korean speakers.

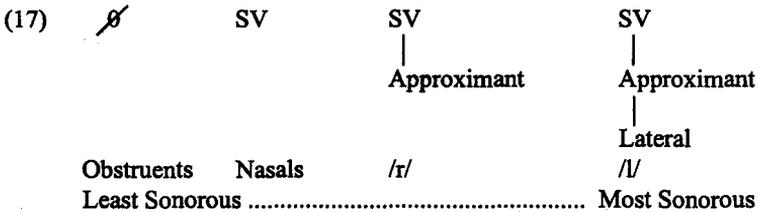
Derived Sonority

We adopt the model of segmental structure shown in (16).

(16)

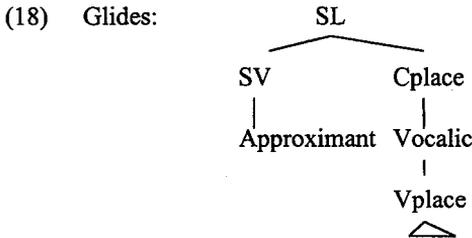


The Spontaneous Voice (SV) node represents sonority. In general, the more SV structure a segment has, the more sonorous it is. This allows us to derive the sonority hierarchy in (17).



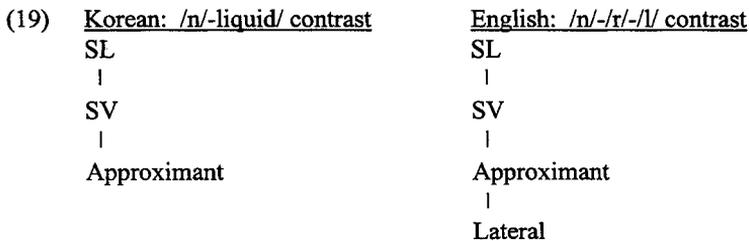
As shown in (17), obstruents have no SV structure and therefore are the least sonorous, while /l/ is the most sonorous having the most SV structure. We note

that glides are absent from the hierarchy in (17). We assume that glides have the representation in (18), where SL refers to the Supralaryngeal Node.



According to (18), glides have just as much sonority as liquids, but differ from other consonantal sounds in that they have both Cplace and Vplace nodes. As we shall see, this representation allows us to derive the tautosyllabicity of stop+glide clusters in English.

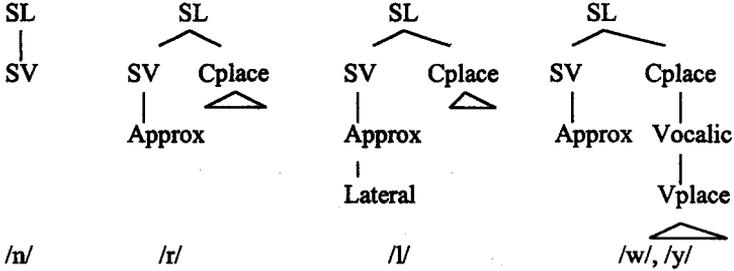
It is important to remember that the structure of a segment is based upon the contrasts it is involved in phonologically. Rice (1995) shows how the representation of a lateral is dependent on the contrasts found in the segmental inventory. The structures in (19) show how a Korean liquid could have quite a different representation from an English liquid.



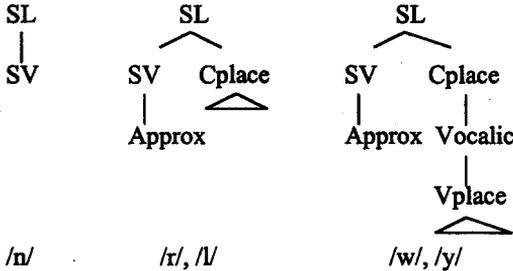
The acquisition of English [l], then, means the acquisition of the contrast between [l] and [r] which means the acquisition of the representation of [l], not just the phonetic ability to produce a lateral.

The trees in (20) show the segmental structure we are assuming for English, while the trees in (21) show the segmental structure we are assuming for Korean.

(20) English Segmental Structure



(21) Korean Segmental Structure



As (20) and (21) illustrate, the structure of the liquids differs between the two languages, while the structure of the glide remains constant. What differs in the two languages is whether the onglide is found in the onset (English) or the nucleus (Korean). And, as we shall see, this is the result of differences in syllabification between the two languages which we will discuss next.

Phonological Government

Following Rice and Avery (1992), we assume that phonotactic constraints result from universal principles of phonological government and syllabification

determined by deriving sonority via the segmental structure discussed in the previous section. We adopt the definition of phonological government in (22) and the syllable algorithm in (23).

(22) Government

A segment governs an adjacent segment if it has more feature structure than the adjacent segment within a governing domain. Sonorant Voice, Supralaryngeal, and Root are governing domains.

(23) Syllabification Algorithm

Process: A segment (A) governs a segment (B)?
Possibilities: Y (yes)/N (no)
Resulting Parse: Y --> A and B are heterosyllabified
N --> A and B are tautosyllabified

To account for the observed variation in allowable onset sequences cross-linguistically, we propose the minimal sonority distance parameter in (24).

(24) Minimal Sonority Parameter

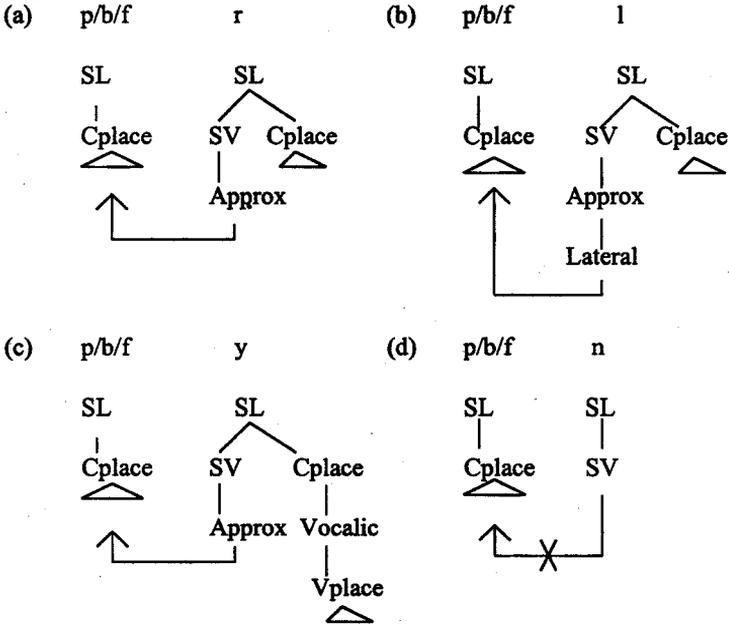
Parameter: SV government requires that the governor (B) must have at least X more nodes than the governee (A)
Settings: X = 1, 2, or 3
Default: X = 3

English and Korean have different settings of this minimal sonority distance parameter: English has a setting of X = 2 allowing stop+liquid onsets, while Korean has a setting of X=3 prohibiting onset clusters. Next, let's examine how (22), (23), and (24) along with derived sonority and the segmental representations in (20) and (21) account for the differences in English and Korean syllabification.

English and Korean Syllabification

The structures in (25) show the allowable onset clusters in English.

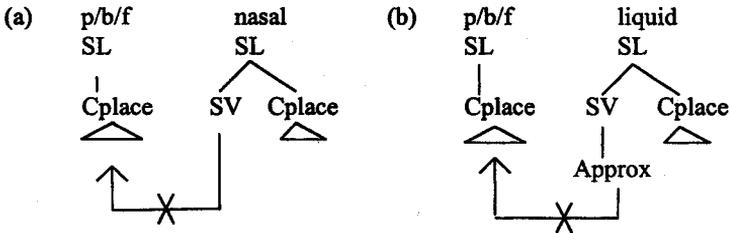
(25) English Onset Clusters

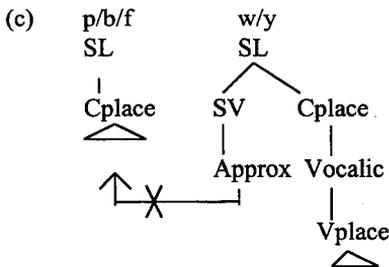


The first three clusters are well-formed tautosyllabically, since in each, the governor has at least two more SV nodes than the governee. The last cluster is not allowed in English, since the governor has only one more SV node than the governee.

The trees in (26) show why Korean with a MSD of three does not permit any consonant clusters.

(26) Lack of Onset Clusters in Korean





As shown in (26), an MSD of three prevents both nasals and, liquids, as well as glides from entering into the onset in Korean, since in all cases, the governor never has at least three more nodes than the governee. Finally, let's look at the acquisition of English syllable structure by Korean speakers.

Acquisition of English Syllable Structure

There are four important points we need to make concerning the acquisition of English syllable structure by Korean speakers. First, that Korean speakers are producing English onset clusters with few errors suggests that they have re-set the MSD parameter to the English setting. However, as noted, stop+glide clusters tend to be more problematic than stop+liquid clusters. This difficulty may arise because the Korean speakers must re-analyze the glide from a nucleus to an onset position and this re-analysis might require negative evidence: the subjects would have to note that English does not allow the sequences in (27).

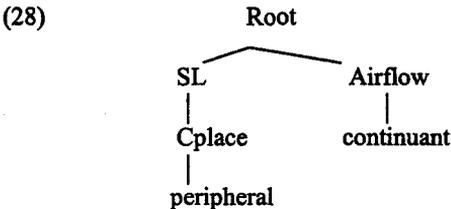
(27) *nwV, *lwV, *rwV (where V stands for vowel)

We assume that there is no positive evidence insofar as listening to the sequence of sounds would not be enough. That the cue to reanalyze the syllable structure requires negative evidence is consistent with the subjects' difficulty in this area. Young-Scholten (1994) has shown that areas of the L2 which require negative evidence may be difficult to learn. Another possible explanation, and one which avoids negative evidence might be found using segmental structure and government relations. If glides did not have any SV structure so that the only difference between glides and consonantal sounds is in place structure, then SV government could not account for their syllabification as no governing relation

would exist. However, since there is positive evidence that stop+glide clusters exist in English, this evidence might trigger an expansion in the governing domain opening up the possibility for other types of government such as Place to derive their tautosyllabification. It is also possible that there are restrictions on place government similar to SV government and that these restrictions may help to account for the lack of onset clusters shown in (27) as well as the lack of /pw/, /fw/ and /ty/ onset clusters in English as well as those clusters shown in (27). This remains an area for future research.

Second, let's go back to Broselow and Finer's and Eckman and Iverson's acceptance of any liquid-like production. In our model, the acquisition of [l] means the learner must add the lateral node. We would argue that the acquisition of this representation is an essential step in acquiring English onset clusters. Vanderweide (1994) showed that children acquiring English as a first language did not start producing tautosyllabic onset clusters until they had acquired the appropriate representation for [l]. We would argue that the same is true for second language learners of English. A pilot investigation of three Korean speakers revealed that all of the subjects had acquired an [l] / [r] contrast and all had some onset clusters. This is consistent with the claim that the acquisition of /l/ is a necessary prerequisite for producing clusters.

Third, and relatedly, the fact that Broselow and Finer's subjects had more difficulty on the f-clusters in relation to the [p] and [b] clusters may also fall out from structural considerations. Recall that Korean lacks a [p] / [f] distinction. The acquisition of this distinction in English, requires that the learners elaborate the structure under the airflow node by adding the continuant node as shown in (28).



Again, structural markedness would explain the problem: continuant is the marked option under the Airflow node. Therefore, it must be acquired before it can be used within an onset cluster. This is consistent with Vanderweide's (1994) claim that children acquire the segments involving more structure in onsets later.

Finally, we must admit that derived sonority does not allow us to account for the difference in performance of Broselow and Finer's subjects on the p-clusters as opposed to the b-clusters. Most models of feature geometry simply assign a fan structure under the laryngeal node rather than one involving markedness relations. However, the differential performance of Broselow and Finer's subjects on [p] versus [b] might well have a partial explanation in L1 transfer. Korean has a three stop series: fortis, lenis, and aspirated. None of these are voiced as in English. If the subjects are transferring any of their L1 stops to English, the resulting stop would be voiceless. This would explain why the subjects are more accurate on [p] than on [b], but it would not necessarily explain why they were better on [p] clusters than [b] clusters. Our contention is that we may be witnessing processing limitations. Given the automatic production of [p], the subjects have more processing capacity to devote to the articulation of the cluster. In attempting to produce a [b] cluster, the subject has to focus on the production of a new stop and a new cluster. This type of explanation is appealing in that we note that Eckman and Iverson's subjects did not show this pattern. Such variation is often the result of processing factors.

Conclusion

Let us now consider the broader implications of this type of study. Consider now, someone whose first language does not allow branching onsets or codas. The universal principles of sonority will not be fully fleshed out in the L1. For example, they will not have any information on whether the sonority sequencing is respected within a constituent (onset or coda). As Steriade (1988:121) noted, if the glide goes into the nucleus, then the MSD is irrelevant:

co-occurrence constraints based on sonority distance are found exclusively within the pre or post nuclear section, and never between the nucleus and the pre-nuclear section.

It is an interesting question to ask whether the second language learners will be constrained by such universal principles. In this sense, the phonological study is analogous to studies of L2 syntax that ask whether subjects whose L1 does not have overt WH movement respect subadjacency. We need to note as well, that some languages (like English and German) contain sequences that violate the Sonority Sequencing Generalization (i.e. /st/ and /ts/). The question remains: are L2

learners whose first languages do not allow clusters going to be aware of these violations? We would suggest that re-analyzing the Korean data within this framework provides interesting insights into the nature of the representation of interlanguage grammars. Broselow and Finer argued for access to UG based on phonetic facts. Our re-analysis shows that we can still claim that interlanguage grammars are constrained by such phonological principles as derived sonority. The Korean learners are showing evidence of sonority effects even though their L1 does not have branching onsets.

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The role of L1 feature geometry in the acquisition of L2 segmental phonology: Acquiring /θ/ and /ð/ in English

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Abstract

Why do second language learners fail to acquire certain L2 phonemic contrasts even long after they have “mastered” the L2 syntax? In this paper, I seek to provide an answer to this question. Research by Brown (1993) indicates that the learner's L1 feature geometry plays a role in the acquisition of L2 segmental phonology. This hypothesis is tested by examining the inability of Japanese, German, Turkish and French (Canadian and European) learners of English to correctly perceive /θ/ and /ð/. I argue that the lack of the feature [distributed] in these languages is the source of these errors. This feature marks the contrast between /θ-ð/ and /s-z/ in English. Although feature geometry cannot predict the specific errors for each language, I argue that it can constrain the list of possible candidates which will be substituted for the interdental. The error phones perceived share the same structure or have minimally less structure than that of the target phone. I suggest that the specific error phone is then determined at the phonetic level of the learner's L1.

1.0 Introduction

Although we as humans generally acquire our first languages (L1) with minimal difficulty, the same cannot be said for adults learning a second language (L2). Of particular difficulty is the acquisition of L2 phonology when new phonemic contrasts which are not present in the learner's L1 must be acquired. Since the ability to 'properly' produce L2 sounds hinges in part on the ability to perceive the L2 contrasts (Flege 1995; Rvachew and Jamieson 1995), this perceptual ability is of great importance. However, these perceptual and productive abilities are not easily acquired. Even after prolonged exposure to the L2, adult learners still tend to encounter difficulties in both perceiving and producing phones which are foreign to their L1 (Rvachew and Jamieson 1995; Jamieson and Morosan 1986). This fact leads to the much debated question: What is the source of this “failure” to acquire certain L2 phonemic contrasts?

In this paper I attempt to provide a possible answer to this question. Following Brown's (1993) reasoning, I shall argue that the feature geometries of both the L1 and L2 play a significant role in determining whether or not a contrast can be acquired by the L2 learner. To illustrate my argument, I will examine the inability of Japanese,

German, Turkish and French learners of English to correctly perceive the segments /θ/ and /ð/, neither of which occur within the learners' L1 phonemic inventories. I will also show that feature geometry can account for (though not predict per se) the phones which are perceived in place of the English interdental fricatives by learners from each of these languages. The model of feature geometry which I use is the Rice and Avery model (cf. Brown and Matthews 1993; Avery and Rice 1989; Rice 1992, 1994).¹

The paper commences with a brief overview of various other approaches to L2 segmental phonology followed by a summary of Brown's (1993) study which provides direction for this investigation. In §3 Rice and Avery's model of feature geometry is presented. Section 4 is comprised of the analysis of the feature geometries of English, Japanese, German, Turkish and French with reference to the phones substituted by each of the learners' languages. A discussion of this evidence will be given in §5 followed by suggestions for future research and investigation.

2.0 Approaches to L2 segmental phonology—An overview

2.1 Interlanguage theories and approaches

The interlanguage (IL) hypothesis assumes that in the course of L2 acquisition "the learner internalizes a system of rules which may be distinct from both the target language and the native language" (Eckman 1987b: 125). Three different approaches to interpreting errors resulting from the IL are outlined by Altenberg and Vago (1987). Contrastive analysis views errors as the result of interference from the learner's L1. In Error Analysis, all errors are analysed without any preconceived notions as to their source, whereas Autonomous System Analysis deals with the IL as a system unto itself and examines the characteristics of the system. But what causes these errors?

Tarone (1987) claims that learners employ negative transfer for phonemes which are absent in their L1. Thus, they simply replace the foreign segment with the closest one from their L1. This straight transfer is rejected by Beebe (1987) and Major (1987). Beebe suggests that most production errors do not result from simple substitution of phones, but are rather phonetic approximations or composites of two variants of the target sound, e.g., [sθ] or [θs] for English /s/ as produced by Chinese speakers. Major, conversely, posits the influence of both developmental factors and interference on the learner's L2 production. He proposes that interference processes predominate in early stages before they decrease in occurrence. Next developmental processes increase in use over time before they finally decrease in frequency. These stages are exemplified in the following sample from a Brazilian Portuguese speaker:

¹ The Rice and Avery model which I use is a composite of the various parts of their model as they are presented and discussed in these articles.

[dɔgi] (interference) > [dɔgə] (developmental) > [dɔk] (developmental) > [dɔg]. Hecht and Mulford (1987) concur with Major as to the importance of both developmental and interference factors in L2 learning. They note both of these factors in the acquisition of English by a young Icelandic boy, Steinar. Their results indicate that transfer from L1 is the greatest predictor of segmental difficulty while developmental factors provide better insight into the actual substitutions (p.223).

Eckman (1987a²,b) also attempts to account for the difficulty learners will encounter in the course of L2 acquisition. His Markedness Differential Hypothesis (MDH) is based on his definition of markedness which states that “a phenomenon A in some language is more marked than B if the presence of A in a language implies the presence of B; but the presence of B does *not* imply the presence of A” (1987a:60). The more marked a segment is, the more difficult it will be for the L2 learner to acquire. Thus, /θ/ would be considered to be more marked than /s/, and therefore more difficult to learn for a learner whose language lacks the segment.

2.2 Perception and feature approaches

Although accurate phonetic perception is necessary, it is not a sufficient condition for accurate L2 production (Rvachew and Jamieson 1995). Nevertheless, correlations between identification and production errors are well noted in the literature (Rvachew and Jamieson 1995; Flege 1995). Perceptual targets of L2 learners will evolve with experience but these targets will never match those of the native speakers because of interlingual identification (Flege and Hillenbrand 1987). A study by Morosan and Jamieson (1989) illustrates this point. Although they were able to train Canadian French speakers to discriminate between /θ/ and /ð/, success on this task did not carry over to an improved ability for subjects to discriminate /ð/ from /d/.

Brown (1993) also notes that the ability to detect contrasts is crucial for establishing contrasts in our phonological structure. She states that children undergo a decrease in their ability to discriminate non-native sounds with increased exposure to one specific language. At a young age, they are able to discriminate the Hindi /t/ versus /t/ as well as the Salish velar and uvular stops /k/ and /q/. However, since English does not contrast these places of articulation, English children eventually lose their perceptual discrimination abilities for these segments. In light of these sorts of facts, Flege (1995) claims that linguists need to do more than simply list the features of both the L1s and L2s to account for the errors made.

Listing features, however, is precisely how Hancin-Bhatt (1994) approaches her analysis. She states that a model of segment transfer must be able to explain how certain features are more apt to be maintained in transfer whereas others are more

2 This paper is a reprint of the original article from 1977 in *Language learning* 27: 315-30.

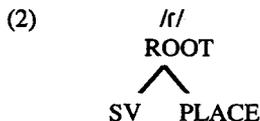
likely to change (p.243). Using a Feature Competition Model (FCM), she attempts to account for the mapping of L2 sounds onto L1 sounds. This model assumes that not all features are of equal prominence in a given inventory and that this feature prominence is determined by underspecification. The more contrasts a feature marks in a language, the more that feature will be maintained when perceiving a non-native sound. She tests her model by verifying the perception of English /θ/ and /ð/ by Japanese, German and Turkish speakers. Since [continuant] marks a statistically significant number of contrasts in each of these languages (cf. Hancin-Bhatt 1994: 255-257), she hypothesises that this feature will be maintained when subjects perceive the interdental. Contrary to her prediction however, Turkish listeners more commonly mistake the interdentals for stops whereas the Japanese and German subjects more commonly perceive the segments as /s-z/.

2.3 Brown's (1993) feature geometry approach to L2 segmental acquisition

In her paper, Brown (1993) reports that L1 grammar may block access to Universal Grammar (UG) during L2 acquisition thus preventing native like attainment of phonemic contrasts not present in the learners' L1. She implements feature geometry as the key tool in her investigation into the acquisition of the English /l-r/ contrast by Japanese and Mandarin speakers. These phonemes are contrasted by the feature coronal as indicated in (1):



Both of these segments share the same manner of articulation, approximate, which is represented by the node Spontaneous Voicing (SV). Therefore, according to Brown, it is the feature [coronal] which distinguishes /r/ from /l/. In languages where these segments are non-contrastive, they would share the same representation. Japanese provides an example of this fact where /l/ and /r/ are allophones of the phoneme /r/ represented in (2).



The phonetic output or allophonic variations would be determined by the

phonological environment. In light of the differences in the underlying representations of these phones between English and the subjects' L1s, Mandarin and Japanese, Brown investigated whether the L2 learners could acquire this non-native contrast. Since both Japanese and Mandarin include these phones as allophones in their L1, Brown expected that neither subject group would be able to perceive the phonemic contrast. The results of her study both support and contradict her hypothesis. Japanese speakers were unable to perceive the difference between /r-l/. By contrast, the Mandarin speakers perceived the contrast well above chance levels. Since both groups of subjects were evenly matched for age of exposure, education, and time resided in North America, Brown closely examined the differences in the feature geometries of the two languages. She postulated that if a feature defining an L2 contrast was present in the learners' L1, even if it was not used in the representation of the native sound of the contrast, then they would be able to perceive the non-native contrast. By examining Mandarin, Brown discovered that the feature defining the contrast, [coronal], was present in this language. Japanese, however, does not require [coronal]. From these results, Brown concluded that the lack of a relevant feature in a learner's L1 will inhibit his or her ability to perceive L2 contrasts based on this feature. It is this last statement which serves as the main hypothesis to be tested in this paper using the English interdentals, /θ/ and /ð/, as the means for verification. This test provides the opportunity to verify Brown's hypothesis as well as to see if the L1 feature geometries tell us something about the sounds which are perceived in place of the interdentals.

3.0 Feature geometry and the Rice and Avery model

The theory of feature geometry can best be summarised by examining the common thread which weaves and connects the various models. In this section I will commence by providing a brief background to feature geometry before proceeding to a discussion of the Rice and Avery model which will be used in this analysis.

3.1 Feature geometry

The main thrust behind feature geometry is that the distinctive features which create segments are arranged in a hierarchy (Brown 1993; Brown and Matthews 1993; Clements 1993; Clements and Hume 1994; Avery and Rice 1989; Rice 1992, 1994; and Stemberger 1991). This hierarchy captures the dependency relations between features and defines the natural classes of features that function together in phonological processes. Furthermore, markedness relations are also displayed by the segmental structure. The more marked a segment is, the more structure it will possess (Rice 1992, 1994). No one language will avail itself of all aspects of feature geometry, however, it can account for all the phonemes and inventories of the world's languages.

