VARIATION WITHIN AND ACROSS ROMANCE LANGUAGES

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Marie-Hélène Côté and Éric Mathieu (eds.)

Variation within and across Romance Languages.
Selected papers from the 41st Linguistic Symposium on Romance Languages
(LSRL), Ottawa, 5–7 May 2011

VARIATION WITHIN AND ACROSS ROMANCE LANGUAGES

SELECTED PAPERS FROM THE 41ST LINGUISTIC SYMPOSIUM ON ROMANCE LANGUAGES (LSRL), OTTAWA, 5–7 MAY 2011

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Foreword and Acknowledgments

The Department of Linguistics at the University of Ottawa was proud to host, for the first time in 21 years, the 41st annual meeting of the Linguistic Symposium on Romance Languages (LSRL), May 5–7, 2011. No presentation of LSRL is necessary: it is by now a well-known annual conference of international standing, widely acknowledged to be the most prestigious and selective forum worldwide in the field of Romance linguistics, whose contribution to the discussion and dissemination of research in all areas of linguistics as they apply to the Romance languages has been widely influential over the years.

In addition to standard conference presentations in the major domains of linguistics (e.g., phonology, syntax, semantics, sociolinguistics), LSRL 41 in Ottawa featured a special parasession on "the acquisition of Romance languages: theoretical and experimental issues", targeting the interaction between formal and experimental approaches to the analysis of Romance languages. Keynote speakers included Yves Roberge (University of Toronto), Tobias Scheer (Université de Nice), Rena Torres Cacoullos (Pennsylvania State University) and William Snyder (University of Connecticut), as well as Bethany MacLeod, an outstanding graduate student from the University of Toronto, who was chosen as invited student speaker (a new feature of LSRL 41). We thank them for their contribution to the success of the conference.

The successful organization of LSRL 41 owes much to the dedication of numerous people. We would like to express our gratitude to the following sponsors for their generous support of LSRL 41 and without whom the conference could not have been held at the University of Ottawa: the Social Sciences and Humanities Research Council (SSHRC), Research Management Services and the Faculty of Arts, University of Ottawa, with special thanks to Antoni Lewkowicz, Dean and Lucie Hotte, Vice-Dean Research. The help of Jeanne D'Arc Turpin, Administrative Assistant, Department of Linguistics, was invaluable in all matters organizational. LSRL 41 would not have been possible without the energy and hard work of the student members of the LSRL Organizing Committee: Lorenzo Patino, Mélissa Chiasson and Yukiko Yoshizumi. We are also grateful to the many student volunteers who graciously gave their time to ensure the success of the conference: Isabelle Benoît, Christie Brien, Stephanie Cherry, Karine Cyr, Karine Groulx, Laura Kastronic, Julien Léger, Richard Léger, Martine Leroux, Claire Leroux, Claire O'Brien, Joe Roy, Ariane Séguin, Keren Tonciulescu and Lia Walsh. We would like to thank our colleagues Shana Poplack for her special contribution to the organization of the conference and Laura Sabourin and Tania Zamuner for

the organization of the parasession. Finally, thanks to all speakers, invited and regular, for making LSRL 41 such an enjoyable intellectual experience.

LSRL has a long tradition of bringing out selections of the best papers in the "Current Issues in Linguistic Theory" series, created and since its inception edited by E.F.K. Koerner and published by John Benjamins of Amsterdam & Philadelphia. This publication, which disseminates the latest theoretical and experimental developments in Romance linguistics, is highly influential and enjoys worldwide distribution. The present volume provides a collection of the best papers presented at the conference and showcases the latest developments in linguistic theory and their application to the Romance family, focusing on variation. Variation is a very current topic. It has been in the limelight in recent years because any linguistic theory that aspires to explanatory adequacy must offer a satisfactory answer to the question of why and how languages vary. The 20 papers included in this volume were rigorously refereed. We thank all the reviewers as well as Professor Koerner, his advisers, and the support team at John Benjamins for their work. Finally, we thank Gita Zareikar for compiling the index.

Québec — Marie-Hélène Côté
Ottawa, July 2014 — Éric Mathieu

Editors' introduction

This volume contains a selection of twenty papers from the 41st Linguistic Symposium on Romance Languages. One theme that links the individual contributions is *linguistic variation*, understood in a broad and inclusive sense and viewed as a fundamental feature of language. All papers deal with one or several aspects of variation across languages, dialects, speakers, time, linguistic contexts or communicative situations, and address its causes, manifestations or formal treatment. Furthermore, the selected papers offer a representative sample of current perspectives and methods, applied to the Romance family and across a wide spectrum of linguistic subfields, from phonetics to semantics, from historical linguistics to bilingualism and L2 learning. Romance languages have continuously played a leading role in the evolution of linguistic research and this volume is an indication that they continue to serve as testing grounds for current hypotheses and as stepping stones to new developments.