Moreover, feature geometry captures two primary relations: dependency and constituency. Dependency results when a feature or node is dominated by a superordinate node, thus becoming the superordinate node's dependant. In Constituency, features that pattern together are organised under a common node. Constituency is created within organising nodes (e.g., Place) which are universal across languages and which are fully specified in the geometry (Stemberger 1991). By contrast, content nodes differ from language to language and are not always fully specified, e.g., [coronal]. When content nodes are not fully specified, a default feature is supplied at a later stage in order to articulate the sound.

Underspecification plays a critical role in feature geometry. It is concerned with which features are predictable and how they are then subsequently filled into the appropriate slots in the geometry. The degree of underspecification is highly variable across theories. Three main types of underspecification exist, namely Radical Underspecification (RU), Contrastive Specification (CS), and Minimally Contrastive Specification (MCS)³ (cf. Stemberger 1991 and Dresher et al. 1994 for descriptions of each theory). These theories differ in their use of bivalent versus monovalent features. MCS is the only theory which strictly employs monovalent features although Clements and Hume (1994) indicate that the Place features labial, coronal and dorsal are monovalent within CS. The use of monovalent features rests upon the assumption that the mere presence of a feature denotes the active involvement of the articulator in segmental production (Brown and Matthews 1993).

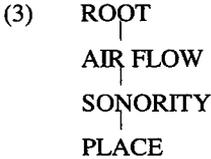
3.2 Minimally contrastive specification and the Rice and Avery model

According to the MCS theory, unmarked content features are absent in the underlying segmental representation (UR) (Rice 1992, Avery and Rice 1989). Universal Grammar (UG) provides information as to the markedness of features and therefore determines their presence or absence in the UR. Since [coronal] is deemed to be the unmarked place of articulation, it is underspecified in the UR and later filled in by default rules at the time of articulation. In some cases [coronal] will need to be specified if a language makes a further contrast within the class of phonemes already distinguished by [coronal]. An example from Sanskrit illustrates this point. Sanskrit maintains a contrast between /t/ and /t̪/ (cf. Avery and Rice 1989: 192). Both segments are coronal stops and therefore need further elaboration of the [coronal] node to be able to distinguish between them. The alveolar /t̪/ differs from the retroflex /t/ by means of the [coronal] dependent feature [retroflex]. This is accomplished through the Node Activation Condition (NAC) (Avery and Rice 1989; Brown and Matthews 1993). The NAC stipulates that "if a secondary content node is the sole distinguishing feature between two segments, then the primary feature is

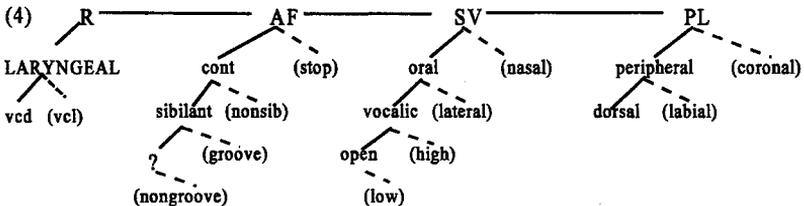
3 This theory is also known as Modified Contrastive Specification (Dresher et al. 1994).

activated for the segments distinguished. Active nodes must be present in underlying representation” (Avery and Rice 1989:183). According to the NAC, [coronal] will be present for both the plain alveolar /t/ and the retroflex /t/ which is then further distinguished by the secondary feature [retroflex].

A further characteristic of the Rice and Avery model is that features are not simply organised into hierarchical constituents, but these constituents are also further organised into a hierarchy rather than a flat structure (cf. (3) and (4)). As outlined in Dresher et al. (1994), the hierarchy employed by this model is indicated in (3):



According to this hierarchy, place contrasts are made within manner classes (Air Flow) and not vice versa. Furthermore, it more fully demonstrates fidelity to the concept of hierarchy within segmental structure. A composite of the Rice and Avery model for consonants is elaborated in (4)⁴ (cf. Brown and Matthews 1993; Rice 1992, 1994; Avery and Rice 1989; Dresher et al. 1994).



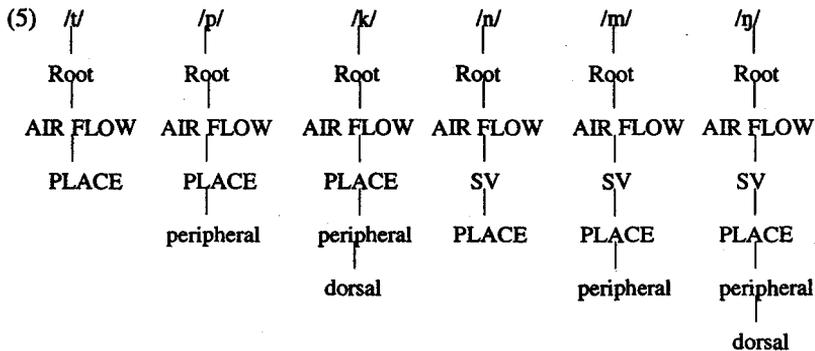
R=Root AF=Air Flow SV=Sonorant Voice PL=Place

4 This composite combines the basic structure illustrated in Brown and Matthews (1994) and the hierarchy in (3) (Dresher et al. 1994). It also includes the Laryngeal node to account for voicing which is missing in the Brown and Matthews model. The Laryngeal node is attached separately from the hierarchy as it is shown to be separate in Rice (1992) and Avery and Rice (1989). Furthermore, since [voiceless] is generally considered to be the unmarked feature, it is shown in parentheses in the model. One modification that I have made to this model is to the Place node which only includes [coronal], [labial] and [dorsal] as in Avery and Rice (1989) and Rice (1992, 1994). I will be assuming dorsal dependent nodes as in Clements and Hume (1994), Clements (1993) and Yu (1992). These features are better able to account for the German fricative contrasts (cf. §4.4).

In (4), the nodes located on the right in parentheses are the unmarked and default features. These features are underspecified in the UR, but are filled in at the phonetic level if their superordinate node is activated. Furthermore, if a dependent feature is present in the UR, its superordinate node must also be present in the UR.

Each of the organising nodes establishes contrasts. In this model, Laryngeal accounts for voicing of non-sonorant consonants. When it is absent, the consonant surfaces as voiceless. The Air Flow node indicates the manner of articulation. Nasal stops also include this as a bare node indicating that the consonant is indeed a stop (cf. (5)). In order to contrast sonorants from obstruents, the Sonorant Voice node (SV) is included in the representation of the consonant where the default feature is [nasal]. The node of particular interest for this paper is the Place node. Arguments for this structure as indicated in (4) are found in Rice (1994) and Avery and Rice (1989). Peripheral denotes any consonant that is non-coronal.

In constructing the geometries, segments are specified minimally including only those features which are needed to distinguish them from other consonants in the language's inventory. Some examples of prototypical consonants are given in (5) to illustrate the model as outlined above (cf. Brown and Matthews 1993).



These sample consonantal geometries provide an excellent sample of the increase in complexity embodied in the structures.

It will be using this model as outlined above that I will argue that feature geometry does indeed provide insight into the ability for L2 learners to acquire contrasts not present in their L1. I now turn to this issue.

4.0 The role of L1 feature geometry in L2 acquisition of /θ/ and /ð/

As previously discussed in §2.3, Brown (1993) concluded that the Japanese speakers were unable to perceive the /r-l/ contrast because their language lacked the

feature [coronal] which was crucial to the distinction in English. Since Mandarin does employ [coronal], albeit not for this contrast, these speakers were able to perceive the contrast well above chance levels. Following Brown's reasoning, I will argue that L2 learners will be unable to perceive the English segments /θ/ and /ð/ if their language does not employ the feature needed to distinguish these segments from other consonants in English. These learners are native speakers of Japanese, German, Turkish, and French (in particular the Canadian dialect).

After presenting the perception errors made by each of these language groups, I shall establish the feature required in English to create the contrast of /θ/ and /ð/ from other segments. I will then proceed to examine the feature geometries of each of the learners' native languages to verify the absence or presence of the feature in question. I will also investigate the structure of the L1 geometries to establish whether the feature geometries of the L1s provide any insights into the phones which were perceived in lieu of the interdentals.

4.1 Misperceived phones — the data

Data regarding the phones perceived in place of the English interdentals come from two sources. The Japanese, German, and Turkish data are found in Hancin-Bhatt (1994) and the French data come from Morosan and Jamieson (1989). The misperceived phones are shown in Table 1:

Table 1 Misperceptions of English interdentals by L2 learners

Japanese	German	Turkish	French	
			Canadian	European ⁵
/s-z/	/s-z/	/t-d/	/t-d/	/s-z/

These data, particularly the data from Hancin-Bhatt (1989), reflect tendencies in the errors rather than absolute misperceptions. In her outline of errors, Hancin-Bhatt indicates that variability does occur such that on some occasions a stop may be perceived in lieu of the more common sibilant error, and vice versa. While acknowledging that this variability does arise, the main focus will be on the more common misperceptual error phones. Although interdentals were also mistaken as labiodentals (/f/ and /v/), even by native speakers in the study by Hancin-Bhatt

⁵ European French speakers are reported to produce and perceive the English interdentals more as sibilants than stops. This, however, is variable (Flege 1995; p.c. with Chris Miller and Julie Auger). Using these data which stem in part from the production of European French speakers rather than from perception is based on the concept that "transfer...is reflected in production, though,...it actually originates in perception" (Hancin-Bhatt 1994:263).

(1989), this error phone is most likely the result of acoustic similarity.⁶ In light of this explanation, this error will not be discussed further.

4.2 English feature geometry—The contrast between /θ/ and /ð/

To commence the analysis, it is necessary that the distinguishing feature for the English interdentals be established. To do this, I will determine the contrastive features used within the English consonantal inventory shown in (6) based on the insights from the Rice and Avery model from §3.2. Place distinctions are also made based on the descriptions of labial, coronal and dorsal by Clements (1993).

(6) English consonantal inventory

← Place →				
[peripheral] (labial)	(coronal)	[peripheral] [dorsal] (velar)	Not specified for Place	
p b	t d	k g	ʔ (stop)	
f v (nonsibilant)	θ ð	[distributed] s z	[posterior] ʃ ʒ	h (nonsibilant) [contin]
	[sibilant]	tʃ dʒ	(stop)[contin]	
m	n	ŋ	(nasal)	
	r		[vocalic]	[oral]
	l		(lateral)	

AF }
SV }

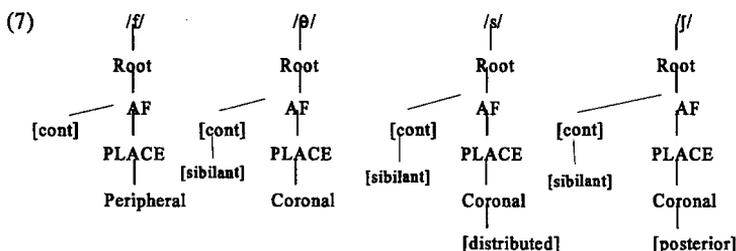
Several points are noteworthy with regards to the inventory above. First, Avery and Rice (1989:190-1) note that the glottal stop has no specification for place. This allows for the alternation between the glottal stop and /t/ in words like [bʌʔŋ] 'button'. The unmarked node [coronal] can either be filled in to be realised phonetically as [t] or left empty for the glottal stop. The liquid /r/ has been marked here as [vocalic], however Brown (1993) notes that this segment is distinguished from /l/ by the Coronal node (cf. §2.3 (1)). Since this difference is of no consequence to the question at hand, I will not make any further claims as to the actual distinctions required. Furthermore, I have not included the glides /w/ and /j/ in the above inventory since they provide no further insights into the query of interdental acquisition. These glides could, however, easily be fit into the inventory by further elaborating the SV node. Another aspect of the inventory which should be explained

6 This substitution is well documented even in some dialects of English (cf. Murray 1995: HO 7).

is that the nasals have not been grouped under the AF node. This is only because nasals are not contrasted within AF as are continuants and stops. This does not preclude, however, the existence of the AF node for nasals indicating that nasals are indeed stops. Furthermore, segments have not been distinguished by voicing in (6).

The contrasts which are relevant for the analysis involve the Place node distinctions for the fricatives. The segments marked under [coronal] need to be distinguished from one another. First, following the distinctions outlined by Avery and Rice (1989:192) where the palatal-alveolar series of consonants were distinguished from the dental and retroflex series by the feature [posterior], I have distinguished the segments /ʃ/ and /ʒ/ from the other [coronal] fricatives by [posterior].⁷ This also avoids two dependent nodes attached to [coronal] for the structures for /s/ and /z/, although this does not seem to present a problem for Clements and Hume (1994). These alveolar fricatives are distinguished from the interdental fricatives by the feature [distributed] (Stemberger 1991:102; Katamba 1989: 55). Distributed marks the difference between segments articulated with the blade as opposed to the tip of the tongue. Also, [sibilant] is present not so much as a means of establishing a contrast but rather because its absence would result in the default feature [nonsibilant] (cf. (4)).

The geometries of these fricatives are given in (7). The voiceless series will be given to maintain simplicity since their voiced counterparts differ only with regards to the addition of the Laryngeal node [voiced] (cf. (4)).



The node [coronal] is included in these representations as required by the NAC (cf. §3.2). At first glance it appears that /θ/ is less marked than /s/ according to the tenet stating that more structure means more markedness. This would seem to contradict the assumption that /s/ is less marked than /θ/ particularly in light of its early acquisition by children learning English as their first language (Sander 1972).

7 The /s/ could alternatively have been marked by [anterior]. This would not create a tremendous difference overall. However, for the purposes of uniformity, I shall maintain [posterior].

In reality, the voiced interdental occurs with a high frequency in common words including *they, this, there, their, then, them, that*, and most importantly *the* (Jamieson and Morosan 1986: 213). Furthermore, the phoneme /s/ could very well have been acquired first without the use of [distributed]. As the child detected a contrast between /s/ and /θ/, then he or she could have increased the structure necessary to distinguish these two phonemes, thus adding the necessary feature [distributed] (cf. Brown 1993; Brown and Matthews 1993). Another consideration is that there could be a difference in terms of phonetic and phonological markedness. Although /s/ is clearly less marked with reference to its frequency, it may very well be phonologically more marked (Keren Rice, p.c.).⁸ Another marked feature, [sibilant] has also been included in the geometries not as a means of establishing a contrast, but rather because its absence would default to a [nonsibilant] feature (cf. (4)). Putting these issues aside for the moment, I will proceed to examine the feature geometries of the learners' native languages.

4.3 Japanese

The Japanese inventory is small in comparison with that of English. It does not contrast any segments within [coronal] as already indicated by Brown (1993). The inventory, taken from Brown (1993: 203) is given in (8) below.

(8) Japanese consonantal inventory

← Place →			
[peripheral] (labial)	(Coronal)	[peripheral] [dorsal]	
p	t	k	?
b	d	g	(Stop)
			No specification for place?
			h
			[eont]
m	n	ŋ	(nasal)
			r
w	y		
			[oral]

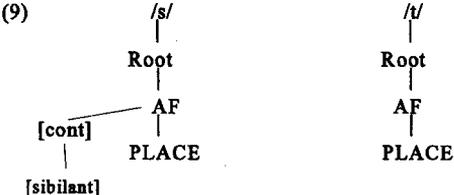
} AF

} SV

⁸ Keren Rice (p.c.) admits that the representations of these fricatives are difficult to deal with. She also notes that there are apparently some languages where there is language change and variation between /s/, /θ/ and /ʃ/, indicating that there is something very close about these sounds when they are not contrastive with one another.

Since there are no contrasts made within [coronal], this node will be underspecified in the UR. Furthermore, since the features from SV which are required to differentiate the liquid from the glides do not pertain to this study, I have not fully distinguished these segments.

The absence of the feature [distributed] in Japanese confirms the hypothesis explaining the failure to perceive the interdental in English. A closer look at the geometry of the fricative /s/ in (9) also reveals a similarity to /θ/.

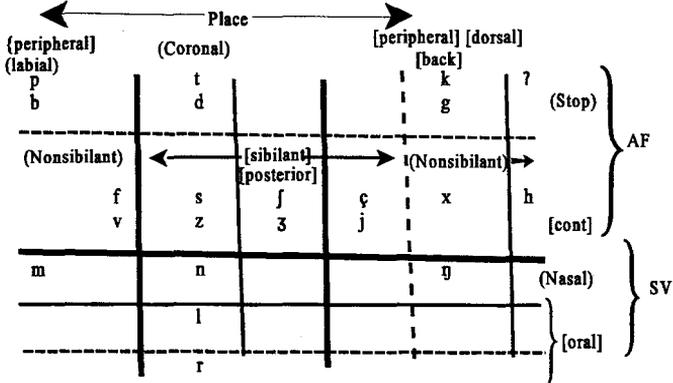


The Japanese /s/ shares a very similar structure with the English /θ/. The main difference is the [coronal] node specified within the UR for /θ/ because of NAC, otherwise, these are essentially the same representations. Taking this explanation one step further, the less common (yet still existent) misperception of /θ/ as /t/ could easily be explained by the delinking of the [continuant] node. Delinking is also a common phenomenon in feature geometry.

4.4 German

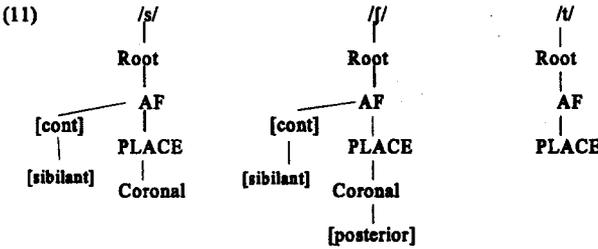
Like Japanese, German native speakers tend to misperceive the English

(10) German consonantal inventory



interdentals more commonly as the sibilants /s/ and /z/ (cf. §4.1). An examination of the German consonant inventory quickly reveals the lack of the feature [distributed] further providing support for the hypothesis. This inventory in (10) comes from Yu (1992). Yu alludes to the feature [distributive] in German, however, in the underspecified feature matrix, [distributive] is not present since it is noncontrastive in German, and therefore unnecessary as a feature in the geometry (Yu 1992: 146). One notable difference observable in the German inventory is the three-way contrast between dorsal fricatives. The palatal fricatives are easily distinguished from the other two dorsal series by [sibilant]. The velar fricative /x/ is subsequently distinguished from /h^o/ by the dorsal dependent [back] (Yu 1992; Clements 1993; Clements and Hume 1994; Katamba 1989).

The resulting feature geometries for /s/, /ʃ/, and /t/ are illustrated below in (11). Although German speakers generally tend to misperceive the interdentals as the sibilants /s/ and /z/, they do occasionally claim to hear /t/ and /d/ (Hancin-Bhatt 1994). The alveopalatal fricative is also illustrated in (11) to see if it provides any



insights into the “choice” of perceptual error phones. Similar to the Japanese data, the structure for German /s/ matches that of /θ/ in English. This is significant since this model of feature geometry is based on contrasts between segments and both the English /θ/ and German /s/ are defined by the same contrasts. Another similarity is found with the German /t/. Since /t/ would be realised as [coronal], the interdental differs minimally from /t/ only with respect to [continuant] (the overt specification for [coronal] in the UR not being considered a difference). The loss of [continuant] by delinking would produce a similar structure as /t/. By contrast, /ʃ/ is not misperceived in lieu of /θ/. The structures of these two segments also differ

9 Once again the existence of /h/ presents a problem for Place. I have grouped it here under dorsal, however, it may very well not belong in this position. If this is indeed the case, then the feature [back] would be redundant since [sibilant] would already create the contrast between the palatal and velar fricatives. Nevertheless, this issue does not bear significant weight on the results since the existence of this feature is not in question in this study.

minimally with respect to one another. The significant difference, however, is that /ʃ/ is a more marked and more complex segment with the addition of the feature [posterior].

4.5 Turkish

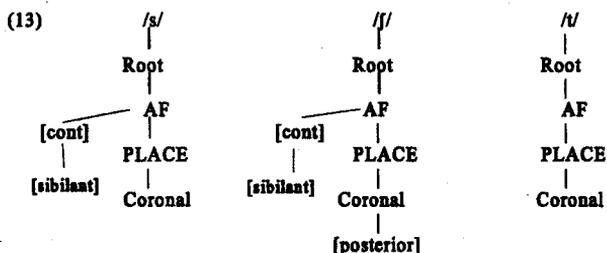
One of the difficulties with analysing the Turkish inventories is the vast proliferation of inventories, none of which concur (cf. Hancin-Bhatt 1994; Van der Hulst and Van de Weijer 1991; Demircan 1987; Underhill 1986; and Lees 1961). Thus, the reliability of the data provided is not guaranteed. For the sake of simplicity, I shall use the obstruent inventory from Hancin-Bhatt (1994) with some of the insights from Underhill (1986). Although this ignores the sonorants, even a cursory glance at the various inventories indicates that no significant contrasts are established within the sonorant class. The inventory is given in (12).

(12) Turkish Obstruent Inventory

[peripheral] (labial)	(coronal)	[posterior]	[peripheral] [dorsal]
p	t	tʃ (ç)	k
b	d	dʒ (c)	q* [low] g (stop)
f	s	ʃ (ş)	[contin]
v (nonsibilant)	z ← [sibilant] →	ʒ (j)	ɣ* (nonsibilant)

*These phones are seen as allophones of their respective phonemes according to some inventories (Swift 1963)

Once again, the lack of the feature [distributed] supports the hypothesis that speakers whose L1 lacks the feature required to make a contrast in the L2 will be unable to perceive the contrast. A further look at the feature geometries of the error phones for Turkish speakers also reveals similarities to those for German.



The main difference between the German and Turkish geometries is the overt specification of [coronal] for the stop. Otherwise, the same structure for English /θ/ represents Turkish /s/. However, in spite of the same structure being shared by Turkish /s/ and English /θ/ as was the case with German and nearly the case with Japanese, Turkish speakers do not generally tend to perceive the English interdental stops as the alveolar sibilants, /s/ and /z/ as do German and Japanese speakers. They do, instead perceive the stops /t/ and /d/ with greater frequency (cf. Table 1). With the overt specification of [coronal] for the Turkish /t/, the two phonemes become even more similar, distinguished only by [continuant] (cf. §4.4 for further details as to the similarities). Once again we see that the two possible error candidates possess either the same structure or minimally different structure, where minimally different implies minimally less structure.

4.6 French—[t] versus [s]

In sections 4.3 to 4.5, three different languages have been highlighted. All of these languages have been proven to not use the feature [distributed] in establishing contrasts. However, despite shared feature geometries of the misperception errors of the various languages, two different error phones abound. In this section I will outline the inventory for French which exemplifies this very phenomenon of different error perceptions coming from similar or like inventories and feature geometries.

Before investigating the feature geometry to verify if it provides illumination as to a possible predictor of the phones misperceived, I will outline the consonantal inventory of French to determine whether [distributed] is a contrastive and thus necessary feature in its geometry.

4.6.1 The consonantal inventory

The inventory for both European French (Standard French) and Canadian French are the same (cf. Rogers 1991, Léon 1966) with perhaps the variation of the "r" regionally (Rogers 1991: 111-112). Nevertheless, the contrasts within the

inventory are easily made as shown below in (14):

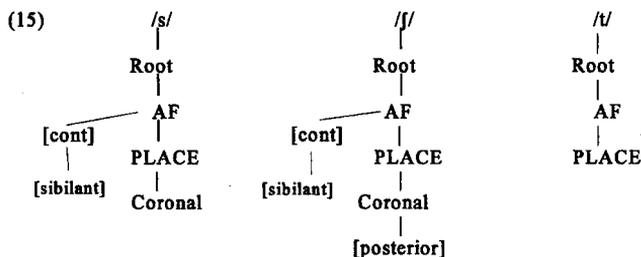
(14) French consonantal inventory

[peripheral] (labial)		(coronal)		[peripheral] [dorsal]	
p		t		k (stop)	} AF
b		d		g	
(nonsibilant) f		s*	(sibilant)	[posterior]	} [contin]
v		z*	↔	ʃ	
m		n		ŋ† (nasal)	} SV
		l		[oral]	
		r			

* The /s/ and /z/ are shown to be distinct from /t/ and /d/ which are considered to be more dental. Some sources group them together under "alveolar" whereas others distinguish the /s/ and /z/ as predorsal-palatals (FREN 433 Handout).

† This nasal is used only in borrowed words (Rogers 1991).

Once again the feature [distributed] is absent from the inventory further providing support for the hypothesis. Moreover, the feature geometries for /s/, /ʃ/ and /t/ also reveal similarities to those structures already given above for the other languages.



These structures in fact are the same as those required by German (cf. §4.4 (11)). The structure for /s/ also perfectly matches the structure defining /θ/ in English. This likeness of the two structures, French /s/ and English /θ/, could easily account for the misperception of /θ/ as /s/ in European French. The further explanation for the error /t/ could once again be expressed as the delinking of the [continuant] feature, thus rendering a structure similar to that of /t/ with only the overt specification required by /θ/ distinguishing them. As also earlier suggested, the additional structure of the

French /ʃ/, though producing a minimal difference, could account for the lack of /ʃ/ to be experienced as an error phone.

5.0 Discussion of results

5.1 Support for Brown's hypothesis

Brown's (1993) hypothesis appears to be confirmed by the data and results above. The distinguishing feature creating the contrast between the interdental and the other fricatives, especially /s/ and /z/ is [distributed]. The fact that this feature was not actually attached to the interdental fricatives per se is not a problem. The important fact remains that it is this feature which is required to establish the contrast. Without this contrast, /θ/ and /ð/ would "neutralise" in English. Not only did the L1s of the speakers lack this feature, but these speakers made errors in their perception of /θ/ and /ð/. Thus, these results support the claim that if a learner's L1 does not employ a feature required to create a contrast in the L2, this speaker will be unable to perceive the L2 contrast marked by the feature with native-like competence. From this claim it can further be stated that feature geometry does in fact play a real role in the ability for L2 learners to acquire foreign contrasts.

This claim could also be used to explain the results of the popular problems with French learners of English as demonstrated by the results in Morosan and Jamieson (1989). As discussed earlier, the authors were able to train Canadian French speakers to detect voicing differences between /θ/ and /ð/ with a high degree of accuracy in word initial position. This was an accomplishment since not only do interdentals not exist in French, but English and French also differ from each other with regards to VOT (Flege 1995; Flege and Hillenbrand 1987; Jamieson and Morosan 1986, 1989; and Morosan and Jamieson 1989). Despite the success at distinguishing between interdentals, this success did not carry over into the subjects' ability to discriminate between /ð/ and /d/. This further supports the hypothesis since not even training subjects in discrimination can force a "renovation" of the feature geometry structure of a language. It is important to note that these subjects were monolingual francophones attending a summer school in Kingston to learn English. Similar problems in discrimination are not necessarily experienced by bilinguals for whom French is the first language (Alain Theriault, p.c.).

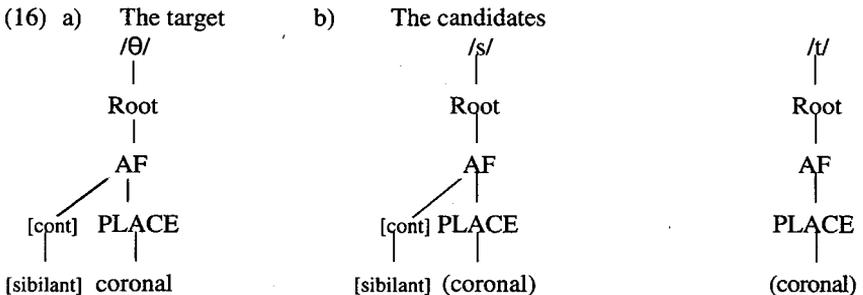
In yet another application to the French problem, both the lack of [distributed] as a contrastive feature in French as well as the effect of L1 feature geometry on L2 acquisition could be the motivating factor behind the French constraint against interdentals as described by Paradis and Lebel (1994). The authors explain the constraint as the reason "why interdentals are systematically adapted as soon as words containing them are introduced into French" (Paradis and Lebel 1994: 75). The lack of [distributed] could very well explain the "why" behind the contrast.

5.2 Predictability of errors from feature geometry?

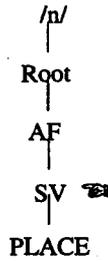
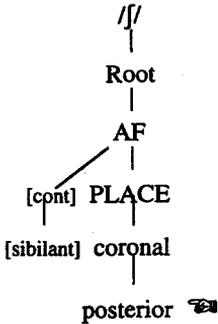
Verifying Brown's hypothesis was far more straight forward (despite its length) than an account of predictability. In light of the identical feature geometries of both German and French and yet the differing errors, it is difficult to propose that feature geometry has predictive power as to the error phones. The fact that French yields two different misperceived error phones from the same inventory and geometries provides unequivocal proof against predictability. However, does this simply mean that any L1 segment can be considered a candidate for being an error phone misperceived in place of the target phone? The answer is a resounding no!

The error phones clearly indicate a select choice of "possible" misperceptions. Not every consonant from the languages' inventories were error substitutions. Recall from Table 1 (cf. §4.1) that the phones perceived were either /s/ and /z/ or /t/ and /d/ where voicing was deemed irrelevant. The alternative error phones, the labiodental fricatives /f/ and /v/ were explained based on an auditorily based substitution. However, even within languages the error phones recorded in the table reflect only tendencies and not absolutes permitting essentially, to a certain extent, both the stops and sibilants to be candidates even within a specific language. Hence, what I propose is that although the feature geometry cannot predict which phones will be heard in lieu of the target sound, it can constrain the candidates from the numbers of possibilities in the L1. But how does this constraining operate?

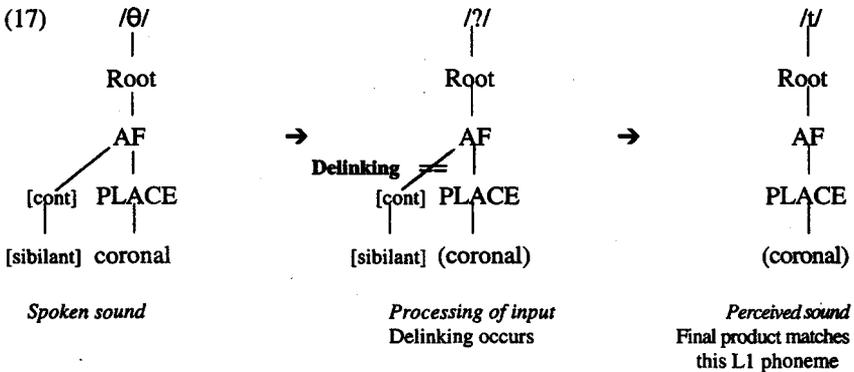
As suggested earlier, the error phones either share the same structure (e.g., /s/) or have minimally less structure than that of the target phone (e.g., /t/). The differences between specification or underspecification of [coronal] in the URs do not appear to play a role or affect the outcome of the comparison of structures since in both cases the feature is actually an inherent part of the make up of the phone. Segments, however, which differ minimally more such as /ʃ/ are not candidates for misperception. To illustrate this generalisation, several feature geometries of both attested errors and unattested error substitutions have been reproduced in (16).



c) The Non-candidates



Although only a few examples are given, those that are illustrated represent phonemes found within all inventories outlined in this analysis with the exception of /ʃ/ which is not found in Japanese phonemically. The candidates shown in (16.b) demonstrate my proposal. The structure for /s/ is identical to that for /θ/ in (16.a) (where coronal is shown in parentheses to indicate that it may either be specified or underspecified due to the NAC). The representation for /t/ differs only by the absence of the [continuant] node. This is easily accounted for by the process of delinking the [continuant] node to which perhaps some learners do not attend thereby producing or perceiving the stop through default. This delinking is illustrated in (17):



The representations of the Non-candidates in (16.c) share one thing in common. These representations have added structure to the original geometry of /θ/. For /ʃ/,

the addition of [posterior] marks the only difference between the two segments.¹⁰ As for the nasal, /n/, the [continuant] node has been delinked as was the case with /t/, however, the SV node which has [nasal] as its default has been added. Clearly this is not a simple case of minimally less structure. The features which violated the minimally less option are indicated by the pointed fingers to the right of each structure in (16.c).

Thus, there appears to be a means of predicting or constraining the possible candidates which will be perceived (or produced possibly) in place of the target phone. These predictions and constraints appear to follow the principles of Minimality and Preservation as outlined in Paradis and Lebel (1994). They define a Repair Strategy as “a universal context-free phonological operation that inserts or deletes structure to make a phonological unit or structure conform to a constraint” (p.77). Although my proposal necessitates only the deletion of structure, the principle of Minimality can account for this deletion in that it “must involve as few strategies (steps) as possible” (p.77). In this case the candidates represent the deletion of only one node (even though it may include its dependent nodes as well). Most notably is the principle of Preservation which requires that segmental information be maximally preserved and maintained (p.78). These principles contribute to the constraining of perception error candidates.

5.3 Accounting for the choice of which error candidate

Having arrived at the list of possible candidates, how is the specific error determined? This topic had been debated, particularly for French, since the different dialects tend to show varying inclinations towards a particular error substitution.

Tom Wilson (MS) tried to account for the differences in French substitution errors by employing a lexical phonology approach. He claimed that the default and redundancy rules filled the appropriate feature value as shown in an example in (18):

(18) [+continuant] → [+strident]

He then proposed that the feature value was filled in lexically for Canadian French (CF) but postlexically for European French (EF). If this was indeed the case, and assuming that only postlexical rules can be transferred from L1 to L2, then this supposedly would account for the sibilants in EF and the stops in QF. This, however, does not take into consideration variation within dialects and idiolects.

Another consideration that has been raised is word position. Differences in errors can be contrasted based on word position (Hancin-Bhatt 1994; Flege 1995).

¹⁰ If my proposal does bear any truth, this could also prove a further impetus to the use of [posterior] for /ʃ/ rather than marking /s/ for [anterior] to create the contrast.

Hancin-Bhatt (1994) noticed differences in the rates and types of errors based on word position. Flege (1995: 264) noted that Dutch learners of English use /d/ for /ð/ word initially but then use an alveolar fricative word finally. Thus, word position may be a consideration in the choice of error phones.

Another possible insight into whether the stop or fricative series will be "chosen" as the error phone may be tongue position in the production of /s/. Allison Teasdale (p.c.) has recently finished a phonetics study to explain the substitution errors for the English interdental /s/ by learners of English. She found that speakers who produce /s/ further forward, i.e. a more dental /s/, substitute /s/ for /θ/. On the other hand, speakers who produce an alveolar /s/ are more apt to substitute /t/. This claim is supported by two different pieces of evidence. First, Flege and Hillenbrand (1987) claim that French and English /s/ are not both produced as alveolars. Only the English variety is an alveolar whereas the French /s/ is more of a dental. This sweeping generalisation of French, however, could be disputed by the findings of Teasdale. Another piece of support comes from Rice (1994: 201) who states that "a single phoneme can take on a range of phonetic realizations. ...[In] languages...where there is only a single type of coronal stop, that stop may be realized as alveolar in some languages and as dental in others." There is no reason why this cannot be applied to the phoneme /s/.

Since the feature geometry does not specify the actual phonetic realisation, it is possible that it is at this level that the actual choice of an error substitution takes place. If the findings of Teasdale's study are found to be valid, then that could also account for the differences in perceptual errors. I find this former study to be promising and perhaps insightful.

6.0 Conclusions

In this paper I have provided further evidence for Brown's (1993) hypothesis as to the role of L1 feature geometry in L2 acquisition. If a learner's L1 lacks a feature important in marking a contrast in the L2, then this learner will encounter difficulties in perceiving (and perhaps producing) the L2 contrast. Furthermore, I have demonstrated that although feature geometry does not enable a prediction of the specific error phones in perception, it does constrain the possible perceptual substitution candidates using the principles of Minimality and Preservation. It is possible that the specific choice of phones perceived in lieu of the target phone could be determined by phonetic considerations as found by Teasdale in her recent study.

Therefore, specifically relating to the perception of the English interdentals, the determination of perception may be as follows. The learner's L1 feature geometry may determine whether or not he or she will be able to perceive the interdentals. Namely, if the learner's L1 contains and employs the feature [distributed], then the learner will be able to perceive the contrast; if, however, the learner's L1 does not

utilise this feature, then the learner will experience difficulties in perception of English interdentalals. If difficulties with interdental perception are expected, then the candidates for perceptual substitution will be determined using the principles of Minimality (where minimally different implies minimally less structure) and Preservation. Once these candidates are established, then the specific perceptual substitute will be determined by phonetic and acoustic factors such as tongue placement in the production of /s/.

Further investigation is required to verify the validity of these claims. A wider range of languages needs to be examined to determine if the existence of [distributed] is the key issue in determining ability of interdental perception. Moreover, the ability to constrain substitution candidates also needs to be tested on more languages. Most importantly, however, is the need to corroborate the hypotheses tested in this paper by studying other contrasts and phonemes being acquired by L2 learners of a variety of languages.

It seems at this stage that there is indeed validity to the claim that the feature geometry of a learner's L1 does play an important role in the acquisition of L2 segmental phonology. Further study into this area of phonology could indeed provide better insights into developing a more comprehensive model of feature geometry that is not simply able to account for phonological processes but also one that is able to account for both first and second language acquisition. There seems little doubt that there is promising work waiting to be done in this area.

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On the differential substitution of English [θ] A phonetic approach

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A phonetic approach to the differential substitution of English [θ] successfully predicts that speakers of languages with a dental [ʃ], or a slit-type [s], will substitute it for the English fricative, while speakers of languages with a more retracted [s] will not. Data from native speakers of Quebec French, European French, Russian, and Japanese is employed in the study.

0 Introduction

The pronunciation of English [θ] and [ð] (henceforth [θ]) is known to be problematic for the second language (L2) learner whose native language (L1) does not have these sounds in its inventory. To deal with this sound, the learner resorts to L1 segment transfer, transferring either /t/ or /s/ depending on the L1. This phenomenon is commonly referred to as differential substitution and is known to be a challenge to L2 research. Several phonological accounts have been proposed and the idea of a phonetic-based approach has been discarded (Weinberger 1990). The study presented in this paper is a response to this rejection of a possible phonetic explanation of the phenomenon. I investigate whether the spectral characteristics of the fricative [s] of the L1 can serve as the predictor of which segment will be used as a substitution for the English interdental fricative [θ]. Quebec French (QF), European French (EF), Russian, and Japanese are the four languages considered.¹

1 Previous Accounts

The differential substitution of English [θ] phenomenon has, so far, been treated as a phonological problem. The very existence of differential substitution appears to be enough grounds for phonologists to reject a phonetic-based hypothesis for the phenomenon. Wilson (ms) notes that Altenberg and Vago allow that the problem is phonetic in nature but that phonetics cannot predict the substituted form. Three phonological studies are briefly described below:

Hancin-Bhatt (1994) proposes the Feature Competition Model, which assumes that features in a given language's inventory have values of greater or lesser prominence.² This model predicts, for example, that since the feature [continuant]

¹ Though QF and EF are both dialects of the French language, they will simply be referred to as *languages* for purposes of simplicity. EF investigated in this paper is spoken in France.

² Hancin-Bhatt explains that "prominence" is calculated by relating the number of phonemic distinctions a particular feature makes in a UR to the total number of phonemes in the language's inventory" (252).

is of high prominence in German, speakers of this language will tend to notice it in the perception of the English interdental fricative, [θ], making them likely to map it with their fricative [s]. Given that QF and EF have the same underlying inventory, Hancin-Bhatt's model still cannot explain why they substitute a different segment for [θ].

Wilson (ms) accounts for the QF - EF problem by claiming that the low-level phonological rule of assibilation of alveolar stops preceding high front vowels in QF versus the non-occurrence of this allophonic process in EF forms the basis of the differential substitution. This difference between the two languages allegedly causes their speakers to effect different phonological transfers. He argues that the QF substitution /t/ is due to QF constraints on phonological representations and that the EF /s/ substitution is due to the transfer of a postlexical (redundancy) rule. This approach finds one (allophonic) difference between QF and EF and from it builds a multi-layered and highly complex analysis of the phenomenon.

Weinberger (1990) attempts to account for the differential substitution of English [θ] by Russian /t/ and by Japanese /s/ using Underspecification Theory. A major problem with this study is that Weinberger starts off with the wrong claim that Russian speakers substitute /t/ for [θ].³ This fact undermines his phonological claims. Weinberger claims that phonetics can have no say in the matter of differential substitution. He notes that Russian and Japanese speakers substitute different segments for [θ] — /t/ and /s/ respectively (but see the criticism above) — even though these segments are identical in both languages, namely that /s/ and /t/ are alveolar. Based on the research I report in this paper, it appears that he based his judgment on the labels provided by his source(s). We shall see that an acoustic analysis of /s/ in both these languages shows that they are *not* identical. This analysis will be extended to QF and EF to see whether their different substitution pattern can be explained.

2 The substitution patterns

The substitution patterns for the four languages in question are indicated in (1).⁴

³ The Russian speakers who participated in the study informed me that speakers of their language substitute /s/. If Weinberger's /t/ substitution claim is correct for some speakers, then we may be dealing with dialect-based substitutions. I return to this in section 8.3.1.

⁴ At this point, the *phonetic* brackets do not include precise phonetic information about the sound produced. Recall that [s] in Japanese and Russian are acoustically different; in these two cases then, the [s] substituted is different; hence the use "Japanese [s]," "Russian [s]", etc.

- (1)
- | | | |
|------------|---|-----|
| • QF | → | [t] |
| • EF | → | [s] |
| • Russian | → | [s] |
| • Japanese | → | [s] |

These patterns reflect what the L2 speakers substitute *most* of the time. Two subjects—a EF and a Russian speaker—were found to fluctuate in their substitutions. This fluctuation is not considered in the study but will be briefly discussed in section 9.2.⁵

3 The hypothesis

I will assume that the L1 segment substituted for English [θ] reflects the L2 learner's judgment of what the best perceptual and articulatory match in his/her native language is. The phonetic nature of the relevant L1 segments—[t] and [s]—determines whether they are considered a good match or not. The study specifically proposes that the spectral characteristics of [s] in the L1 can predict which L1 segment will be substituted for English [θ].⁶ The proposed hypothesis follows.

(2) Hypothesis

A speaker of a language with a fronted/dental [s] in its inventory will substitute it for the English target [θ] while a speaker of a language with a more retracted, e. g. alveolar, [s] and a dental [t] in its inventory will substitute the [t] for [θ].⁷

This hypothesis implies that place of articulation is considered a more important cue than manner of articulation in selecting a match for [θ]. While [s] matches [θ] in manner of articulation it does not adequately approximate it in place of articulation and is therefore not considered a good match; [t] though a stop, approximates the place of articulation of the target and is used as the substitute.

⁵ The fluctuation appears to be environmentally determined. This should be considered in a larger scale study.

⁶ The possibility that an "L2 dialect" is part of the explanation for the segment substituted was ruled out after working with one of the EF speakers. His only contact with English has been in Calgary without any contact with other EF speakers. "On line" language-specific differences are considered the cause and are investigated in this study.

⁷ The pattern "alveolar [s] - alveolar [t]" (allegedly found in German) is not included in this study.

We expect then, that [s] substituting languages have a dental [ʃ] in their inventory, while the [t] substituting languages have an alveolar [s] (and a dental [ʃ]). The next section describes how place of articulation can be read in the noise filtering cue.

4 Spectral characteristics of fricatives and their relation to articulation

In the literature, fricatives are described and referred to in classes of shared articulatory and spectral characteristics. The fricatives [f / θ] and [s / ʃ] form two separate groups.

4.1 Group [f / θ]

Both these fricatives—the so-called non-sibilant fricatives—are produced by the approximation of a lower articulator to the upper incisors—the lower lip and the tongue tip respectively.⁸ The sound produced is "the result of turbulence generated at the constriction itself" (Ladefoged and Maddieson 1996: 138). In the production of [θ], the tongue is quite flat, forcing the airstream through a wide thin slit; [θ] is traditionally referred to as a slit fricative. This type of constriction produces a low energy sound which is reflected in the faintness of its spectrographic frequency band. The breadth of the band for the fricatives of this group is not agreed on for the reason given by Ladefoged and Maddieson (1996: 173), who state that "it seems that in the case of the pairs f, θ and v, ð in English, the inconsistencies between speakers are . . . great . . ." Borden and Harris (1980: 122) and Stevens (1960) agree on a broad band; Stevens specifies that it extends from approximately 1.4 KHz to 8 KHz. Fry (1979: 122), on the other hand, notes that the band extends from 6 to 8 KHz. As for the place of articulation of [f] and [θ], F2 transitions are the main indicators (Borden and Harris: 185; Fry: 141).

4.2 Group [s / ʃ]

The so-called sibilant fricatives are produced by a high velocity jet of air that is formed at a narrow constriction—in the dental or alveolar region for [s] and in the post-alveolar region for [ʃ]—that goes on to strike the edge of some obstruction such as the teeth (Ladefoged and Maddieson, 1996: 138, 145, 148). In the production of [s], the tongue is grooved, resulting in a narrow constriction, while in the production of [ʃ], it is flatter, forming a wider constriction. The great intensity of these two sounds is seen in the darkness of their frequency bands. Their place of articulation is indicated by a relatively sharp cut-off of their noise filtering cue. Fry (1979: 140) states that ". . . the noise filtering cue indicates place of articulation by progressively higher cut-off of the noise as the point of articulation moves forward in the tract; the sounds are in other words progressively higher pitched". [s] is noted to have most of its energy above 4 KHz and extending to 8 KHz while [ʃ] has its energy above 2.5 KHz and extending to 6 KHz (Borden

⁸ Variations are recognized in the articulation of [θ]. MacKay (1987: 95) notes that it can be interdental or articulated with the tip of the tongue behind the upper front teeth.

and Harris: 122). Only resonances in the front cavity— the ones formed in front of the constriction—are heard.⁹ Thus, the [ʃ] place of constriction produces a long effective resonator and consequently, a lower pitched sound, while the [s] place of articulation, being further front, shortens the effective resonator producing a higher pitched sound (Borden and Harris: 122). The noise filtering cues are therefore sufficient in determining the places of articulation of [s] and [ʃ].

5 Expectations and other considerations

The above discussion suggests that in testing my hypothesis I should expect that a more fronted (or dental) [ʃ] will be indicated by a higher cut-off of the noise energy than for an alveolar [s]. However, Mann and Repp (1980) and Soli (1981) claim that the noise spectra of fricatives are affected by vowel coarticulation effects. Mann and Repp discuss the effect of a round vowel on a fricative, as in [su]. They note that the rounding of the lips will have the effect of lowering the cut-off of the fricative. This is explained by the fact that lip rounding in the production of a back vowel results in an "extended" type of rounding; the effective resonator is thus extended and a lower frequency sound is produced (Rogers, 1991:179). Soli claims that the place of articulation of a fricative assimilates to high vowels—30 to 60 ms before the onset of the vowel—and that this results in an increase of 100 to 300 Hz of the peak frequencies. It is not clear in this latter claim whether cut-offs are also affected. In any case, they seem to suggest that the onset of the fricative is unaffected by the following vowel. However, we shall see in section 7 that this cannot be relied on. This suggests that a careful selection of tokens is crucial. The tokens of the four languages in question shall allow for comparison of the fricative in identical or, at least, similar environments.¹⁰

6 The corpus and recording procedures

6.1 Choice of tokens

The tokens chosen were all real words in the languages investigated. To control for consistency across the four languages, care was taken to select tokens that had the fricative /s/ word-initially before a stressed vowel to ensure clarity of articulation; for this reason, monosyllabic words were chosen whenever possible. Also, to account for the fricative-vowel coarticulation effect, the tokens contained the sequence /s/ + the vowels [i], [e] or [ɛ], and [a].¹¹ An acoustic analysis of the

⁹ Borden and Harris (1980: 122) explain that this is due to the narrowness of the constriction.

¹⁰ We can only approximate the degree of equality in the vowel quality cross-linguistically: an [i] in QF could be slightly different from a Russian [i]. We will not worry about these slight differences here.

¹¹ Tokens [su..] and [so..] or [sɔ..] were initially also part of the token bank. However, it was found—as claimed by Mann and Repp (1980)— that they did lower the cut-off of the noise.

target, English [θ], (produced by native speakers of English) was also performed. In these tokens, [θ] appears in the same environments as the above [s] tokens. The tokens are listed in Appendix I.

6.2 Recording of tokens

Three native speakers of each of the four languages and of the target language were recorded reading down the list of their respective tokens, repeating each one three times to allow for the choice of repetition to be analyzed (to control for a falling intonation in all cases). The recording was performed with a Sony Professional Walkman WM-D6C and a Realistic Electret 33-1063 tie-pin microphone at a consistent recording level. For speaker information, see Appendix II.

7 Corpus analysis

7.1 Transfer to Soundscope 16.1

The selected repetition of each token was transferred to Soundscope 16.1 at a sampling rate of 22 000 samples per second and at a constant sound level input. All tokens were normalized.

Though testing the hypothesis only involves the analysis of the noise cut-offs, a more full acoustic profile for each token was gathered, as presented in section 7.2.

7.2 Measures taken

Noise Cut-off: In KHz. 25 dB is considered to be the lowest point of perceivable noise.¹²

Peak intensity: The peak intensity of the fricative was noted in decibels and the location of the peak intensity, in KHz.

High intensity area: Location/range (in KHz) of the high intensity area—35 dB and above.

Average intensity: Averages were calculated by taking 25 dB to be the lowest point of perceivable noise and the peak intensity figure to be the highest.

A spectrogram and an Average Spectrum (AS) of the fricative portion was printed out for every wave. The AS is a plotting of average intensities at all (relevant) frequencies in the time period selected—in this study, the entire duration of the fricative. The cut-offs of some fricatives were clearly seen to be affected by vowel coarticulation. Most often, the vowel coarticulation effect only began in the

They were rejected because the lowering effect was too great: approximately of 1.5 KHz; this would have had a undesirable effect on the averages.

¹² On the instrument used, a complete lack of spectrographic trace began at 25dB.

mid portion of the fricative, as suggested by Soli (1981) and reported in section 5 above. In these cases, the cut-off frequency at the onset of the fricative was easily readable. In other cases, however, the spectrographic evidence was ambiguous. The cut-off remained at the same frequency level throughout the entire fricative portion. This made it impossible to tell whether the fricative was produced without any vowel coarticulation or with vowel coarticulation that was already present at the onset of the noise. But since the cut-off levels in these cases corresponded roughly to those found in the initial portion of the fricatives that showed no coarticulation effects until halfway through, it was assumed that there was (surprisingly) no vowel effect on the fricative.

8 Data analysis

8.1 Results

Averaged results of the noise cut-offs and average intensities are shown in Table 1. A spectrogram of a typical [s] production is shown for each language in Figures 1 to 4. Figures 5 and 6 show spectrograms of a [θ] token production by two different speakers.

Measures	English	QF	EF	Jpn	Russian	
	[θ]	[s]	[ʒ]	[s]	palat.[s ^h]	non-pa.[s]
Cut-off (KHz)	2 / 6	4.3	5.6	6.5	2.6	4.3
Peak intensity (dB)	29	41	44	30	37	37.6
Location of peak (KHz)	7.5	7.4	7.25	09	5.5	5.75
High intensity range (KHz)	spread	6.6 - 9	6.1 - 9	spread	spread	spread 5.6-7
Avg. intensity (dB)	27	33	34.5	27.5	31	31

Table 1 Averaged spectral measurements for the target fricative [θ] in English, and for the native fricative [s] in Quebec French, European French, Japanese, and Russian¹³

¹³ The results for both English subjects are noted for cut-off frequency. An average would have been misleading due to the large discrepancy between the measurements for each speaker (see footnote 8).

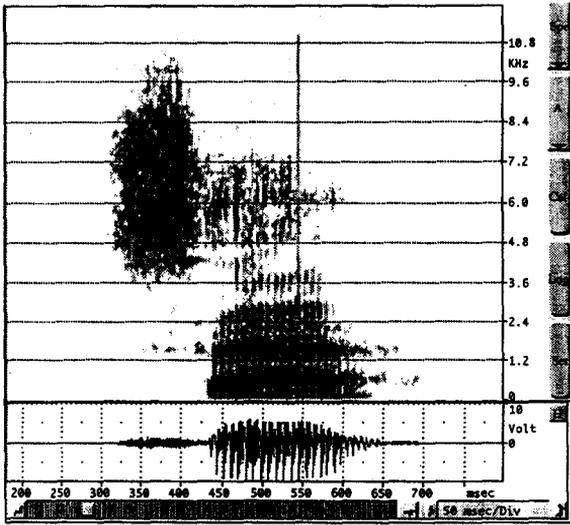


Figure 1 QF [sa] produced by speaker pa

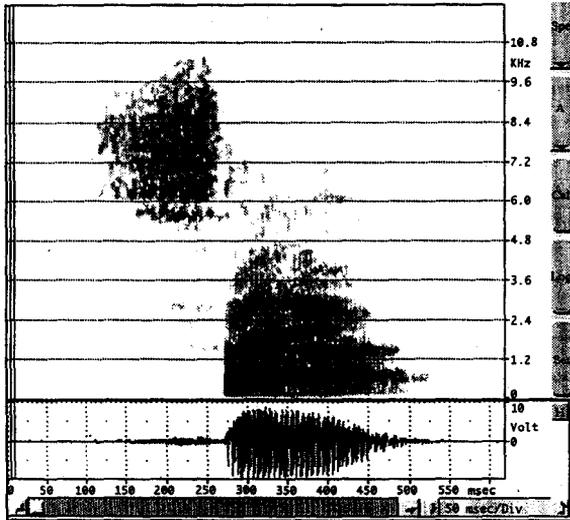


Figure 2 EF [sa] produced by speaker al

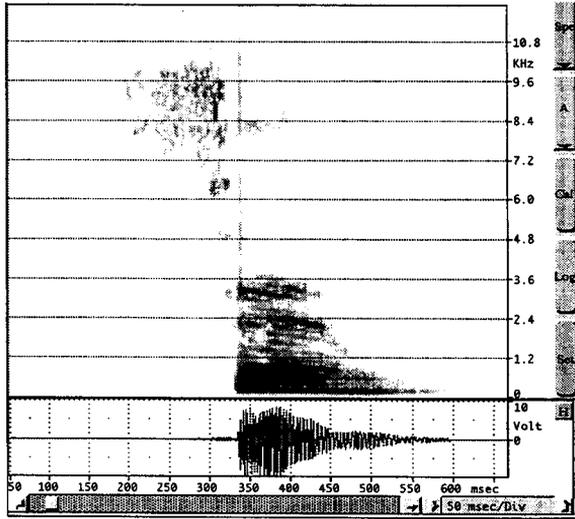


Figure 3 Japanese [sen] produced by speaker na

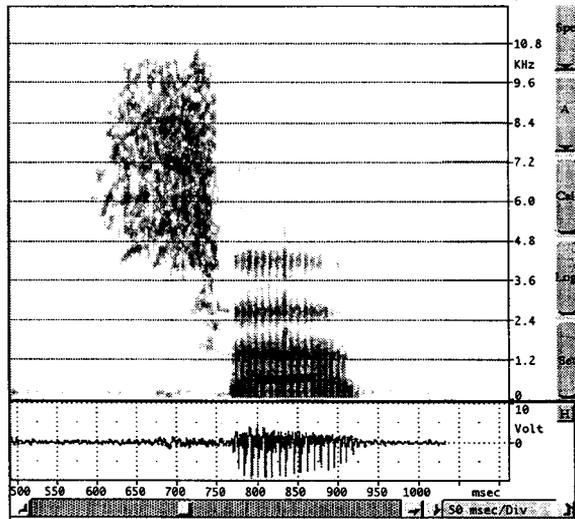


Figure 4 Russian [sat] produced by speaker vic

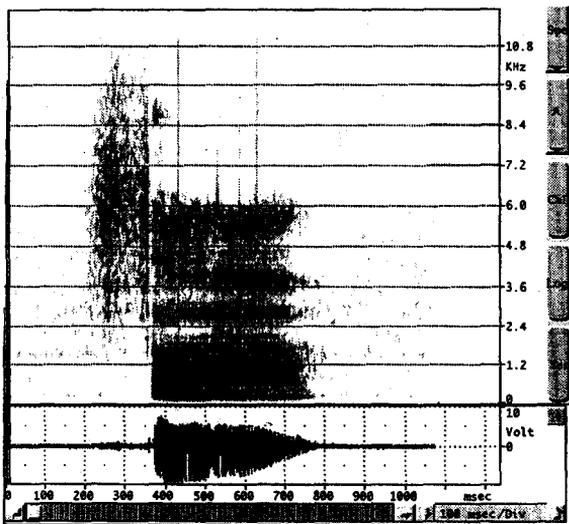


Figure 5 English [θa] produced by speaker vl

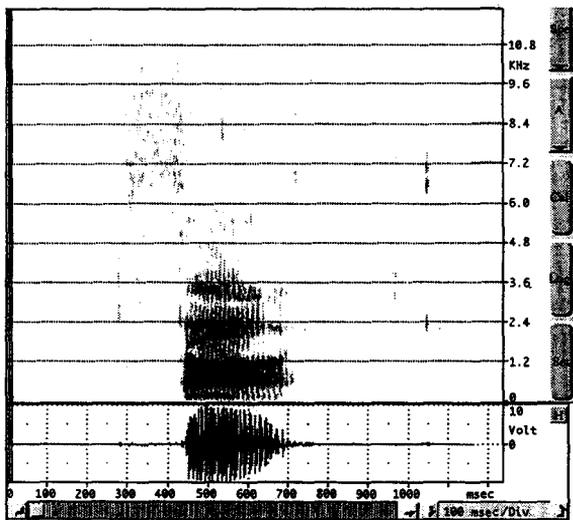


Figure 6 English [θa] produced by speaker cr

8.2 General observations

The hypothesis will be upheld if the fricative [s] in the [ʃ] substituting languages—EF, Japanese, and Russian—has a higher cut-off than the [s] in the [t] substituting language (QF). This is indeed supported by the fairly high cut-offs in Japanese and EF. Russian, however, appears to pose a problem with its low cut-offs.

8.3 Language-specific cases

8.3.1 The [t] substituting language

QF: With a 4.3 KHz cut-off point, it seems reasonable to consider the QF [s] as an alveolar [s] (compared to 4 KHz for alveolar [s], as suggested in section 4.2).

8.3.2 The [s] substituting languages

EF: This language's [s] can definitely be considered dental with a cut-off of 5.6 KHz.

Japanese: This language has the highest cut-off, appearing to suggest that it is even more dental than EF. However, the low intensity characteristic of Japanese [s] suggests that it is probably also produced with a flattened tongue, making it a slit-type fricative just as English [θ] is (they have very similar levels of energy—29dB for English [θ] compared to 30 dB for Japanese [s]). This means that the cut-off of the noise energy is not necessarily an indication of place of articulation here. Recall that in the case of [θ], F2 transitions are claimed to be the indicators of place of articulation. It is not clear then whether Japanese [s] is dental or not. F2 transitions need to be taken into consideration in further study.

Russian: The Russian [s] cut-offs seem to suggest that the hypothesis is not upheld. But unfortunately, the Russian data is inconclusive. One speaker (from St. Petersburg) substituted [s]; the other speakers' (from Tyumen) substitutions are unknown since they had successfully acquired [θ]. The non-palatalized [s]'s low cut-off of 4.1 KHz suggests that they would have substituted [t]. Until further data is acquired, I will withhold judgment. It is clear however that some speakers substitute [s].

9 Discussion

9.1 Is the hypothesis upheld?

The hypothesis tested is repeated in (3).

(3) Hypothesis

A speaker of a language with a fronted/dental [s] in its inventory will substitute it for the English target [θ] while a speaker of a language with a more retracted, e. g., alveolar [s] and a dental [t̪] in its inventory will substitute the [t̪] for [θ].

QF and EF uphold the hypothesis. These languages respect the claim that the place of articulation of the fricative [s] of a language—indicated by the cut-off of the noise filtering cue—determines which L1 segment will be substituted. QF was found to have an average cut-off of 4.3 KHz, a reasonable figure for an alveolar classification and thus not a good match for [θ]. In this case the [t̪] will be substituted—the correct prediction for QF. EF [s̪] showed a high cut-off, at 5.6 KHz. It can therefore be identified as a dental [s̪] and thus, as predicted, the substitute for [θ]—which is correct. The results of the spectral analyses of Japanese [s], however, shows that the hypothesis stated is not applicable in all cases. As discussed in section 8.3.2, [s] in this language is low in intensity and thus similar to English [θ] in that respect; their intensity peaks are of 30 and 29 dBs respectively. Similar levels of peak intensity appears to entail similar types of constriction—a slit or nearly slit-type constriction. We saw that with this type of fricative, place of articulation is not seen in the noise filtering cue and was thus not determined in this study.¹⁴ For Japanese, the type of constriction of its [s] determines the substituted segment. A low intensity slit-type [s] is automatically considered a good match with the target. For Russian, the results are inconclusive.

9.2 A proposed revision

The hypothesis was on the right track with its statement of place of articulation of [s] as the substitution determiner, but only for cases of languages with *sibilant* [s]—as found in QF and EF. *Slit / non-sibilant* [s] involve a separate case calling for intensity as a determining factor. This leads to a revised version of the hypothesis.

(4) Revised hypothesis

- If a language has a sibilant [s], its place of articulation will be the determining factor in the substitution pattern:

A speaker of a language with a fronted/dental [s] in its inventory will substitute it for the English target [θ] while a speaker of a language with a more retracted, e. g., alveolar [s] and a dental [t̪] in its inventory will substitute the [t̪] for [θ].

- If a language has a slit / "weak-sibilant" [s], it will be substituted for [θ].

The revised hypothesis suggests that the type of constriction as well as the place of articulation involved in the production of [s] is an important factor in the

¹⁴ F2 transitions cues should be considered in further study in order to determine these slit-[s]'s exact place of articulation.

judgment of goodness of match. Not any [s] fricative is considered a good match with the fricative [θ]. A three way substitution criterion is suggested:

- ① Slit [-s] "weak-sibilant" fricatives are clearly *good* matches (as in Japanese).
- ② A sibilant dental [s] fricative, though louder than the slit [θ] (thus not agreeing with its type of constriction) is considered an *acceptable* match if it agrees in place of articulation (as in EF).
- ③ A sibilant [s] that doesn't agree in place of articulation with the target is considered a double *bad* match and will not substituted; L1 [t] is substituted in this case (as in QF).

Perhaps it is possible that, in the third case, alveolar [t] is substituted regardless of its place of articulation—a "quiet" alveolar [t] is perhaps considered a better match for [θ] than a "loud" alveolar [s]. This, however, remains to be determined (see footnote 7). If this was shown to be the case, then the restriction to [s - t] patterns could be eliminated from the hypothesis.

This three-way criterion could perhaps explain why fluctuations sometimes occur, as briefly discussed in section 2. It was mentioned there that a EF and a Russian speaker were found to (sometimes) fluctuate. Speculatively, for EF this fluctuation could be explained by the fact that [s] substitution is an *acceptable* match; this segment agrees in place of articulation but is not a good match in its type of fricateness. QF and Japanese speakers were never found to fluctuate. For QF this could be because its alveolar [s] is a *bad* match and will therefore *never* be substituted for [θ]. Japanese [s] showed to be quite similar to [θ] in intensity and would therefore always be considered a *good* match.

10 Conclusion

The results obtained in this pilot study are promising. They seem to suggest that phonetics indeed has a say in the matter of the differential substitution of the English interdental fricative [θ]. We saw that the results of an acoustic analysis of the fricative [s] in the L1 can successfully predict which L1 segment will be substituted for the target [θ].

The next step is, of course, to test our revised hypothesis against a larger body of data from more languages. A larger scale acoustic analysis of [s]—one that includes more tokens produced by more speakers—would allow the obtainment of more reliable averages and also to see whether any threshold dividing [t] - [s] substitutions can be established. In the sibilant [s] cases, a cut-off threshold is to be determined, while in the slit-type [s] cases, we would be looking for a peak intensity threshold. The place of articulation of the slit [s] fricatives should also be included in the measurements of further study—this involves analyzing the F2 transition cues.

A study of the type presented in this paper could be extended to cases that involve context-dependent substitutions, as in the alleged phenomena in Dutch and Mandarin:

- Dutch speakers substitute [t] for [θ] syllable-initially but [s] syllable-finally (Hancin-Bhatt, 1994: 244).
- Mandarin speakers substitute [t] for [θ] word-initially, but [f] word-finally (Weinberger, 1990: 142).

It would also be interesting to see what kind of L1 [s] fricatives lead to [f] fricative transfer.

This phonetic account shows that speakers are sharply attuned to acoustic details in fricatives. We saw that not any type of fricative is considered a good match with the English fricative [θ]. A working hypothesis has been established for further research based on a hierarchy of preferred substitutions: [ŝ] > [s̄] > [t] > [t] >>> * [s] (where [ŝ] represents a slit-type "weak sibilant"). I believe that the phonetic basis of differential substitution hypothesis remains a viable avenue of research.

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**Appendix I
Tokens**

♣	s + [i]	s + [e / ε]	s + [a / aɨ / ɔ]	s + [u]
QF	[si] 'if'	[se] or [se] 'his / her (plur.)'	[sa] 'his / her (fem.)'	_____
EF	[si] 'if'	[se] or [se] 'his'	[sa] 'his / her (fem.)'	_____
Japanese	_____ 2	[seŋ] 'a thousand'	[sajgen] 'limits'	_____
Russian Palatalized [s'] ⁶	[sʲila] 'strength'	[sʲetʲ] 'net'	[sʲak] 'that' 4	_____ 5
Russian Non-palatalized [s]	_____ 3	[ser] 'sir'	[sat] 'garden'	[sun] 'son'
English	[θɪf] 'thief'	[θeft] 'theft'	[θə] 'thaw'	_____

Notes:

- 1 Tokens with the rounded vowels [u] and [o] or [ɔ] were also recorded but were not included in the calculation of averages (because of their strong frequency-lowering effect on the fricative).
- 2 In Japanese, [s] preceding [i] is pronounced [ʃ].
- 3 The non palatalized counterpart tends to (allophonically) appear with the back vowel [u], as in [sun] 'son'.
- 4 This is from the Russian expression [itakis'ak] 'in this way and that way'.
- 5 See note 3
- 6 Token [sʲɔk] was added for two of the subjects.

**Appendix II
Speaker Information**

Speakers	City of origin	Gender	Age	Occupation
QF				
al	Drummondville	F	Mid 20's	student
pa	Trois-Rivières	M	Mid 20's	accountant
au	St-Jean d'Iberville	F	50	librarian
EF				
od	Britanny	F	Early 40's	teacher
gi	Lyon	M	40	teacher
ac	Paris	M	Mid 30's	waiter
Japanese				
yu	?	F	Early 20's	student
na	?	F	Early 20's	student
mi	Fukuoka	F	Early 20's	student
Russian				
el	St. Petersburg	F	Mid 30's	PhD student
vic	Tyumen	M	Early 20's	student
vad	Tyumen	M	Early 20's	student

**Appendix III
Results: raw data**

Quebec French

Measures	Speaker al			Speaker pa			Speaker au		
	[si]	[se]	[sa]	[si]	[se]	[sa]	[si]	[se]	[sa]
Cut-off (KHz)	4.4	6 ¹	6	4	4	4	4.8	4.6	4.6
Peak intensity (dB)	45	38	38	42	41	41	39	42	43
Location of peak (KHz)	7.5	7.5	7.5	6.6	6.6	5.5	8.8	8.6	8
High intensity range (KHz)	7.1-9.9	7.2-9.6	7.5-9	6-8.6	6.2-8.2	4.8-8.2	7.2-9.5	6.6-9.2	7-8.8
Avg intensity (dB)	35	31.5	31.5	33.5	33	33	32	33.5	34

Note: 1 These two figures (6 KHz) were excluded from the average calculations: they are strangely much higher than the other figures; this would have an enormous effect on the average due to the small number of subjects.

European French

Measures	Speaker od			Speaker 2			Speaker ac		
	[si]	[se]	[sa]	[si]	[se]	[sa]	[si]	[se]	[sa]
Cut-off (KHz)	5.2	5.6	5.5	3	3.2	3.8	5.8	5.5	6
Peak intensity (dB)	43	45	42	49	43	48	45	49	40
Location of peak (KHz)	7.2	7.5	8.5	4.8	4.5	7.5	6.5	6.6	7.2
High intensity range (KHz)	5.5-9.5	6.2-8.6	6.4-9.5	5.5-8.8	5.8-8.2	3.7-8.3	6-9	6.2-8.8	6.5-8.5
Avg intensity (dB)	34	35	33.5	34	34	36.5	35	37	32.5

Note: 2 This speaker's measurements were not included in the calculation of the averages due to the great discrepancies with the results of the other two speakers. This would have affected the averages greatly.

Japanese

Measures	Speaker yu		Speaker na		Speaker mi	
	[sen]	[sajen]	[sen]	[sajen]	[sen]	[sajen]
Cut-off (KHz)	7.2	4.4!	7.2	7.2	6.2	6.5
Peak intensity (dB)	25	35	25	28	32	35
Location of peak (KHz)	9.2 - 9.5	7.2 - 8	9.5	9.5	8.8	9.5
High intensity range (KHz)	spread	6.6 - 8.8	spread	spread	spread	7 - 9.9
Avg intensity (dB)	25	30	25	26.5	28.5	30

Russian: palatalized [s']

Measures	Speaker ³ cl			Speaker vic			Speaker ⁴ cad		
	[s'ila]	[s'et']	[s'ak]	[s'ila]	[s'et']	[s'ak]	[s'ila]	[s'et']	[s'ak]
Cutoff (KHz)	4.8	4.8	4.8	2.6	2.6	2.6	-----		
Peak intensity (dB)	50	44	46	49	34	31	-----		
Location of peak (KHz)	6.2	7.2	7.7	5	5	5	-----		
High intensity range (KHz)	5-8.4	5.5-8.4	5.5-8.2	2.6-9	spread	spread	-----		
Avg intensity (dB)	42.5	34.5	35.5	37	29.5	28	-----		

Notes:

- 3 This speaker's measurements were not included in the calculation of the averages due to the great discrepancies with the results for the other two speakers. These results would have affected the averages greatly because of the small number of speakers. Note that the speaker is from a different location than the other two.
- 4 Unfortunately, these tokens were not obtained for this speaker.

Russian: token [sʲbk]

Token [sʲbk] was excluded from the study because of the recognized rounding effect of the vowels on the fricatives. However, since we did not have many tokens from speaker vad, this token was used (especially to test the level of intensity).

Measures	Speaker vic	Speaker vad
	[sʲbk]	[sʲbk]
Cut-off (Hz)	2.6	2.6
Peak intensity (dB)	36	35
Location of peak (KHz)	4.4	8.2
High intensity range (KHz)	spread	spread
Avg Intensity (dB)	30.5	30

Russian: non-palatalized [s]

Measures	Speaker ed			Speaker vic			Speaker vad		
	[ser]	[sat]	[sun]	[ser]	[sat]	[sun]	[ser]	[sat]	[sun]
Cutoff (KHz)	4.8	4.8	---	4.4	4.4	4.4	--	--	4
Peak intensity (dB)	42	45	---	37	35	39	--	--	37
Location of peak (KHz)	6.6	6.6-6.7	---	6	6	6.2	--	--	4.8
High intensity range (KHz)	6.6-6.7	6.6-6.7	---	5.5-6.2	spread	5-7.7	--	--	spread
Avg intensity (dB)	32.5	35	---	31	30	32	--	--	31

English: The interdental fricative [θ]

Measures	Speaker vl			Speaker er		
	[θijf]	[θeft]	[θa]	[θijf]	[θeft]	[θa]
Cut-off (Hz)	3.5	3	2.8	6.2	! ⁵	7.2
Peak intensity (dB)	32	31	33	28	27	23
Location of peak (KHz)	8	7.5	7	7.2	7.8	7.2
High intensity range (KHz)	spread	spread	spread	spread	spread	spread
Avg Intensity (dB)	25	28	29	26.5	26	24

Note: 5 Since the cut-off levels are noted at 25 dB, it is not possible to note one here. This token's peak intensity is below this level (23 dB).

Double-Object Perception Verbs and Cross-Clausal Anaphoricity¹

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Abstract

In this paper perception verbs (PVs) in Bulgarian, Greek and Spanish are argued to allow for double-object subcategorization frames consisting of a phrasal object and a finite clausal complement. In all three languages an obligatory link of coreference is shown to project between the phrasal object and an external(ized) or internal argument of the clausal complement. As inter-object PV-coreference is obligatory and so is argument status of the participants in the relation the data reviewed support a comprehensive Theory of Control where obligatory referential dependence of an argument is compatible with Standard (as well as Null) Case. The analysis outlined here extends proposals by Suñer (1984/1984) for compatibility of Control and Nominative Case to compatibility of Control and Accusative/Dative Case. Theory-internal considerations and empirical evidence invalidate alternative approaches developed for Greek Control subjunctives which have been argued to license Null Case against a temporally deficient Infl (Varlokosta & Hornstein 1993) or against subjunctive particles heading MoodP (Terzi 1992/3). Neither traditional Case-deficiency formalized as Null Case (Chomsky & Lasnik (1993) and related work) nor non-lexical status of the controllee (Sigurðson 1991) can be defined in absolute terms vis a vis Control. Both lexicalization of the controlled *ec* and its Case specification are viewed as parametrizable, as opposed to coreferentiality which underlies Control universally and, subsuming it under Binding, is crucial for Full Interpretation. To ensure proper identification of controller and controllee it is proposed that their *Interpretable* φ -features are juxtaposed via Move-F(eature) in a designated Head-Head checking configuration for the licensing of [Ctrl]. [Ctrl] is thus treated as a sublabel of Comp of the clausal complement of PVs, as a tribute to their special Control subcategorization properties.

1. Introduction

Government-free Minimalism (Chomsky 1993/5) presents a challenge for Control Theory. There is no syntactic primitive which could regulate the distribution of PRO, the controlled empty category (*ec*). It remains for the match/mismatch of formal features (FFs), which are the driving force behind syntactic movement (Last

¹ I wish to thank M.-L. Rivero, H. Goodluck, A. Kotsopoulos, O. Arnaoudova, L. Proctor, D. Stojanović, J. Walker for a series of discussions and encouragement. Thanks also go to J. Liceras and E. Astorga for verifying the Spanish data, including Castillian-River Plate Spanish contrasts for CL-doubling (which will not be mentioned here due to space constraints), and to the friendly, co-operative CLA'96 audience, who witnessed an earlier version of this paper.

Resort in Chomsky (1995)), to compensate for the invalidated PRO-theorem.² In other words the FF matrix of PRO and the specification of licensing functional heads should be held responsible for the non-occurrence of PRO in what LGB terms “governed positions”, viz. The Spec of [+Tense] Infl and the complement position of a transitive verb.

For the sake of theory-internal consistency Minimalism posits “Null Case” (Chomsky & Lasnik (1993) and subsequent work) as the FF propelling PRO from the position in which it is merged to the Spec of [-Tense] Infl (= reunited AgrS and Tense), presumably on the analogy of [Nominative] motivating raising of a finite subject to the Spec of [+Tense] Infl. Current assumptions are silent as to what bans PRO from the Spec of [Accusative]-licensing AgrO. The question that arises is, if Tense-deficient Infl can license Null Case, can transitivity-deficient AgrO similarly do so? Related to that is the core issue of whether a (bi)unique correspondence obtains between Null Case specification and (obligatory) referential dependence of an argument, and also whether there is a correlation between phonological non-realization of an argument and Null Case/Control status.

(1-3) list the set of data from three languages - Bulgarian (Bg), Greek (Gk) and Spanish (Sp) - based on which this article will attempt to provide answers to the questions posed above:

- (1) a. Vidjaxa Boril_i [_{CP} [_{AgrS/TP} ec_i; [_{MoodP} da vliza usmixnat *Obj-Subj* (Bg)
saw-3PL Boril DA come-in-3SG smiling-MASC
'They saw Boril coming in smiling'
b. Vidjax Boril_i [_{CP} [_{MoodP} da [_{CLP} ec_i; go otveždat *Obj-Obj*
saw-1SG Boril DA him-CL take-away-3PL
'I saw Boril as they took him away'
- (2) a. Akusa ton Yanni_i [ec_i; na klei *Obj-Subj*(Gk)
heard-1SG the-Acc Yanni NA cry-3SG 'I heard Yanni crying.'
b. Iða ton Yanni_i [_{na} [_{CLP} ec_i; ton parasimoforan *Obj-Obj*
saw-1SG the-Acc Y. NA him-CL decorate-3PL
'I saw Y. as they decorated him'
- (3) a. Vió a las niñas_i [que ec_i; hugaban en el arroyo *Obj-Subj* (Sp)
saw-1SG A the girls that play-3PL in the creek
'(S)he saw the girls playing in the creek'
b. Vió a Pedro_i [que ec_i; [_{CLP} lo condecoraron *Obj-Obj*
saw-1SG A Pedro that him-CL decorate-3PL
'(S)he saw Pedro as they decorated him'

² But in some analyses the PRO subject of a Control subordinate clause is governed (by the matrix predicate). (Cf. E.G. Varlokosta and Hornstein (1993) and references cited there.)

The key typological feature which all three languages discussed here share is *multiple pro-drop*. Bg, Gk and Sp may or may not lexicalize the subject position, in which case the external(ized) argument is deduced from the overt subject-agreement marking on the clausal predicate: all matrix clauses in (1-3) have *pro* subjects. Similarly, if *doubling* object pronominal clitics (CLs) (cf. the (b) examples in (1-3) for DOs, (4) for IOs) are treated on a par with object-agreement markers heading an AgrDO/AgrIO-type of functional projection³ and CLs on their own are by uniformity treated as CLs doubling a phonologically null argument DP, then *pro-drop* extends to (in)direct objects.

In all (b) examples above the CL-doubled DO position in the subordinate clause is phonologically null and like the subordinate subject *ec* in the (a) examples it is referentially dependent on the phrasal matrix object. The same holds for CL-doubled IO *ecs* in (4):

- (4) a. Vidjax [_{CLP} *ec*_i ja_i da [_{CLP} *ec*_i i_i davat cvetja] (Bg)
 saw-1SG *ec* her-CL DA *ec* to-her-CL give-3PL flowers
 'I saw her as they were giving her flowers'
- b. Epjasa ton Petro_i na [_{CLP} *ec*_i tou_i kanun tatuaz] (Gk)
 caught-1SG the-ACC P-ACC NA *ec* to-him make-3PL tattoos
 'I caught Peter as they (were tattooing) him'

In the sections to follow verbs of perception (PVs) like 'hear', 'see', 'notice', 'catch/witness' in Bg, Gk and Sp⁴ will be shown to allow for double-object subcategorization frames including a phrasal object (*Boril* in (1), *ton Yanni* in (2), *a las niñas/a Pedro* in (3), *ec* in (4a), *ton Petro* in (4b)) and a clausal object headed by Bg/Gk variants of the Balkan subjunctive particle *da/na*⁵, Bg *kak/če* 'how/that', Gk *pou/Sp que* 'that' (on a complementizer, rather than on a relative *wh* reading).

- (5) *perception verb* - DP - *da-, kak-, če-*clause (Bg)/*na-, pou-*clause (Gk)/*que-*clause (Sp)

In all three languages an obligatory link of coreference will be shown to project between the phrasal PV-object and either the subject (1a/2a/3a) or the clitic-

³ Cf. Sportiche's (1992/6) Clitic Voices for Romance, Alexandrova's (1996b) CLP for Bg.

⁴ According to Suñer (1982/4) PVs are a subset of control Vs of double-object subcategorization alongside with verbs of causation such as 'let', 'make', 'force'.

⁵ Cf. Rivero's (1994) clausal structure of Balkan languages where *da/na* project MoodP; Rudin (1983) for Bg *da*.

doubled direct (1b/2b/3b) or indirect (4) object of the clausal PV-complement. It will be argued that these data support a comprehensive Theory of Control where obligatory referential dependence of an argument is compatible with Standard as well as Null Case. In this sense the analysis proposed here extends earlier proposals by Suñer (1984) for the compatibility of Control and Nominative Case to compatibility of Control and Accusative/Dative Case. Coindexation of controller and controllee will be argued to take precedence over controlled Case as the former is crucial for LF Full Interpretation, whereas the latter being the "prototypical formal feature" in Chomsky's (1995) terms becomes inaccessible to the computation by LF due to erasure after checking. Thus coreference is the core notion to Control and the Case value of the controllee is parametrizable. Preferential non-lexicalization of the controlled argument will be treated as a reflex of some version of the Avoid-Pronoun Principle, whereby natural language discourages (lexical) redundancy if mechanisms instrumental in recovering a minimal set of +*Interpretable* features are made available. Based on data from the languages discussed here it will be argued that [-lexical] status of the controllee cannot be viewed in absolute terms, just like [-Case]/[Null Case] status, and Sigurðsson's (1991) view of Control as allowing standard Case but invariably suppressing lexicalization will be replaced by the view that lexicalization of the controllee is as a rule discouraged but becomes (marginally) possible e.g. when entailing emphasis/focus.

2. The dual subcategorization frame of perception verbs

2.1. A definition of Last Resort

Minimalism recognizes operations like Select /Merge introducing items into the derivation and operations like Attract/Move applying to selected/merged items. Attract/Move is governed exclusively by Last Resort according to recent modifications in the model. Below I provide a strict version of Last Resort, defining syntactic movement as satisfying the needs of *both* moving item and target, rather than satisfying disjunctively the needs of one *or* the other:

(6) Last Resort:

- (i) An item α moves to a target β to license formal features in the FF-matrix of α , and/*or
- (ii) A target β attracts an item α to license a sublabel of β

Building on the theoretical shift from 1) *Greed* catering to the needs of moving items alone to 2) Lasnik's (1995) *Enlightened Self-Interest* & Chomsky's (1995) recognition of the needs of hosting targets as well as hosted material, (6) goes a step further in providing a *conjunctive* definition of Last Resort. In a FF-checking model movement is by necessity derivative on the notion of FF-matching as a

condition for the licensing of FFs. Barring cases of acceptable default non-match, (6) is the correct rendition of syntactic movement. I accept it as the operative definition for Attract/Move in the discussion to follow, where compliance with Last Resort is used as the determinant for the (non)availability of positions within the internal argument domain of PVs in Bg, Gk, and Sp, as well as within their embedded clausal complements.

2.2 Deducing the internal argumentation of PVs

This subsection demonstrates that PVs have a choice of realizing one (phrasal or clausal) Obj-argument or two (phrasal plus clausal) arguments. The latter case presents interest for the analysis of Control proposed below. Establishing that the designated controller and controllee are not e.g. members of a single movement chain is a necessary condition for upholding the Control hypothesis as the logical explanation for the coindexation of non-clausemate entities registered above.

Starting with Bg, (7a-c) pose no problem as to identifying the number of internal arguments - there is exactly one object: (7a) has a simple DP, (7b) exemplifies the CL-doubling option, and (7c) has a CL-doubled *pro* on the null hypothesis assimilating CLs on their own to doubling CLs.

- (7) a. Vidjax Asen b. Vidjax go Asen (Bg)
 saw-1SG A. saw-1SG him-CL A.
 c. Vidjax go d. Ne vidjax Asen da tancuva
 saw-1SG him-CL not saw-1SG A. DA dance-3SG

(7d) however is controversial. Since Bg nominals lack explicit Case marking *Asen* can in principle realize a Nominative or an Accusative DP. Moreover, clausal subjects of *da*-clauses surface to the left of the subjunctive particle and never immediately after it, so that nothing contradicts the subordinate-clause subject analysis of *Asen*. Additionally, an unambiguously Nominative-marked pronoun can be substituted for the proper name corroborating its analysis as embedded subject:

- (8) Ne vidjax ...[... [_{AgrS/TP} Asen/toj]_i [_{MoodP} [_{Mood} da [_{VP} t_i [_V tancuva (Bg)
 not saw-1SG Asen/he DA dance-3SG
 'I did not see Asen/him dance'

So far evidence points to *Asen* checking [Nom] and subject agreement ϕ -FFs in AgrS/TP of the embedded clause. This means that *vidjax* 'I-saw' has a single clausal complement. Notice however that an unambiguously accusative pronoun can equally successfully replace the proper name and an accusative pronominal CL sharing its ϕ -FFs can double it:

- (9) Ne (go)_i vidjax Asen/(nego)_i [_{AgrS/TP} ec_i [_{MoodP} [_{Mood} da [_{VP} [_v tancuva t_i (Bg)
not him-CL saw-1SG Asen/him DA dance-3SG (= (8))

Importantly, a feminine singular clitic *ja* 'her' or a plural clitic *gi* 'them' is ungrammatical in the presence of a masculine singular nominal like *Asen*. This forces the conclusion that when a CL-head is merged in the higher clause the proper name is associated to it. Therefore it must be the case that *Asen/nego/pro* check FFs in the AgrOP (or its equivalent) of the matrix clause. Additionally, since the verb in the embedded clause does not take human objects even when it is transitive, no suitable clause-mate target (AgrOP) can be projected within the *da*-clause. This rules out the possibility of *Asen/nego/pro* originating in the embedded clause and consequently raising into the main clause. If the DPs in question can satisfy their FFs in the extended projection of the higher predicate but not in that of the lower predicate they are merged and licensed in the main clause in view of Last Resort. This means that they realize an object structurally independent from the embedded *da*-complement.

In short, even if (9) allows a single clausal complement treatment, it is important to note that the alternative DP-object plus *da*-clause-complement structure is a legitimate choice.

By uniformity within the latter option, even when AgrOPs with identical FFs are available in the main and the embedded clause as in (10),

- (10) Ne [_{CLP} ec_i [_{CL} go_i [_{VP} vidjax t_i [_{AgrS/TP} pro_j] [_{MoodP} [_{Mood} da [_{CLP} ec_i [_{CL} go_i [_{VP} t_j [_v otvezdat t_j
not him-CLsaw-1SG DA him-CL take-away-3PL
'I did not see him being taken away/as they took him away'

and the null arguments checking FFs in them are interpreted as coindexed, they still must belong to two distinct FF-licensing chains. Given Minimalist assumptions, (Accusative) Case being [-inter-pretable] is subject to erasure on both target (AgrO) and moving item ([+Acc] DP) after checking. Thus the needs of the AgrOs in the extended projection of the embedded transitive verb and the matrix transitive verb can be satisfied if and only if there are two objects with the relevant specification. Once again, this is in agreement with the hypothesized double-Obj subcategorization of PVs and against the raising-to-matrix-Obj analysis.⁶

⁶ For the sake of precision I should point out that a single clausal argument is a viable option for a Spell-Out ordering as in (i) if *brat ti* "your brother" is assumed to surface in the higher functional layers of the embedded clause. For Bg this would be possible on a Topic interpretation aided by an appropriate intonation contour:

- (i) Ne bix [_{VP} gledala spokožno [_{CP} [_{TopicP} brat ti_i] [_{MoodP} da [_{CLP} ec [_{CL} go [_{VP} operirat t_i
not would-1SG watch-PastPart calmly brother your DA him-CL operate-3PL
'I would not watch calmly your brother being operated (on)'

In sum, Last Resort applied to Bg has identified two alternative subcategorization frames for PVs. A PV can take a single phrasal or clausal Obj as illustrated by (7a-c) vs. (8). It can also subcategorize for a phrasal and a clausal Obj (9&10), which is the option pertinent to the discussion at hand.

Gk and Sp have one advantage over Bg: the Case specification of DPs is disambiguated by the morphological marking on nouns and articles in Gk (*o Yannis*, nom. masc. sg., vs. *ton Yanni*, acc. masc. sg.) and by the preposition *a* at least for [+animate] object nominals in Sp. In agreement with (6) the explicitly [Nom]-specified DPs in (11) cannot be analyzed as matrix objects but should satisfy the needs of embedded AgrS alongside with their own.

- (11) a. Akusa [ke o Yannis na klei (Gk)
 heard-1SG and(=even) the-NOM Y. NA cries 'I heard Y (even/ too) cry'
 b. Vió [que (*a) las niñas hugaban en el arroyo (Sp)
 saw-3SG that A the girls played-Imp.Ind.3PL in the creek
 '(S)he saw that the girls were playing in the creek'

If (11) argues for a single clausal object, (12) repeating (2a)&(3a) above trivially supports the phrasal-plus-clausal-Obj analysis:

- (12) a. Akusa ton Yanni, [ec, na klei (Gk)
 heard-1SG the-ACC Y-ACC ec NA cry-3SG
 'I heard Yanni crying.'
 b. Vió a las niñas, [que ec, hugaban en el arroyo (Sp)
 saw-3SG A the girls that ec played-3PL in the creek
 '(S)he saw the girls playing in the creek'

Finally, both Bg and Gk have one advantage over Sp. While *que* in the latter case is ambiguous between a complementizer and a relative *wh*, *da* and *na* being special particles rather than (homonyms of) relative pronouns, discourage the complex DP-analysis of the DP - *da/na*-clause sequence. In the same vein, *da/na*-complements of PVs in these two languages allow *wh*-extraction (13a&b), like Sp *que*-complements of PVs (13c), but their corresponding true relatives predictably do not (14).

Intonation can equally successfully force a double-Obj analysis. Marisa Rivero has pointed out to me that in Sp an embedded Topic is dispreferred.

- (13) a. Kakvo_i ču Maria [da pee t_i? (Bg)
 what heard-2SG Maria DA sing-3SG
 'What_i did you hear [Maria sing t_i?'
 b. Ti_i to korici akuses [na tou lei t_i (Gk)
 what the-ACCgirl heard-2SG NA to-him-CL say-3SG
 'What_i did you hear [her say t_i to him?'
 c. Con quién_i lo ves [que anda t_i en la escuela? (Sp)
 with whom him-CL see-2SG QUE go-3SG in the school
 'Who_i do you see [him going to school with t_i? (Suñer's ex. (17a))
- (14) a. *Kakvo_i ču Maria [kojato pee t_i? (Bg)
 what heard-2SG Maria WHO sing-3SGs
 'What_i did you hear [Maria who sings t_i?'
 b. *Ti_i to korici akuses [pou tou lei t_i (Gk)
 what the-ACC girl heard-2SG WHO to-him-CL say-3SG
 'What_i did you hear [the girl who says t_i to him?'

(13-14) can be taken as a proof that the sequence DP - *da/na*-clause does not equal a complex DP-object, since there are no Complex NP Constraint effects resulting from *wh*-extraction. By extension, the double-Obj analysis is ruled in.⁷

Summing up the results of this section, Last Resort considerations have proved to be an effective diagnostic for the internal argument structure of PVs in Bg, Gk, and Sp. Verbs of this class have been shown to employ a choice of subcategorization frames, viz. one consisting of a single phrasal/clausal object and its complementation-bifurcation alternative, translatable as a Larsonian double-Obj sequence, with the clausal object being more deeply embedded than the phrasal object.

- (15) ... [VP [V (PV) [DP controller_i [V (P V) ... [CP ... [VP (controllee_i) [V (controllee_i) ...

The pivot of the present discussion is the fact that the phrasal object projects a coreferential bridge into the subject or object position of the clausal object. This type of *cross-clausal anaphoricity* seen as a distinctive characteristic of Control (Alexandrova 1995) is the topic of the next section.

⁷ Cf. the detailed argumentation provided by Suñer (1984 :256-262) against the raising to object and against the relative clause analysis for Sp. To rule out the former she employs the θ -criterion prohibiting two θ -roles per chain, Binding Theory prohibiting two Cases per chain, the ECP. The latter, apart from the subjacency test used here (13), is disqualified due to the grammaticality of doubling CLs, which do not as a rule accompany relative clause heads, the compatibility with unique entities (*a Pedro*), which are in principle banned from restrictive relatives, etc. Most of these arguments apply to Bg and Gk but due to the limited space their equivalents will not be discussed here.

3. Inter-object cross-clausal anaphoricity and argumenthood

Due to their rich verbal morphology the three languages under investigation provide a straightforward proof of *obligatory* coreference holding between the PV phrasal Obj and an embedded subject or object. The parallel sentences from Sp (Suñer's (1984) exs. (24a-d) compressed), Bg, and Gk in (16) show that ungrammaticality results from the mismatch of Gender/Number/Person FFs of the matrix DP-object deducible from the morphology of the matrix CL and the Gender/Number/Person FFs of the embedded *ec* subject deducible from the subject agreement on its clause-mate predicate:

- (16) a. [_{CLP} *ec* lo [_{VP} vi [_{CP} que *ec* estaba/*estaban (Sp)
ec-MASC him-CLsaw-1SG that *ec*-MASC was-3SG/*were-3PL
 más alto/*altos/*altas
 taller- MASC/*MASC.PL/*FEM.PL
 'I noticed him to have grown taller'
- b. Ne [_{CLP} *ec* go [_{VP} zabeljazax [_{CP} [_{MP} da [_{AgrSP} *ec* e /*sa (Bg)
 not *ec*-MASC him-CL noticed-1SG DA *ec*-MASC is/*are
 porasnal/*porasnala/*porasnali
 grown- MASC/*FEM/*PL
 'I did not notice him to have grown (up/taller)'
- c. Ton epjasa ton Petro [_{CP} [_{MP} na [_{AgrSP} *ec* kapnizi/*kapnizun (Gk)
him-CL caught-1SG the-P-ACC NA *ec*-MASC smoke-3SG/*3PL
 'I caught Peter smoking'

The parallel extends to (in)direct CL-doubled embedded objects referentially dependent on the matrix phrasal object:

- (17) a. Vidjax (go) Asen da [_{CLP} *ec* go/*ja [_{VP} nagraždatav (Bg)
 saw-1SGhim-CL A DA *ec*-MASC/*FEM him- CL/*her-CL decorate-3PL
 'I saw Asen as they decorated him'
- b. Vidjax (go) Asen da [_{CLP} *ec* mu/*im davat nagradata (Bg)
 saw-1SGhim-CLA DA *ec*-MASC/*FEM to-him-CL/*to-them-CL give-3PL prize
 'I saw Asen as they gave him the prize'
- c. (Tin) iða tin Maria [_{CP} [_{MP} na [_{CLP} *ec* tin/*ton parasimoforun (Gk)
her-CL saw-1SG the-M-ACC NA *ec*-FEM/*MASC her-CL/*him-CL decorate-3PL
 'I saw Maria as they decorated her'
- d. (Ton) epjasa ton Petro na tou/*tis kanun tatuaz (Gk)
him-CL caught-1SG the-P-ACC NA to-him-CL/*to-her-CL make-3PL tattoos
 'I caught Peter as they were tattooing him/having a tattoo done (to him)'

e. Lo vi a Paco [_{CP} que [_{CLP} *ec* lo/*los condecoraron (Sp)
him-CLsaw-1SG A.P. that ec-MASC/*MASC.PL him-CL/*them-CLdecorated-3PL
 'I saw Paco as they decorated him'

The eligibility of the matrix DP-embedded *ec* pairs in (16-17) for Control status is confirmed by adherence to the Control requirement for argumenthood. Consider Bg (18) with a zero-place predicate *ima* 'there-be' in the more deeply embedded clausal complement.

- (18) */? Ne go zabeljazax da ima dostatačno xora i ne ostanax za objad (Bg)
 not it-CL noticed-1SG DA there-is/has enough people and not stayed-1SG for lunch
 (a)*I did not notice *there to be* enough people and did not stay for lunch
 (b)?I did not notice him *having* enough people at his disposal and did not stay for lunch

On the strict *existential reading* of the embedded predicate (18a) the Control link is precluded from the start by the lack of a subject argument of 'there-be' and hence of an eligible controllee.⁸ The sentence may be improved on a *referential reading* of the embedded subject (18b), e.g. a company manager who may "have people", and likewise of its potential controller, the matrix CL-associate. In other words, PV inter-Obj coindexation patterns like referentiality-conditioned Control.

If Arg-status vs. non-Arg-status echo Control-status vs. non-Control-status, an intermediate value in the former opposition is predicted to result in marginal acceptability of double-Obj PV structures if they are in reality Control structures. The prediction is borne out by empirical evidence: a weather verb in the embedded clausal PV-complement which projects a *quasi*-argumental dummy subject results in questionable grammaticality (19), thereby corroborating the Control hypothesis.

- (19) ??? Vidjaxme *ec*, go, [če *ec*, se kani da vali i vzexme čadări (Bg)
 saw-1SG ec it-CL that ec is-about-to rain-3SG and took-1PL umbrellas
 'We noticed it was about to rain and took our umbrellas with us'

Judgements of native speakers predictably vary meeting the expectation that to the extent to which the embedded weather *pro* subject is interpreted as argumental, given the special double-Obj frame, it will/will not be able to project a cross-clausal

⁸ Mirroring for a PVsuñer's exs (22&23) for Control double-Obj *hay* "there-be" the impersonal reading of *parer* "seem" in (i) is predicted to be ungrammatical as opposed to its personal reading in (ii) in which case starred (18a) is echoed by (i).

(i) **ec*, lo, ves [que *ec*, parece [que comen ... (ii) *ec*, los, ves [que *ec*, parecen [PRO] comer ...
ec it-CL see-2SG that ec-Imprs seems that eat-3PL ec them-CL see-2SG that ec-3PL seem-3PL eat-INF
 Predictably, the form *que coma* 'that eats' is aligned with personal (ii), rather than impersonal (i).

Control link to the *ec* associate of matrix CL.

To sum up, this section has demonstrated the *obligatory* coreference obtaining between the higher Obj and subject/object arguments within the lower clause of Bg, Gk, and Sp PVs. The three pro-drop languages pattern identically in enforcing a cross-clausal anaphoric bridge as natural language does in instantiations of standard Control. Additionally, data from Bg/Sp corroborate the treatment of PVs on a par with Control environments as the graded acceptability of examples with embedded zero-place and weather predicates reflects the graded argumenthood of the coindexed pairs, just like candidates for controller-controllee pairs do. It will be possible to uphold the Control hypothesis for PVs given that either the designated controlled entity (finite subject or CL-doubled object) is invariably a bearer of Null Case, whether it realizes an external(ized) or internal argument of the embedded predicate, or given that Standard Case ([Nom], [Acc], [Dat]) is not incompatible with Control. Section 4 provides arguments in favor of the latter option.

4. The Control Parameter

In order to show the theoretical and empirical advantages of reconciling Control and Standard Case the global problem can be approached by way of 1. Establishing that coreference and deficient/dependent Temporality need not be forcefully correlated. This paves the path for 2. Compatibility of Control and Nominative Case, and by extension for 3. Compatibility with Standard Case in general. This in turn gains legitimate access to 4. Lexicalization of controllees constrained by emphasis/focus. The outcome of the outlined logical sequencing is the justification of a Com-prehensive Control Theory whose possible implications are sketched in the concluding section 5.

4.1. Parametrized Case

Studies of Control in Gk, which like Bg lacks infinitives but may employ instead finite (subjunctive) clauses, have concentrated on preserving the exclusively subject status of controlled entities. They either set out to demote Tense in finite clauses to a non-Nominative Case-assigner (Varlokosta & Hornstein 1993) or seek alternative licensors of Null Case (Terzi's 1992/3 Gk subjunctive particle *na*) which is deemed to be the prerogative of nonfinite as opposed to finite Infl.

V&H have argued that Gk has PRO- and pro-subjunctives. The former generate referentially dependent null subjects and only the latter allow subjects of disjoint reference. This partitioning is argued to correspond, even if imperfectly, to the impossibility vs. possibility of Tense alternations and to the (non)availability of a CP layer. Absence of embedded CP allows for PRO to be governed Bouchard-style and bound by matrix S. When present CP is the locus of the otherwise unaccounted for *temporal sequencing* of the embedded T-deficient *na*-clause, relative to the fully-

fledged matrix clause. In sum, on the Control hypothesis V&H's analysis predicts that the clausal complements of PVs would have a very restricted choice of Tense values and also that a CP layer and presumably relevant lexical material is unavailable. Empirical data reviewed below invalidate both claims: Bg and Gk PV-complements employ Tense alternations as well as CP material.

- (20) a. Ne sme ja zabeljazali/ ja zabeljazaxme da vliza (Bg)
 not are-1PL her-CL notice-PastPart-PL/her-CL noticed-3PL DA come-in-Pres
 'We have not noticed her enter(ing)'
- b. Ne sme ja zabeljazali/ ja zabeljazaxme da e vlizala
 not are-1PL her-CL notice-Part-PL/her-CL noticed-1PL DA is come-in-Part.FEM
 'We have not noticed her to have entered'
- c. Vidjax go će štē padne i mu pomognax
 saw-1SG him-CL that will fall-3SG and to-him-CL helped-1SG
 'I noticed he would fall and helped him'
- d. Vidjax go će pada/ e padnal i mu pomognax
 saw-1SG him-CL that is-falling/ is fallen-MASC and to-him-CL helped-1SG
 'I noticed he was falling/had fallen and helped him'

Bg which like Gk (and unlike e.g. English) does not observe the Sequence of Tenses rule accepts Present Tense (20a) or Past Indefinite (=Present Perfect) (20b) in the *da*-clause, embedded in a main clause specified for Past Indefinite or Preterite. If the embedded clause is headed by complementizer *će* "that" instead of by the particle *da* the inventory of tenses comprises the Future (20c) as well. The range of tenses is wide enough to disprove even a milder version of the desirable [-Tense] specification, assuming that an impoverished tense paradigm is a reliable diagnostic of [-Tense] status (cf. V&H, Terzi (1992/3), Iatridou (1993)) to start with. In Gk too the variety of tenses in the subordinate clause of double-Obj PVs is significant, even if it does not (nor can it realistically be expected to) exhaust the verbal paradigm in this language. Present Tense (21a), Aorist (21b), and Present/Past Perfect (21c&d) are all acceptable:

- (21) a. Δ en ton iða pou/na pēnai (Gk)
 not him-CL saw-1SG that/NA pass-by-Pres
- b. Δ en ton iða pou/na perase
 not him-CL saw-1SG that/NA pass-by-Aorist
 'I did not see him pass(ing) by'
- c. Δ en ton proseka na exi perasi simera
 not him-CL noticed-1SG NA has pass-by today
 'I did not see him pass(ing) by today'

- d. Δ en ton_i ixa_i δ i pou ixe pari_i tis fotografies
 not him-CL had-1SG seen that had taken the photos
 'I did not see him to have taken pictures'

Clearly, Tense variation is possible in both Bg and Gk, and this happens in the face of obligatory matrix-Obj - embedded-Subj coreference. If Control is assumed to entail Null Case in the FF-matrix of the controllee and its checking necessitates establishing T-deficiency, the desired Infl-specification is unattainable. Moreover, the same choice of Tenses coincides with matrix-Obj - embedded Obj obligatory coreference and Tense is not a factor in the licensing of object FFs:

- (22) Ne ec_i go_i bjax_i usetil ... (Bg)
 not ec him-CL was-1SG felt-MASC
 a. \check{c} e/kak ec_i go_i mestjat/ sa ec_i go_i mestili / ? ec_i go_i
 that/how ec himCL move-Pres.3PL/be-Pres.3PL ec CL moved-PL/ ec CL
 bjaxa prelestili
 be- Past.3PL moved-PL
 b. da ec_i go_i tegljat/ sa ec_i go_i izteglili / ? ec_i go_i bjaxa teglili
 DA ec CL pull-Pres.3PL/be-Pres.3PL ec CL pulled-PL/ec CL be-Past.3PL pulled-PL
- (23) Δ en ec_i ton_i ixa_i δ i ... (Gk)
 not him-CL had-1SG seen
 a. pou ec_i ton_i fotografisan/ixan fotografisi
 that ec CL photograph-Pres.3PL/had-3PL+Part
 b. na ec_i ton_i fotografizun/exun fotografisi
 NA ec CL photograph-Pres.3PL/have-3PL+Part

If one were to pursue Terzi's alternative, viz. correlating Control and (subjunctive) particles *da/na* this could provide a leeway for circumventing finite T and also transitive AgrO⁹, presumably treating them as inactive targets and ascribing Null Case-licensing for controlled Subj (as Terzi does) and Obj alike to the MoodP head. Barring the difficulty of accounting for T and AgrO-inactivity, the MoodP corollary is inapplicable to Sp which lacks comparable particles but has both infinitives as potential Control environments and morphological subjunctives widely discussed for their obviation effects, i.e. the antithesis of Control, despite subjunctive T-deficiency acknowledged across languages (cf. Avrutin & Babyonyshev (1994) for

⁹ I exclude Acc-deficiency of AgrO in the presence of CL since Bg & Gk do not employ devices like Sp *a/Romanian pe* argued to compensate for absorption of verbal Acc Case by CL (cf. the well-known Kayne/ Jaeggli Generalization). NB! In Sp/Rom too these are markers for [animate]/[human] rather than Case per se.

references and examples from Sp, Russian). This line of thought does not look promising for Bg and Gk either, since not only is PV coreference targeting Subj and Obj-positions preserved in the absence of the particles in question (Bg *čē* 'that' & *kak* 'how' clauses, Gk *pou* 'that' clauses - cf. (20)&(21)), but it is not the case that *da/na* are restricted to environments conducive to coreference. Just as Sp PV *que*-clauses (24a) are homo-nymous with standard Case-licensing finite clauses (24b), so Balkan clauses headed by *da/na* or by CP material are in principle environments for standard Case, whether in subordinate (25a&b) or main clauses (25c&d). The non-PV examples below are insensitive to coreference, allowing it optionally.

- (24) a. $ec_i lo_i \underline{vi}$ [que ec_i estaba más alto/[que $ec_i lo_i$ condecoraron *EmbedCl*(Sp)
 ec him-CL saw-1SG that ec was taller-MASC/that ec him-CL decorated-3PL
- b. $ec_i le_i \underline{dijeron}$ [que ec_j estaba más alto/[que $ec_j lo_j$ condecoraron *EmbedCl*
 ec to-him-CL said-3PL that ec was taller-MASC/that ec him-CL decorated-3PL
- c. *ec* estaba más alto/ *ec* lo condecoraron *MainCl*
 ec was taller-MASC/ec him-CL decorated-3PL
- (25) a. Vidjax $ec_i go_i$ [kak/čē/da ec_j se usmixva / [kak/čē/da *EmbedCl*(Bg)
 saw-1SG ec him-CL how/that/DA ec Refl smile-3SG/how/that/DA
 $ec_j go_j$ snimat
 ec him-CL photograph-3PL
- b. Kazax $ec_i mu_i$ [kak/čē/da ec_j se usmixva [kak/čē/da *EmbedCl*
 saw-1SG ec to-him-CL how/that/DA ec Refl smile-3SG/how/that/DA
 $ec_j go_j$ snimat
 ec him-CL photograph-3PL
- c. Kak se usmixva Jasen samo! *MainCl*
 how Refl smiles Jasen only 'Look at the way J. smiles!'
- d. Da se usmixvat milite, njamam ništo protiv *MainCl*
 DA Refl smile-3PL dears-DEF not-have-1SG nothing against
 'Let the darling things smile, I don't mind'

The data reviewed in this subsection lead to the conclusion that no part of the triple correlation (*subjunctive*)*T-deficiency*~ *Case-deficiency*~ *Control* can be maintained without costly assumptions. If in the spirit of Minimalist uniformity identical morphological composition of coreference-sensitive PV finite complements and coreference-insensitive finites (23b&c/24b,c&d) is considered to condition identical Tense, Transitivity, and correspondent Standard Case values, then the Control Parameter can be formulated to allow alternative settings: A. *Null Case* (for *nonfinite Subj*) B. *Nominative/Accusative Case* (for *finite Subj/transitive Obj*). The empirical and theoretical advantages of parametrized Case in the FF-matrix of controlled entities have been established and the next logical step is to retrace the entailment in Vergnaud's Case Filter. If reconciling Control and standard Case means

that little pro can be controlled, the prediction can be made that an obligatorily referentially dependent cased position may be lexicalized. The subsection below shows that this prediction is borne out for Subj and Obj controlled positions in the three languages under investigation.

4.2. Parametrized lexicalization

Consider the self-explanatory examples in (26)&(27) below:

- (26) a. Vidjax go_i Asen_i [*toj_i kak/da gotvi*
 saw-1SG CL A. he how/DA cooks 'I saw Asen_i as HE_i was cooking'
 b. Vidjax go_i Asen_i [*(nego_i) će/da go_i snimat (nego_i)* (Bg)
 saw-1SG CL A. (him-EMPH) that/DA CL photograph-PL (him-EMPH)
 'I saw Asen_i as they photographed HIM_i'
- (27) a. Ton_i akusa tonYanni_i [*(ke) aftos_i na klei* (Gk)
 CL heard the Y. and he-EMPH NA cries
 'I heard Y_i as HE_i (too) was crying'
 b. Lo_i vió a Pedro_i [*que lo_i condecoraron a él_i* (Sp)
 CL saw A P-ACC that CL decorated-3PL A him-EMPH
 'I saw Pedro_i as they decorated HIM_i'

The important fact to note is that the controlling matrix arguments can be lexicalized as proper names as well as pronouns. By contrast the referentially dependent positions in the clausal complement can be lexicalized as pronouns, which in all three languages are a morphological explication of Case and ϕ -FF, the only concession granted to them being desamentized epithets such as "the poor chap/soul", "the poor devil", etc. This shows that the embedded positions are deprived of descriptive content. It must be the case then that Control is not restricted to null categories but to those categories that give the bare FF skeleton of a nominal. Association to a potentially fully-fledged nominal category must obtain to allow them to reconstruct their descriptive content and ultimately their semantic reference.

The necessarily emphatic reading that the embedded pronouns in Bg and Sp receive and the licensing effect of the focus particle in Gk can be treated as a reflex of the pro-drop parameter. In this sense avoiding lexicalization of a Cased position is motivated by the same natural language principles that discourage the usage of a coreferential overt pronoun in any environment characterized by retrievability of content, whether this is an environment conditioning obligatory (the PV case) or optional coreference: *Kazax ec_i mu_i će [toj/TOJ]_{i, j} e naj-visok* 'I told him_i he_{i, j} was the tallest'.

In conclusion, lexicalization of the designated controlled Subj or Obj is in agreement with the Control Parameter formulated to allow compatibility with

Standard Case. The need for emphatic in-tonation/focus particles licensing lexicalization corroborates effectively the parallel with pro-drop mechanisms whereby overtness is a marked option. Thus the data in this section are indisputable proof for the availability of Standard Case for the constituents bound by *Obj - Subj/Obj* cross-clausal anaphoricity characterizing Control, and going back a step earlier, for the availability of a sufficient number of syntactic positions to fill out the double-Obj internal argument domain of PVs. This completes a full round of argumentation necessitating another look at the starting point of the discussion.

5. Conclusion and extensions

The question yet to be addressed concerns some primary motivation for Control. The answer hinges on an empirical generalization that has gained acceptance in the generative literature without finding proper formalization. This is to say that the collocation "verb of Control" is the operative notion. If members of a certain semantic group of verbs pattern as Control-mediators in more than one language it must be the case that they share a host of lexical-syntactic properties. Following Alexandrova (1995/1996a) I treat the properties in question as being associated with the CP-layer of embedded complements typing a clause for subordination. I can further propose that whereas [Ctrl]-specification for the finites discussed here is V-mediated, for adjunct Control nonfinites it is specification by default, properly embedding a nonsubcategorized constituent. To make the picture complete [Ctrl]-checking can be viewed as involving Head-Head juxtaposing of Interpretable ϕ -FFs. After being checked in non-clausemate AgrPs (or the equivalent) ϕ -FFs undergo Move-F to the CP of the Control clause, ensuring identification of controller and controllee for LF Full Interpretation.

Developing a comprehensive Theory of Control where neither Case-deficiency nor non-lexicalization are viewed in absolute terms whereas BT-properties are considered universal has been shown to have empirical justification in three languages. What deserves further exploration is subsuming a number of currently idiosyncratic environments of coindexation such as parasitic gaps, tough constructions under Control compatible with e.g. Accusative side by side with Null Case. If this reasoning is on the right track, in the spirit of minimizing theoretical primitives Binding types could ultimately be bipartitioned into 1) Control, coindexing members of independent FF-checking chains and 2) Trace-licensing, coindexing chain-mate members. Such an approach would obviously require reorganizing a number of traditional views, but its theoretical appeal is undeniable since it promises what Minimalism aims for - an economical theory with dynamic explanatory adequacy.

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NULL OBJECT CONSTRUCTIONS IN STANDARD SPANISH REVISITED*

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Abstract

Most of the literature of null objects has accounted for the categorial status of these empty constituents by resorting to categories such as PRO, pro, NP-trace or wh-trace, and most recently, null epithet (Lasnik & Stowell, 1991). These categories are shown to be insufficient to describe null objects in standard Spanish. Therefore, a new type of empty category seems to be necessary in this language to account for null non-definite bare direct object constructions. This paper also specifically examines subjunctive and indicative constructions that contain null objects in complement clauses. The difference between these two types of constructions is looked at in terms of operator-variable binding and subjacency effects. In this regard, it is shown, following a suggestion by Campos (1986), that subjunctive and infinitive constructions constitute a weak bounding node for subjacency while indicative constructions constitute a strong bounding node. I claim that subjunctive and indicative constructions are better characterized as [-Tense] by being devoid of time features whereas indicative is characterized as [+Tense]. A number of reasons and relevant data are put forward to support the conjoined analysis of subjunctive-infinitive as opposed to indicative.

1. Introduction

The purpose of this paper is twofold. First, I show that the already existent categories in the Principles and Parameters framework are insufficient to describe null objects and thus, that a new type of empty category needs to be formulated in standard Spanish to account for null non-definite direct object constructions such as that in (1)¹:

- (1) * $[_{IP} \text{pro}_j \text{ pienso } [_{CP} \text{OP}_i \text{ que } [_{IP} \text{pro}_j \text{ le traje } e_i \text{ a } \text{pro} \text{ (I) think OP that pro cl-3sg brought e for } \text{Mary} \text{ 'I think I brought } e_i \text{ for Mary'}$

¹ As pointed out to me by María Luisa Zubizarreta and Mario Saltarelli (p.c), the null direct object in (1) could be an indefinite pro. However, I tentatively suggest a possibility along the lines of Zubizarreta (1996) -see section 2-

Secondly, I show, following a suggestion made by Campos (1986) for standard Spanish, that subjunctive and infinitive constructions in complement clauses constitute a **weak bounding node** for **subjacency**, while indicative constructions constitute a **strong bounding node**². The interpretation of these facts has some interesting consequences to explain the contrast in grammaticality in null object constructions illustrated in (2) and (3):

(2) [_{IP} pro_j no creo [_{CP}OP_i [_Cque [_{IP}María traiga e_i]]]]
 pro not (I) think OP_i that Mary will bring e
 'I don't think Mary will bring (any) (SUBJ)'.

(3) ?? [_{IP} pro no creo [_{CP}OP_i [_Cque [_{IP} María trae e_i]]]]³
 pro not (I) think OP_i that Mary is bringing/will bring e
 'I don't think Mary will bring (any) (IND)'.

The different grammaticality judgements in (2) and (3) with respect to the tense-mood being used in their embedded complements follows as an automatic consequence of the internal specification of **tense**. Null object constructions in standard Spanish with a [-Tense]⁴ IP node seem to produce better sentences than those with a [+Tense] IP node. In this sense, subjunctive and infinitive are characterized as [-Tense] by being devoid of time features and indicative is

2 See Torrego, E & J. Uriagereka (1990).

3 Interestingly enough, the sentence seems to improve in grammaticality if new elements are added after the empty category:

(i) pro no creo que María trae e_i nunca
 pro not think that Mary brings e never
 'I don't think that Mary never brings e_i'.

(ii) pro no creo que María trae e_i en la cartera
 pro not think that Mary brings e in her wallet
 'I don't think that Mary brings e_i in her wallet'.

I am indebted to Myriam Uribe-Etxebarria for bringing this to my attention.

4 Note that in Spanish there is a use of the subjunctive that expresses a future action. In this sense, the subjunctive construction will be [+Tense]:

(i) pro quiero que pro vengas
 pro want that pro come
 'I want you to come'.

characterized as [+Tense]⁵. A number of reasons will be given to support this specification.

This paper is organized as follows. Section 2 investigates a number of possibilities to account for the null object empty category *e* in (1). Section 3 examines the phenomenon of **subjacency** in standard Spanish. As claimed above, I follow Campos (1986) in his proposal of weak bounding nodes (subjunctive and infinitive) playing a role in the licensing of null objects. I further extend his assumption to additional constructions taking subjunctive and indicative in their complement clauses. Section 4 deals with the difference in grammaticality between these two structures. In section 4.1 I provide some analyses of subjunctive clauses proposed in the literature. Section 4.2 establishes a fine-grained distinction between subjunctive and indicative constructions and argues for a conjoined analysis of subjunctive-infinitive as opposed to indicative. Section 5 summarizes the analyses and provides final remarks.

2. A note on Campos' (1986) "Indefinite Object Drop" Squib

Campos (1986) analyzes **indefinite object drop constructions** in standard Spanish. According to him, direct objects in Spanish may be dropped when they are non-definite. Consider the following example:

- (4) a. ¿Trajiste libros_i ?
'Did you bring (any) books_i?'
b. Sí, traje e_i
'Yes, I brought (some)_i.'

Speakers of standard Spanish agree on the grammaticality of (4b) as an answer for (4a). In the same variety of Spanish, a sentence like (5b) will not be acceptable as an answer for (5a):

- (5) a. ¿Trajiste el libro_i ?
'Did you bring the book_i ?'

⁵ For a similar interpretation of these facts see A. Terzi (1992) and L. Progovac (1992). Progovac's work focuses on NPs and subjunctive in Serbo-Croatian. She examines the possible correlation between negation and subjunctive in that language. For a detailed discussion the reader should refer to Progovac's (1992) work.

- b. *Sí, traje e_i^{6,7}
 'Yes, I brought e_i'

Campos--as already pointed out in the introduction--gives the status of a variable to the empty category occupying the position of the verb's internal argument in (4b). According to Chomsky (1982), a variable is defined as an element that is locally A-bar bound by an operator⁸. This operator is assumed to move in the syntax (as in (6)), and therefore, to meet the restrictions that apply to movement⁹:

- (6) Sí OP_i [traje e_i]
 Yes OP_i (I) brought e_i
 'Yes, I brought.'

Before establishing that nonarbitrary bare direct objects in standard Spanish are variables, Campos analyzes a number of other possibilities. He considers that in a structure like (4b), the analysis of the empty category as PRO must be discarded since e in that position is governed by the verb "traer" and according to the PRO Theorem (Chomsky 1982:21) "PRO must be ungoverned". NP-trace as a

6 Since the object of "traer" is interpreted as definite, an empty category cannot occur in this position. For (5b) to be grammatical in standard Spanish the clitic "lo" needs to be uttered in order to satisfy both the argument structure of "traer" and the Projection Principle postulated by Chomsky (1981).

7 This sentence, however, will be grammatical in the Spanish variety spoken in the Basque Country. In this variety of Spanish, as pointed out by Landa & Franco (1992) and Landa (1995), arbitrary null objects as well as referential null objects are acceptable.

8 "Locally A-bar bound" means that the nearest binder for the variable (x) is an operator, even if that binder is quite distant.

9 I assume, following Campos (1986) that the OP moves in SS. The reader should consult Campos (1986) for a detailed discussion of this position. He provides five reasons which illustrate that the dropped indefinite object in Spanish is the trace of an OP that has moved in the syntax. Briefly, he supports his position by resorting to the Complex NP constraint, the Sentential Subject constraint and the Doubly Filled Comp. Indefinite object drop constructions in SS seem to follow the above mentioned constraints. Furthermore, Campos provides evidence from ergative verbs to support his claim and finally, he shows that non-definite null object constructions can be found in adjunct clauses. The reader should refer to Campos' work for examples of the above mentioned tests.

plausible status for the empty category in indefinite object drop constructions in standard Spanish is also discarded by Campos. *e* is not bound by an A-position but by an A-bar position, occupying the Spec of CP. Therefore, *e* “must be either pro or wh-trace” (Campos 1986: 355). Pro¹⁰ is eliminated as a possibility since according to Chomsky (1982) pro is always interpreted as being definite in reference¹¹. Campos, following Chomsky (1982), states that since direct objects in standard Spanish can only be omitted when they are indefinite in reference, pro cannot be a plausible analysis for the empty category occupying the argument position of the verb in (4b)¹².

According to Campos (1986) the only possibility left for the null object in (4b) is wh-trace. As there is no overt operator, he claims along the lines of Chomsky (1982), Huang (1982) and Raposo (1986), that *e* is bound by the operator OP that, as claimed above, moves in the syntax. Yet an analysis of indefinite direct objects as variables in standard Spanish poses a problem for a sentence like (8):

- (7) [_{CP} Qué [_{IP} pro_j crees [_{CP} t [_C que [_{IP} pro_k le compré t_i a María?
 What pro think t that pro CL-3sg (I) bought t for Mary?
 ‘What do you think that I bought t_i for Mary?’

10 Landa & Franco (1992) put forward the analysis of referential non-arbitrary null objects as pro in the variety of Spanish spoken in the Basque Country.

11 This claim, as pointed out by Landa (1996), has been contradicted for Spanish subject pro in Jaeggli (1986). Such a falsification is illustrated in (i):

- (i) *pro* llamaron a la puerta
pro called-3p to the door
 ‘They/someone called at the door’

In (i) the subject can, but it need not be definite.

12 This analysis, however, has been proposed in the literature. Rizzi (1986) accounts for the null direct object in (1) by postulating an indefinite *pro*.

- (8) * $[_{IP} \text{pro}_j \text{creo } [_{CP} \text{OP}_i \text{ que } [_{IP} \text{pro}_j \text{le compré } e_i \text{ a María}]]]$ ^{13,14}
 pro (I) think OP that CL-3sg (I) bought e for Mary
 'I think I bought e_i for Mary.'

The most obvious difference between (7) and (8) is the null versus the overt status of the operator that locally binds the empty category in object position. At first sight, the structure is grammatical when the empty category occupying the direct object position is locally A-bar bound by an overt operator that has moved in the syntax. The structure, however, becomes ungrammatical when e is locally A-bar bound by a null operator¹⁵. Therefore, other possibilities need to be explored in

13 Sentence (8) repeated here as (i) contrasts with (ii):

- (i) * $[_{IP} \text{pro}_j \text{creo } [_{CP} \text{OP}_i \text{ que } [_{IP} \text{pro}_j \text{le compré } e_i \text{ a María}]]]$
 pro (I) think OP that pro CL-3sg (I) bought e for Mary
 'I think I bought some for Mary'
- (ii) $[_{IP} \text{pro}_j \text{creo } [_{CP} \text{OP}_i \text{ que } [_{IP} \text{pro}_j \text{ compré } e_i]]]$
 pro (I) think OP that pro (I) bought e
 'I think I bought some'

The difference in grammaticality between (i) and (ii) seems to suggest that a construction containing an indirect object with a non-definite null object is not allowed in standard Spanish. If the I.O. is not present, the structure is grammatical and the empty category in the direct object position is accounted for by the *variable* analysis proposed by Campos (1986). Thus, the I.O. also plays a role. As suggested to me by Myriam Uribe-Etxebarria (p.c) the presence of the D.O. clitic in (8) could be producing some kind of minimality effects.

14 Again, if new material is added the sentence grammaticality seems to improve:

- (i) A: ¿Has visto esto, alguna vez?
 Have seen this_i ever?
 'Have you ever seen this?'
- B: Sí, pro creo que le compré e_i a María por su cumpleaños el año pasado.
 Yes, pro think that cl.3sg bought e for Mary for her birthday the year past.
 'Yes, I think I bought e_i for Mary's birthday last year.'

The sentence seems to become better when more material is added after "María". In this way, the object becomes more specific. Specificity effects seem to play a role here. I will return to this question later on.

15 Yet a relative structure like (i) stands as a problem for a contrast that relies on the overt/covert nature of the operator:

order to account for this contrast in grammaticality between (7) and (8).

The analysis put forward by Campos (1986) for nonarbitrary bare direct objects as variables accounts for the empty category in (7). Following Chomsky (1982:35) the empty category is a variable since "it is in an A-position and it is locally A-bar bound by an operator". In this case the OP is overt: "que" and it has moved in a cyclic fashion from the argument position of the verb, an A-position, to the Spec of CP, an A-bar position from which it c-commands the empty category in object position.

Sentence (7) is grammatical and does not violate any module of the grammar. Subjacency, a constraint on syntactic movement, is not violated since only one bounding node¹⁶ has been crossed: CP¹⁷. The ECP (Empty Category Principle), a constraint on LF representation as assumed by Huang (1982) and Lasnik & Saito (1992), is not violated either since the empty category in the argument position of the verb is properly governed by being lexically governed by the verb "comprar"¹⁸. Therefore sentence (7) complies with the analysis postulated by Campos (1986). Yet a construction like (8) stands as a problem for his analysis. If we maintain Campos' variable analysis for indefinite object drop constructions in standard Spanish a sentence like (8) should be grammatical. Yet, it is not.

I explore a number of possible analyses for the empty category in object position in (8). I reach the conclusion that (8) stands as a problem for the Principles and Parameters framework (Chomsky 1981, 1982, 1986a, 1986b, 1989; Chomsky & Lasnik 1993) since none of the categories postulated within this framework seem to account for the situation present in the sentence under discussion.

I agree with Campos that the null object can be neither PRO nor NP-trace, for the reasons noted above. However, the empty category could not be a variable either, as postulated by Campos because this analysis would predict the sentence in (8) to be grammatical. Two additional possibilities could be proposed: pro or null epithet¹⁹. Pro, a [+pronominal, -anaphoric] empty category has been postulated by

(i) [_{NP} Los libros [_{CP} OP_i [_C que [_{IP} pro creó [_{CP} t_i [_C que [_{IP} pro le compré t_i a María]]]]]]]
'The books that I think I bought e_i for Mary'

16 I adopt Chomsky's (1973 and later work) proposal that in English S and NP are boundaries for movement.

17 For Spanish, Subjacency will be postulated in the following fashion (Chomsky, 1982):

'A single instance of movement can cross one bounding node, where bounding nodes are CP and NP'.

18 On this topic see Torrego (1984) who claims that the object cannot be lexically governed by the verb in Spanish.

19 On null epithet constructions see Demirdache (1993). She offers a very

Rizzi (1986), Farrell (1990) and Landa & Franco (1992) to account for the empty categories in object position in Italian, Brazilian Portuguese and Basque Spanish respectively 20, 21, 22. An analysis of pro for standard Spanish does not seem plausible taking into account that pro being a pronominal empty category is subject to condition B of the Binding Theory which establishes that a pronoun should be A-free in its governing category²³. The governing category for pro in (8) is the lower clause S since that clause contains the null pronominal, its governor -the verb "comprar"- and an accessible SUBJECT to it, which is [+AGR]²⁴. Therefore, and according to condition B, the null pronoun is coindexed outside its governing category with the OP in Spec of CP. If we pursue this analysis for the null object in (8) the sentence should be grammatical. Yet, it is not. Hence, the empty category occupying the object position in (8) cannot be a null pronoun.

An alternative analysis for the empty category *e* in (8) is that of null epithet²⁵; which according to Lasnik & Stowell (1991) is defined as a "null R-

interesting solution that accounts for the examples involving null epithets for which Lasnik & Stowell (1991) could not find a solution.

20 The term Basque Spanish to refer to the Spanish variety spoken in the Basque Country was first used by Landa (1990).

21 According to Landa & Franco (1992) and Landa (1995) in Basque Spanish referential non-arbitrary null objects are pro. Jevonis (1996) puts forward an analysis of these empty referential categories as null epithet for the same variety of Spanish.

22 Along the same lines, Cinque (1984, 1990) argues that the empty category in parasitic gap and tough constructions are not variables. He treats them as null pronominals (pro).

23 Chomsky (1981:226) defines governing category as follows: 'The governing category is the minimal NP or S containing α , a governor of α and a SUBJECT accessible to α '.

24 Only AGRS is considered to play a role here. I disregard Franco's (1993) proposal that states that object clitics in Spanish should be analyzed as object agreement morphemes on the verb.

25 Lasnik & Stowell (1991) distinguish between two types of locally A-bar bound traces: null variables and null epithets and they claim that "They differ from each other in that null variables are locally bound by a true quantifier (...) whereas null epithets are locally bound by an element that is not a true quantifier" (709). As Ortiz de Urbina (p.c.) pointed out to me, this distinction between a true and a non-true quantifier is crucial, although, clearly, a topic-like element assigning antecedence to an operator would not count as a true quantifier.

expression, with binding properties analogous to those of names and definite descriptions (“epithets”) rather than to those of variables” (692)²⁶. Non-variable R-expressions are treated by Lasnik & Stowell (1991) as a default case, that is, as [-a, -p] elements that fail to satisfy the requirements to be a variable. But null epithets, like other epithets, fall under condition C of the Binding Theory. Then, if the empty category in (8) is a null epithet, the sentence will be predicted to be grammatical and again, contrary to facts.

In view of these data and having pursued a number of different possibilities to account for the status of the empty category in (8), one is led to claim that the ungrammaticality of this sentence stands as a problem for the theory. Tentatively I suggest, along the lines of Zubizarreta (1996), an alternative account based on the **focus/prosody** relation.

As pointed out by Zubizarreta (1996) questions in Spanish begin with a High pitch. The main stress, however, falls at the end of the Intonational Phrase. When addressing wh-in-situ and superiority in Spanish, Zubizarreta mentions the following examples:

- (9) a. ¿Qué le compró QUIEN?
 ‘What CL-3sg bought WHO?’
 b. ¿Qué bebida trajo QUIEN?
 ‘What drink bought WHO?’
 c. *Dime que cosa escondió QUIEN.
 ‘Tell me which thing hid WHO.’

Zubizarreta claims that “the acceptability status of such examples is degraded if there is a phrase following the wh-subject quien within the same intonational phrase” (Chapter 3, 46)²⁷. In this regard, (10) is provided by Zubizarreta:

- (10) a. *¿Qué le compró quién a MARIA?
 ‘What CL-3sg bought who to MARIA?’
 b. *¿Qué bebida trajo quién a la FIESTA?
 ‘What drink brought who to the PARTY?’
 c. *Dime que cosa escondió quién debajo de la CAMA
 ‘Tell me what put who under the BED’

According to her, the last phrase in the IntP in (10) is the target for main stress assignment but such phrases are not part of what she calls the F-set²⁸ in those sentences. Therefore, the FPCP (Focus/Prosody Correspondence Principle)

26 On such constructions see Demirdache (1993).

27 Extractions when something else follows are sometimes degraded.

28 As defined by Zubizarreta (1996, Chapter 2:32) ‘the F-set of constituents of an IntP_i is constituted solely by constituents of IntP_i that are marked [F] and by the terminal elements that such constituents dominate’ (32).

is violated. This principle is defined in the following fashion: 'the F-set of an IntP_i must contain the word that bears main prominence within IntP_i' (Zubizarreta 1996:Chapter 2,32).

The phenomenon addressed by Zubizarreta (1996) seems to explain why (8), repeated here as (11), is ungrammatical while (12) is not:

(11) *Creo que le compré e_i a María
'I think I bought some for Mary'

(12) Creo que le compré e_i
'I think I bought e'

When the benefactive "a María" is added and forms part of the same Intonational Phrase, the sentence becomes ungrammatical. Yet if the PP complement is left dislocated or if it is analyzed as a distinct prosodic phrase, then the resulting sentence becomes more acceptable:

(13) ?A María, creo que le compré e_i
'For Mary, I think I bought e'.

A more in depth study of this phenomenon with respect to **prosody, word order and focus** (in the spirit of Zubizarreta, 1996) is required to help explain this contrast.

3. Subjacency in standard Spanish: Weak and strong bounding nodes

Campos (1986) accounts for the ungrammaticality of sentences (14b) and (15b) by resorting to **Subjacency**:

(14) a. ¿Juán traerá cerveza_i a la fiesta?
'Will John bring beer_i to the party?'

b. *Existe el rumor de que traerá e_i
'There exists the rumor that he will bring (some).'

(15) a. ¿Quién trajo cerveza_i a la fiesta?
'Who brought beer_i to the party?'

b. *No conozco al muchacho que trajo e_i
'I don't know the boy who brought (some).'

In (16), according to Campos (1986:355), "the OP cannot be related to the variable x since they are separated by two bounding nodes, NP and S".

(16) *OP²⁹_i ...[_{CP}...[_{NP}...X ...]...]³⁰

Subjacency, as postulated by Chomsky (1982) establishes that:

(17) A single instance of movement can cross at most one bounding nodes where the bounding nodes are CP and NP³¹.

As pointed out by Lasnik & Saito (1992) “there seems to be parametric variation in the bounding nodes for Subjacency” (12). In this sense, see Rizzi (1980), Sportiche (1981-82) and Torrego (1984) for Italian, French and Spanish respectively. According to Rizzi’s proposal, Subjacency does not allow movement out of embedded questions in English since S is a bounding node in this language. Such an extraction, however, is permitted in Italian and Spanish since in those two languages S’ and not S counts as a bounding node.

For Spanish, Torrego (1984) shows how the effect of V-preposing proves to be relevant to determining the choice of bounding nodes for subjacency in this language: CP and NP. **Subjacency** for Spanish is captured in the following definition:

(18) Movement cannot cross more than one bounding node, where bounding nodes are CP and NP.

Given (18) **subjacency** cannot account for the contrast between (7) and (8), repeated here as (19) and (20) for ease of exposition:

(19) [_{CP} *¿Qué* [_{IP} *pro*_j *crees* [_{CP} *t* [_C *que* [_{IP} *pro*_k *compré* *t*_i *a María*]]]]]]
 ‘What do you think I bought for Mary?’

Taking into account that movement is “successive cyclic” as established by Chomsky (1973), the movement of the wh-phrase “que” in (19) from the argument position of the verb “comprar” to the lower Comp and from that Comp to the next higher Comp is local. Neither the first nor the second movement violates (18). Thus, subjacency is respected in (19) since I have assumed, following Campos, that the OP moves at the level of SS and not at LF where subjacency will play no role. Turning now to (8) repeated here as (20):

29 Campos offers no explanation for the location of the OP so high in the clause. I will assume that the OP occupies the first available Spec of CP.

30 As pointed out in section 2, I assume, following Campos, that the OP moves at SS and therefore, follows subjacency. Note that if the OP moves at LF it will not have to obey subjacency since subjacency operates at the level of SS.

31 This definition of subjacency does not apply in Spanish since the bounding nodes in this constraint on movement differ from language to language, being IP and NP in English—see footnote 17—for bounding nodes in Spanish.

- (20) * $[_{CP} OP_i [_{IP} pro \text{ creo } [_{CP} t_i [_{C} que [_{IP} pro_j \text{ le compre } t_i \text{ a María}]]]]]$
 'I think I bought e_i for Mary'

Subjacency, as claimed above, is not violated in this sentence either. First, the empty category moves to the lower Comp in one single step. That movement does not cross any bounding node, being S' and NP the relevant bounding nodes in Spanish. Secondly, e moves from the lower Comp up to the higher clause without violating (18). Yet the sentence is ungrammatical. Two possibilities seem plausible to account for the ungrammaticality of (20): Either the empty category in object position in (20) is not a variable as postulated by Campos (1986) and as examined in section 2, or the definition of **subjacency** needs to be reformulated so as to rule out a derivation like (20). Yet subjacency helps Campos explain the ungrammaticality of sentences (14) and (15), repeated here as (21) and (22) ³²:

- (21) a. ¿Juán traerá cerveza_i a la fiesta?
 'Will John bring beer_i to the party?'
 b. *Existe el rumor de que traerá e ,³³
 'There exists the rumor that he will bring (some)'
- (22) a. ¿Quién trajo cerveza_i a la fiesta?
 'Who brought beer_i to the party?'
 b. *No conozco al muchacho que trajo e_i
 'I don't know the boy that brought (some)'

³² Sentences (21b), (22b) and (23) are grammatical in the variety of Spanish spoken in the Basque Country, as pointed out by Landa (1996) and Jevenois (1996).

³³ Several factors could be playing a role in (21b). On one hand, the determiner 'el' is making 'el rumor' definite. Non-definite NPs seem to improve the grammaticality of the sentences:

- (i) pro he oído rumores de que pro traerá e_i
 pro have heard rumors that pro will bring e_i
 'I have heard rumors that he will bring e '.
- (ii) Existen rumores de que pro trajeron e_i
 There are rumors that pro brought e_i
 'There are rumors that they brought e '.
- (iii) pro oímos/Hay rumores de que pro ha traído e_i
 pro heard/There are rumors that pro has brought e_i
 'We heard/ There are rumors that he has brought e '.

Specificity and not subjacency could be playing a role here. On the other hand, the use of the future 'traerá' could be acting as a barrier.

Campos points out in a footnote that “if the complement S’ contains a verb in the subjunctive, the sentence is better for some speakers” (355).

- (23) ?Existe la posibilidad de que traiga e_i
‘There exists the possibility that he may bring (SUBJ) (some)’

In the same footnote Campos further claims that subjunctives seem to follow a pattern like infinitives³⁴:

- (24) ?Existe la posibilidad de traer e_i
‘There exists the possibility of bringing (INF) (some)’

These data led Campos to the suggestion that S’ in subjunctives and infinitives is a weaker bounding node” (356)³⁵. Yet Campos’ suggestion is limited to Complex NP constructions. I support his proposal by showing the effects of weak bounding nodes in the licensing of null objects, and I extend his analysis to other constructions, particularly to those associated with declarative predicates like “decir” (“to tell”), “declarar” (“to assert, to declare”), “afirmar” (“to affirm”) and epistemic predicates like “creer” (“to believe”), etc... Consider the following two sentences:

34 This proposal will be examined in depth in section 4.

35 Campos' proposal seems to have sprung from a suggestion made by Rizzi (1982). Rizzi (1982) noticed that infinitives and tensed clauses seem to have a different status for **subjacency**. He mentions sentences such as:

- a. *Quest' uomo, che non so se ritieni che Mario conosca abbastanza bene, ci potrebbe essere molto utile.
‘This man, who I don't know whether Mario knows well enough, could be very useful to us’.
- b. ?Quest'uomo, che non so se ritieni di conoscere abbastanza bene, ci potrebbe essere molto utile.
‘This man, who I don't know whether you believe to know well enough, could be very useful to us’.

Such a contrast between (a) in which the clause embedded under the wh-island is a tensed sentence and the (b) sentence in which the clause is an infinitive seems to indicate that the S’ of infinitive is not a bounding node. Although Rizzi does not explicitly pattern subjunctive with indicative as regards to extraction, I tentatively show that his suggestion might have been the basis for Campos' proposal.

(25) [_{IP} pro_j no creo [_{CP}OP_i [_C que [_{IP} pro_k traiga e_i]]]]
 pro not (I) think OP that pro (he/she) bring some]]]]
 'I don't think that he/she may bring (SUBJ) e_i.'

(26) ??[_{IP} pro no creo [_{CP}OP_i [_C que [_{IP} pro trae e_i]]]]]³⁶
 pro not (I) think OP that pro (he/she) bring some]]]]
 'I don't think that he/she brings (IND) e.'

The contrast in grammaticality between (25) and (26) will be the focus of the following section. A brief note of explanation seems to be needed at this point. The most obvious difference between (25) and (26) is the different moods that have been used in the embedded complements. In (25) the verb "no creer" subcategorizes for subjunctive in the embedded clause while in (26), the same verb subcategorizes for indicative. The contrast in grammaticality between these two types of clauses in Spanish seems to call for a structural distinction that will be primarily formulated in terms of **bounding nodes**³⁷. I claim, following Campos' (1986) proposal that S' in a subjunctive clause constitutes a **weak bounding node**³⁸. This bounding node does not violate subjacency. An S' that contains a verb bearing indicative mood constitutes a **strong bounding node** for extraction and renders the sentence less acceptable and in some cases, even ungrammatical. In section 4, I provide a fine-grained distinction between the two structures. This distinction may become very productive in languages that allow for both subjunctive and indicative in complement clauses.

4. A fine grained distinction in standard Spanish: Structural differences between subjunctive and indicative with respect to null objects.

Constructions like "ser necesario" ("=to be necessary") and "ser posible" ("=to be possible") subcategorize for subjunctive and not for indicative in their subordinate clauses:

36 The addition of new elements after the empty category seems to improve grammaticality of (26):

(i) pro no creo OP que pro trae e_i en el bolsillo
 pro not think OP that pro brings (IND) e in his pocket
 'I don't think that he brings e in his pocket'.

I owe this example to Myriam Uribe-Etxebarria (p.c).

37 See Torrengo, E. & J. Uriagereka (1990).

38 I return to this question in the next section.

- (27) a. No hay pan_i para comer.
 'There is no bread_i for lunch'.
 b. * Es necesario que compres e_i³⁹
 'It is necessary that you buy (IND) (some)'.
 c. Es necesario que compres e_i
 'It is necessary that you buy (SUBJ) (some)'.
- (28) a. María no ha hecho muy bien el examen_i aunque estudió muchísimo.
 'Mary did not do well in the exam_i although she studied a lot'.
 b. *Es posible que no aprueba e_i
 'It is possible that she will not pass (IND) (it)'.
 c. Es posible que no apruebe e_i
 'It is possible that she will not pass (SUBJ) (it)'.

The difference between (27b) and (28b) on the one hand, and (27c) and (28c) on the other, lies in the tense-mood of the subordinate verb: (27b) and (28b) are in the **indicative** and (27c) and (28c) in the **subjunctive**. Such a contrast in grammaticality calls for an explanation. In this section I provide a syntactic approach for the indicative/subjunctive contrast present in (27) and (28).

Next, in section 4.1, I examine some analyses of the subjunctive proposed in the literature. Section 4.2 puts forward the idea that subjunctive clauses are unspecified for tense in contrast to indicative clauses which are characterized by the feature [+Tense]. I provide a number of reasons to account for this contrast between subjunctive and indicative clauses in Spanish. I argue for Spanish that subjunctive and infinitive structures seem to follow a similar pattern in a wide variety of contexts claiming for a [-Tense] characterization as opposed to indicative structures which are characterized as [+Tense]. I briefly refer to the so-called "disjoint reference requirement" (Kempchinsky 1985, 1986, 1990) which seems to be operating in subordinate clauses in Spanish as well as in other Romance languages.

39 According to Campos (1986), sentences (27) and (28) are ungrammatical if the sentential subject is not topicalized. In the variety of Spanish spoken in the Basque Country structures with both topicalized and non-topicalized sentential subjects are grammatical.

4.1 Some analyses of subjunctive clauses in the literature⁴⁰

Two different approaches to the study of the contrast between **indicative** and **subjunctive** clauses have been presented in the literature: a semantic/pragmatic approach and a syntactic approach.

The semantic/pragmatic analyses have attempted to relate the choice of mood in the complement clauses to the meaning of the verb in the main clause. In other words, as Kempchinsky (1986) claims, these semantic/pragmatic analyses are based on discourse factors or presuppositions of truth value in the matrix clause. This is the approach pursued in most traditional grammars of Spanish where it is stated that verbs of emotion, affectedness, doubt and denial subcategorize for a subjunctive verb in the embedded clause. Within more technical works, one can mention Hooper & Terrel (1974), Oviedo (1974), Guitart (1977, 1978, 1980). These works explore the pragmatic factors involved in complement mood choice. One of the weaknesses common to all these works is that although they offer "pragmatic" or "semantic" explanations of the choice of mood, they lack a comprehensive pragmatic or semantic theory and what is more, they ignore the interaction that exists between pragmatics and grammar. In other words, following Kempchinsky (1986) "they fail to explain how it is that these pragmatic choices have purely grammatical consequences" (36).

Previous **syntactic approaches** (before GB analyses) to account for the contrast between indicative/subjunctive in embedded clauses propose that the subjunctive is a morpheme that is conditioned by the main verb, taking that condition or subcategorization as a purely syntactic matter, where semantic considerations do not enter. Along these lines, one finds the works by Lakoff (1968), Calboli (1971) and Lozano (1972) who recognize that subjunctive verbs in complement clauses have to be subcategorized for by the matrix verb.

Within the **Government and Binding syntax**, one can mention the works by Kempchinsky (1985, 1986, 1990), Johnson (1984), Picallo (1984, 1985), Jacobowicz (1984), Meireles & Raposo (1983), Raposo (1986), Suñer & Padilla-Rivera (1984) and references therein. All of them adopt the idea that subjunctive clauses do not have an independent tense but they seem to depend on that of the matrix verb. In this sense, Picallo (1984) and Raposo (1986) among others claim for the existence of a [Tense] operator in the Comp position of complements associated with certain kinds of verbs⁴¹. For Picallo, the value of the [Tense] operator in subordinate clauses "cannot be specified within a given set of points in

40 In this section I will draw heavily on Kempchinsky's (1986) work. She offers a detailed summary of pre-GB analyses of subjunctive clauses as well as some analyses of the same phenomena carried out within the GB framework. See Kempchinsky (1986), section 2.1.

41 The reason that led these authors to postulate the existence of a subjunctive operator in Comp comes from the assumption that subjunctive clauses are tenseless. Along the same lines, Kempchinsky (1986) proposes the existence of a subjunctive operator in Comp whose identifier is the [TNS/AGR] node in INF (see footnote 50).

time, leaving undetermined whether the event expressed in V has occur or will occur" (86). The claim that the tense morphology of subjunctive verbs is determined by that of the indicative verb in the matrix clause has been traditionally referred to as *consecutio temporum*.

In my analysis, I adopt a syntactic approach to account for the contrast between subjunctive/indicative in subordinate clauses. My proposal is based on a structural distinction between subjunctive and indicative. My assumption--contrary to Kempchinsky's (1986)⁴²--is that **subjunctive** is characterized as [-T] for Spanish. In this sense it patterns with **infinitive** while **indicative** is characterized as [+T]. The features of [+Tense], as pointed out by Picallo (1984:83), "will specify a moment in time or a time span, out of a given set of points in time, in which the event indicated by VP takes place".

4.2 A structural account for the indicative/subjunctive contrast in complement clauses in standard Spanish.

The following two sentences in standard Spanish show the contrast I am trying to account for:

- (29) a. María ha pedido a Pedro que encuentre tickets_i para el cine pero
 'Mary has asked Peter to find tickets_i for the cinema'.
 b. No creo que encuentre e_i
 'I don't think he will find (SUBJ) (any)'.
 c. *No creo que encuentra e_i
 'I don't think he will find (IND) (any)'.

My proposal to characterize **subjunctive** as [-T] and **indicative** as [+T] in subordinate clauses in Spanish--as suggested in 4.1-- springs from Campos' (1986) suggestion that "S' in subjunctives and infinitives is a weaker bounding node" (356). According to Campos, **subjunctive** in complement S seems to pattern like **infinitives** as opposed to **indicative**. The following sentences from Campos (1986) illustrate this proposition:

- (30) a. ¿Juán traerá cerveza_i a la fiesta?
 'Will John bring beer_i to the party?'
 b. *Existe el rumor de que traerá e_i
 'There exists the rumor that he will bring (some)'.
 c. ?Existe la posibilidad de que traiga e_i
 'There exists the possibility that he may bring (SUBJ) (some)'.
 d. ?Existe la posibilidad de traer e_i
 'There exists the possibility of bringing (INF) (some)'.

A detailed analysis of these and similar constructions involving subjunctive and

42 The reader should refer to Kempchinsky's work.

indicative in Spanish seems to call for a subjunctive/infinitive versus indicative contrast in standard Spanish, based on a [\pm Tense] distinction.

I provide a number of reasons to support the above mentioned analysis:

1. Subjunctive clauses like infinitives as pointed out by Picallo (1984) can only appear in subcategorized positions and never as root sentences:

(31) *Que Jon haya traído e⁴³

'John has brought (SUBJ) e'.

(32) *[pro] haya traído e⁴⁴

'(He/she) has brought (SUBJ) e'.

2. A second piece of evidence suggesting for a conjoined analysis of subjunctive and infinitive comes from the fact that in Spanish some subjunctives--basically second person singular and plural-- are used as **imperatives**⁴⁵. Consider a verb like "venir" whose subjunctive conjugation follows:

(33) yo venga

usted venga

el/ella venga

nosotros vengamos

ustedes vengán

ellos vengán

The fact (see footnote 44) that subjunctive clauses do not need to be subcategorized in imperative expressions seems to support the fact that imperatives share some properties with subjunctives⁴⁶.

43 These examples are translations from Picallo's (1984) examples in Catalan.

44 Picallo (1984) states that "a subjunctive clause can appear nonsubcategorized in exclamatory or imperative expressions such as:

(i) Y que lo diga

'That (he/she) say it! (cf. I/we wish that he/she say it)' (85).

45 The standard assumption is to consider imperatives as [-Tense].

46 Huntley (1984) proposes for English an account to group together imperatives and subjunctives. In his argumentation he states that "the most salient feature in common" of imperative and subjunctive clauses is their lack of a full auxiliary, in particular, their lack of tense and modals. He concludes that both imperatives and subjunctives lack temporal indication. Huntley's proposal supports the idea that

3. Another reason for the contrast subjunctive-infinitive versus indicative in Spanish can be found in purposive clauses⁴⁷. In Spanish purposive clauses select either infinitive or subjunctive:

(34) A: ¿Qué hace esto_i aquí?

'What is this doing here?'

B: Su dueño lo ha traído para que limpiemos e_i
limpiar e_i

'Its owner has brought it for us to clean (it)'.

(35) A: ¿Quién ha dejado ropa_i encima de la cama?

'Who has left clothes_i on the bed?'

B: Miranda la ha dejado para que planches e_i
planchar e_i

'Miranda has left it for us to iron (it)'.

4. Badia-Margarit (1962) and Luján (1979) among others, have noted, with regard to [Tense] feature specification, that subjunctive clauses do not express a value in time-frame coordinates. In this sense, they claim that they are similar to infinitives. Consider the following examples:

(36) a. Jon y María no pueden ir a la opera porque Jon no encontró entradas_i.

'John and Mary cannot go to the opera because John could not find any tickets_i'.

b. Jon se lamenta de que Pedro no encontrara e_i;
'John regrets that Peter does not find (any)'.

c. Jon deseaba que Peter encontrara e_i.
'John wished that Peter had found (some)'.

According to Picallo (1984) and Kempchinsky (1986), a subjunctive alone cannot denote time. It rather is assigned a value via coindexing with the matrix verb. In this sense, Picallo (1984) claims that "the Infl. node of a subjunctive clause lacks the features necessary to be fully specified as [+T]" (88). For her, the inflection node of a subjunctive clause should be abstractly characterized as [-T,+AGR].

5. Another piece of evidence central to the subjunctive/ indicative contrast is found

imperatives and subjunctives seem to have some syntactic property in common

47 My argument seems to support Landa's (1995) claims for the variety of Spanish spoken in the Basque Country where non-phonologically identified null objects are commonly found after infinitives and/or final clauses.

in Portuguese. Portuguese speakers as pointed out by Picallo (1984) seem to consider inflected infinitives and subjunctives as stylistic variants of one another:

- (37) a. Nao importa eles terem (INF) muito atraso⁴⁸
b. Nao importa que eles tivessem (SUBJ) muito atraso
'It does not matter for them to be late'.
- (38) a. Mandei os alunos entrarem (INF)
b. Mandei que os alunos entrassem (SUBJ)
'I asked for the students to enter'.
- (39) a. Era hora que nos sairmos (INF)
b. Era hora que nos saissimos (SUBJ)
'It is time for us to leave'.

The Portuguese examples constitute another argument in favor of the basic abstract untensed character of subjunctive forms and show how **infinitive** and **subjunctive** seem to share a number of characteristics in contrast to **indicative** forms, mainly a [$\pm T$] distinction.

6. The fact that [Tense] is devoid of time features in the subjunctive is supported by the so-called "disjoint reference effect" (Kempchinsky 1985, 1986, 1990; Raposo 1986)⁴⁹. This phenomenon, very common in Romance languages, and among them, Spanish, is obligatory between a complement subject pronoun and a matrix subject when the matrix predicate belongs to a certain semantic class. Non-factive emotives like "temer" ("to be afraid, to fear"), verbs of volition like "querer" ("to want"), "desear" ("to wish") and verbs of influence and permission like "recomendar" ("to recommend"), "exigir" ("to require"), "ordenar" ("to order") among many others are distinguished by the fact that their subcategorized complement clauses "are characterized by the feature [-T] in their Comp position" (Raposo 1986:80)^{50, 51}.

48 These examples are taken from Picallo (1984).

49 On this topic see also Fukui & Speas (1986). What could be happening with some subjunctives is that they may lack an independent time of reference. The reader is also referred to Enc (1987) for a discussion of functional and lexical categories as closed and open categories in terms of barriers.

50 Kempchinsky (1986) proposes that subjunctive complements to volitional predicates (as well as verbs which subcategorize for controlled infinitival complements) are characterized by the existence of a subjunctive/indicative OP in Comp. At LF this operator must be identified by the element which overtly marks subjunctive in a given language. In a language like Spanish where subjunctive is marked by the Infl., Infl. moves to Comp at LF to identify the operator.

A conjoined analysis of subjunctive and infinitive⁵² is supported by verbs like those mentioned in the previous paragraph since in Spanish verbs of volition like “querer” (“to want”) or “desear” (“to wish”) and verbs of influence or permission like “recomendar” (“to recommend”) or “exigir” (“to require”) subcategorize for both infinitive and subjunctive. Infinitive is chosen when the subject of the matrix clause coincides with that of the infinitive:

- (40) María quiere [PRO ir a París]
 ‘Mary wants PRO to go to Paris’.

An apparently disjoint requirement obtains between the subject of the subjunctive clause and the subject of the matrix clause, producing the so-called “subjunctive disjoint reference effect” (SRD) (Kempchinsky 1985, 1986):

- (41) *María quiere que [pro] vaya a París
 ‘Mary wants that [PRO] to go to Paris’.

Thus, one can claim that subjunctive and infinitive have the referentiality of the subject in complementarity⁵³.

In Spanish the contrast between subjunctive and infinitive on the one hand and indicative on the other with respect to the internal specification of tense follows as an automatic consequence of the fact that in this language non-factive emotive verbs, verbs of volition, influence or permission can subcategorize for both infinitive and subjunctive forms in their dependent clause while in English the same class of verbs are only allowed to take infinitive.

51 A similar phenomenon seems to take place with control versus ECM verbs. See Stowell (1981).

52 It has been claimed in the literature that some infinitives are [+Tense]. In this sense, Stowell (1981,1982) argues that infinitives as well as finite clauses are [+TNS]. According to him, the temporal interpretation of the infinitive can be captured on the assumption that Tense is an operator that must move to COMP by LF. However, infinitives do not always need COMP. Then, according to his account, infinitives without COMP will be tenseless since they offer no landing site for the Tense operator. Infinitives in COMP, however, do allow for some Spec of T. Stowell’s proposal will not be followed in my argumentation.

53 Yet, a sentence like (i) contradicts this proposal:

(i) pro_i dudo que [pro_i vaya a Gerona]
 ‘I doubt that I will go (SUBJ) to Girona’.

(42) pro no compré ninguna bebida_i porque
'pro not bought any drink_i because'

- a. I expected him to bring (some)
- b. Esperaba que trajera (SUBJ) e_i
- c. Esperaba traer (INF) e_i

(43) a. No creo que vaya a haber suficiente cerveza_i para la fiesta.

'I don't think there is going to be enough beer_i for the party. I want Peter to bring (some)'

- b. Quiero que Peter traiga (SUBJ) e_i
- c. Quiero traer (INF) e_i⁵⁴

7. Subjunctive is not attested as a productive verbal form in English. A number of verbs, however, can be said to license subjunctive in embedded clauses: "advice", "ask", "be", "necessary", "beg", "crave" and "demand"⁵⁵. When sentences containing verbs like these are translated into Spanish, two different translations are offered, one with an infinitive and another one with a subjunctive. Consider the following sentence:

- (44) a. I demanded that John leave for Hawaii
b. Exigió que Jon saliera (SUBJ) hacia Hawaii
c. Exigió salir (INF) a Jon hacia Hawaii

This fact has some interesting consequences for the object central contrast between subjunctive and infinitive versus indicative with respect to the internal features of [Tense]. These seven reasons seem to call for an analysis of subjunctive clauses as [-T] for Spanish. This specification seems to support the improvement of a null object construction with the subjunctive and the absence, therefore, of a [+Tense] feature. A [-Tense] IP node produces better sentences.

To summarize this section, infinitive clauses follows a similar pattern to subjunctive predicates by being [-T]⁵⁶ as opposed to indicative complements that

54 One must bear in mind that in constructions like (42b) and (43b) the subjunctive subject must be disjoint in reference with the subject of the dominating S. On the contrary, in (42c) and (43c) the subject of the infinitive must have the same reference as the subject of the matrix clause.

55 In this sense, it has been claimed (Emonds, 1976) that "for" in English is an identifier of subjunctive. In Kempchinsky's (1985, 1986, 1990) account "for" will be the realization of a subjunctive operator.

56 Infinitives, however, differ from subjunctive by being [-AGR]. Infinitives are fully characterized by the features [-T,-A] while subjunctives are characterized as [-T,+AGR]. I disregard the [AGR] features since they have a nominal character. The

are characterized as [+T] in Spanish. This distinction seems to support Campos' (1986) suggestion of subjunctives patterning like infinitives with respect to **subjacency**. One could examine whether Campos' proposal of subjunctive and infinitive as weak bounding nodes works in other Romance languages. I leave this question for further research.

5. Conclusions

This paper has attempted to show that any of the four empty categories in the Principles and Parameters framework is insufficient to explain the distribution of null objects in Spanish null non-definite direct object constructions such as that in (8) repeated here as (45):

- (45) * $[_{IP} \text{ pro } _i \text{ creo } [_{CP} \text{ OP } _i \text{ que } [_{IP} \text{ pro } _i \text{ compré } e_i \text{ a María}]]]$
 'I think I bought e_i for Mary'.

It was tentatively suggested that the ungrammaticality of a sentence like (45) could be accounted for, firstly, by the appearance of the direct object clitic 'le' producing some kind of minimality effect and secondly, by the presence of the benefactive 'a María' since extractions when something else follows are sometimes degraded. The sentence, however, seemed to be improved by either adding new material after the benefactive NP or by deleting it. Furthermore, if the word order was altered, the sentence seemed to become better. In this respect, an account on prosody, word order and focus along the lines of Zubizarreta (1996) was briefly suggested as a solution for the problem posited in (45).

In analyzing the status of non-definite direct object constructions in standard Spanish, an operator was assumed to bind the empty element. I posit, following a suggestion by Campos (1986) that this operator moves at the level of SS and therefore, it meets the restrictions that apply to movement and consequently, subjacency⁵⁷. Furthermore, I adopt Campos' proposal that subjunctive and infinitive constructions in complement clauses in standard Spanish constitute a weak bounding node for subjacency while indicative constitutes a strong bounding node. A number of examples were offered to support this assumption. A fine-grained distinction between these constructions was pursued and a conjoined analysis of subjunctive and infinitive as opposed to indicative was presented. This contrast was claimed to have its source on the internal specification of [Tense]. In this way, I claimed for a characterization of subjunctive and infinitive as [-Tense] and indicative as [+Tense].

features of [Tense], however, are basically "verbal".

57 See Fernández Soriano (1989) for examples in which the analysis via extraction of the OP does not work since according to this author, there are violations of subjacency. According to María Luisa Zubizarreta (p.c), if one pursues this analysis the difference between indicative and subjunctive as weak/strong bounding nodes would not be pertinent.

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HUMOUR

1.0 Knotted Names

Have you ever walked into a bookstore or library wanting to find 'that' book, but couldn't quite remember the title? Like the old saying goes; "you can't judge a book by its cover"--especially if you don't know what's on the cover. And some people don't. So instead, they request an almost-but-not-quite title that leaves booksellers and librarians in stitches.

Here's a list of these tangled titles. Can you guess what they really wanted? Answers are found at the bottom of the page.

- (1) "The Angry Raisins"
- (2) "The Leaves of Miserable"
- (3) "An Old Guy that Dies"
- (4) "Left With the Breeze"
- (5) "A Brilliant Mattress"
- (6) "The Furnace"
- (7) "How to Kill a Bird"
- (8) "Like Water Hot Chocolate"
- (9) "Catch Her in the Eye"
- (10) "Varnished"
- (11) "Embarrassed by the Light"
- (12) "Men are for Women who are from Mars"
- (13) "The Covered Walks of Mayberry County"; "The Bridges of Madison Avenue"; "The Britches of Madison County"; or "whatever that book is about Iowa"

Answers:

1. "The Grapes of Wrath" 2. "Les Miserables" 3. "Death of a Salesman" 4. "Gone with the Wind" 5. A Brilliant Madness" 6. "The Inferno" 7. "To Kill a Mockingbird" 8. "Like Water for Chocolate" 9. Catcher in the Rye" 10. "Vanished" 11. "Embraced by the Light" 12. "Men are from Mars, Women are from Venus" 13. "The Bridges of Madison County" --Palm Beach Post

2.0 Myths in Linguistics

2.1 Etymologies and Sound Changes

The word 'kangaroo' has this interesting story: Mythically Captain Cook said to an aborigine, "what do you call that animal", the aborigine replied, "kangaroo", meaning "I can't understand you", or some such reply.

--Ling. List

The quantity of consonants in the English language is constant. If omitted in one place, they turn up in another. When a Bostonian 'pahks' his 'cah', the lost r's migrate southwest, causing a Texan to 'warsh' his car and invest in 'erl' wells.

This last one comes from a radio talk-show question about the historical battle of Agincourt. The French who were overwhelmingly favoured to win the battle, threatened to cut a certain body part off of all captured English soldiers so that they could never fight again. The English won in a major upset and waved that body part in question at the French in defiance. What was that body part?

This answer was given by one of the listeners: "This clears up some profound questions concerning etymology, folklore and emotional symbolism. The body part which the French proposed to cut off of the English after defeating them was, of course, the middle finger, without which it is impossible to draw the renowned English longbow. This famous weapon was made of the native Yew tree, and so the act of drawing the longbow was known as "plucking yew". Thus, when the victorious English waved their middle fingers at the defeated French, they said; "See, we can still pluck yew! Pluck Yew!"

Over the years some 'folk etymologies' have grown up around this symbolic gesture. Since 'pluck yew' is rather difficult to say (like "pleasant mother pheasant plucker", which is who you had to go to for the feathers used on the arrows), the difficult consonant cluster at the beginning has gradually changed to a labiodental fricative 'f', and thus the words often used in conjunction with the one-finger-salute are mistakenly thought to have something to do with an intimate encounter. It is also because of the pheasant feathers on the arrows that the symbolic gesture is known as 'giving the bird'.

CWPL STYLE SHEET

Documents should be submitted as camera ready hardcopies in accordance with the requirements outlined below. A copy should also be submitted on disk. **The editors reserve the right to return any submissions which do not adhere to the style sheet herein.**

1.0 Manuscripts on disk

Manuscripts should be produced on a Macintosh computer in the following format using Microsoft Word for text and Superpaint or Macdraw for tables, graphs, etc. Disk format required is 3.5 inch and high density. If this is not possible, please contact the editors regarding alternate arrangements. If the disk is to be returned a self addressed envelope should be sent also.

2.0 Manuscript Conventions

- 2.1 All material, including extended quotes, footnotes, references, etc. should be single spaced except for indented quotes and examples, (see § 3 below).
- 2.2 Each article should begin with the title, name of the author, and institutional affiliation or place of residence, all typed on separate lines with no spacing between these lines. Double spacing should be inserted between this section and the abstract
- 2.3 All footnotes, references, tables, diagrams, maps, etc. should NOT be on separate sheets but should be placed in their appropriate locations.
- 2.4 Section headings are required. Main headings should be bolded but not all-caps and not underlined: e.g. **Introduction**. Section sub-headings are optional, but no more than one level of sub-headings should be used. Sub-headings should not be all-caps but should be bolded, e.g. **Sentence Types**. There should be no spaces between section headings and text.
- 2.5 **All text should be fully justified** including abstracts, text body, footnotes, references, etc.

3.0 Text Conventions

- 3.1 Linguistic forms cited within a sentence in the text should be set apart from the text. Recommended conventions are as follows.
 - Forms cited in phonetic transcription should be enclosed between square brackets.
 - Forms cited in phonemic transcription should be between slant lines.
 - Other cited forms (e.g. underlying forms) should be underlined.
 - Authors may specify other transcriptional devices such as vertical lines, curly brackets, obliques, etc.
- 3.2 Glosses of linguistic forms should be enclosed between single quotation marks, which are not otherwise used: e.g. /amihkw/ 'beaver'. Double

quotation marks should be used only for short quotations, reported conversation and the like.

- 3.3 The abstract and extended quotations of more than three typed lines should be set apart from the main text by double spacing both before and after the quotation, should be single spaced, and with both the left and right margins indented five spaces. No quotation marks of any sort should be used.
- 3.4 Sets of examples or example sentences should be numbered serially with Arabic numerals closed in parentheses. If several such examples are grouped together, the entire group is identified by an Arabic numeral, and the individual sentences by lower case letters, e.g.:

- (5) a. John loves Mary.
b. Mary is loved by John.

Rules set off from the text should be similarly numbered, e.g.:

- (3) C --> [-vce]/_____#

4.0 Table/Figure Conventions

- 4.1 Number figures and tables consecutively (figures separately from tables) with Arabic numerals. All figures and tables should be placed in their respective places within the text.
- 4.2 A brief title for each table/figure that makes the data intelligible without reference to the text may be used. Longer explanatory material should be typed as a footnote to the table, not as part of the title.
- 4.3 Column heads should be short, so as to stand clearly above the columns.

5.0 Footnote Conventions

- 5.1 Footnotes should be located at the bottom of the page. They should be typed beginning with a raised number with double spacing between each note.
- 5.2 Footnotes are not used for bibliographical reference. They should be brief, ancillary comments on the main text and not extended discussions.
- 5.3 Footnotes should be numbered consecutively throughout the text. A footnote number in the main text is to be typed as a raised number immediately following the material to which it refers, e.g.:

...the extended linkage³ which is...

Footnotes at the end of a sentence should follow the final punctuation:

...as evidenced in Gothic.³

5.4 Acknowledgements should be placed immediately after the text but immediately before the references.

6.0 Reference Conventions

6.1 Complete bibliographical information is not cited in the text or as a footnote. Within the text, the author's name, the date of the work referred to, and the page number(s) (if appropriate) are sufficient. The reference should be between parentheses, e.g.:

...it has been suggested (Johnson, 1959:32) that...

If the author's name is part of the sentence, only the numbers are between parentheses, e.g.:

...Johnson (1959:32) has suggested that...

If the author's name is part of a parenthetical comment, the parentheses are omitted from the numbers, e.g.:

...some claim (including Johnson, 1959:32 and Smith, 1963) that...

6.2 Do not use the terms "ibid." and "op.cit." Where necessary to avoid ambiguity, repeat the full reference. Do not use authors' initials when citing references in the text unless needed to distinguish two authors of the same surname.

6.3 Full bibliographical information for the references cited in the text should be located within the section entitled REFERENCES at the end of the paper. Entries should be single-spaced both within and between references. Works are listed alphabetically by author's last name, and chronologically when two or more works by the same author are listed, distinguished by lower case letters in the case of works published in the same year. Each entry has four elements: the author's name, the year published, the title, and the source or place of publication. Each line following the first line of an entry is indented eight spaces. Titles of books should be in italics. Titles of both books and articles should follow the convention where only the first word of the title is capitalised. All other words, with the exception of proper nouns, should be in lower case. The following patterns should be used:

Single author:

Sapir, Edward. 1921. *Language*. New York: Harcourt, Brace.

Single Editor:

Fishman, Joshua A., ed. 1968. *Readings in the sociology of language*. The Hague: Mouton.

Multiple authors:

Chomsky, Noam & Morris Halle. 1968. *The sound pattern of English*. New York: Harper and Row.

Articles:

Jasanoff, Jay. 1978. 'Observations on the Germanic Verschärfung.' *Münchener Studien zur Sprachwissenschaft*. 37: 77-90.

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Papers should not include page numbering. Authors are, however, asked to lightly write the page numbers on the back of the pages in pencil.

Left, right, top and bottom **margins** should be not less than 1.5".

All text should be composed using **Times, IPA Times or IPA Extended Times** font. The size of the font should be 12 point for the text and 10 point for the footnotes and 7 point footnote numbers.

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Authors are asked to include an abstract of their paper under the title, their name and their institution. The title **Abstract** should be centred and bolded above the abstract. The first line of the abstract should not be indented like a normal paragraph. The entire body of the abstract should be indented as indicated in Section 3.3. **A separate copy of the abstract should also be submitted with the paper to be sent to a publisher of Working Paper Abstracts.**

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Example:

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