The book is divided into four parts, which deal successively with sound structures and their interface with other linguistic components; syntax and semantics; language change; and interactions across dialects and languages. The languages represented in this volume belong to all main language groups within the Romance family: different varieties of Spanish and Portuguese, Catalan (Algherese variety), French (Old and Modern), Ladin (Fassano variety), Italian, Sardinian and Romanian.

This preliminary chapter introduces some relevant aspects of the status and treatment of variation in linguistics and discusses the structure of and the individual contributions to the volume.

1. Aspects of variation in linguistics

Linguistic variation takes on various dimensions that have traditionally been addressed within different subareas of linguistics. Crosslinguistic variation has always been central to linguistic theory, while internal and diachronic variation has lain at the core of sociolinguistics and historical linguistics. This type of 'division of labor', so to speak, has shifted and variation now tends to be treated in a more integrated fashion across the different subfields of linguistics (see, e.g., Gregersen et al. 2011). The development of experimental and corpus linguistics has contributed to new approaches to the study of variation, but theoretical formalisms and applied areas have also reconsidered the status and treatment of variation at various levels, variation being viewed

more as a fundamental aspect of language and less as 'noise' to be abstracted away from; see Laks (2013) for an enlightening metatheoretical and historical perspective. For example, the acquisition of (socio)linguistic variation is a growing research topic in language acquisition, (e.g., Bentzen & Westergaard 2013; Chevrot & Foulkes 2013). In the realm of applied linguistics, second language teaching and learning have also embraced variation (e.g., van Campernolle 2013; van Campernolle & Williams 2013). However, the following paragraphs will focus on variation from the perspective of the analysis of sound processes and syntactic theory.

In rule-based phonology, crosslinguistic variation was expressed by the use of different rules or rule orderings. Internal variation was often reduced to rule optionality or lexical exceptionality, if it was not altogether ignored. A process could apply or not, but phonological analyses (unlike Labovian sociolinguistics) often offered little understanding of the conditioning factors of variation. Since the 1990s, different developments in phonological theory have allowed a much richer approach to variable processes, as indicated by several recent reference publications on variation in phonology (e.g., Anttila 2002, 2007, 2012; Coetzee & Pater 2011; Hinskens et al. 2014).

The advent of Optimality Theory (OT) gave rise to important developments in the treatment of variation. OT accounts for crosslinguistic variation through constraint reranking (or constraint weighting in the closely related framework of Harmonic Grammar [Pater 2009b]). But OT's potential for a deeper analysis of intragrammatical variation was also immediately exploited, the model allowing variation among different outputs to be accounted for by the very same factors and mechanisms that explain categorical processes and crosslinguistic variation. The scope of phonological analysis could even be extended to include not only categorical and optional phenomena but also finer-grained notions of preferences. Various formal proposals have been put forward to deal with internal variation, including partially ordered or stratified grammars (Anttila 1997; Auger 2001; Anttila et al. 2008; among others), stochastic grammars (Boersma 1997, 1998; Boersma & Hayes 2001), access to non-optimal candidates (Coetzee 2006), markedness suppression (Kaplan 2011) and, for lexically-determined variation, lexically-indexed constraints (Pater 2000, 2007, 2009a; Zuraw 2010; Coetzee & Kawahara 2013).

Parallel to the formal developments associated with OT, experimental and usage-based approaches to the analysis of sound processes have triggered advances in our understanding of various aspects of variation. Prominent research streams in recent years include Laboratory Phonology (Cohn et al. 2012), sociophonetic variation (e.g., Foulkes & Docherty 2006; Hay, Nolan & Drager 2006) and Exemplar Theory (e.g., Goldinger 1998; Pierrehumbert 2001; Bybee 2006; Weddel 2006).

In syntax, variation has been a trending topic since at least the beginning of the 1980s with the advent of the Principles and Parameters theory (Chomsky 1981) and in semantics more recently since Chierchia (1998). Gone are the days when English was the sole language under study. Comparative work has been at the forefront of linguistic research for decades and much has been learned along the way. One

particular approach to variation in syntax that has been popular in the literature is the microparametric approach according to which the locus of variation is attributable to differences in the features of particular items (e.g., functional heads) in the lexicon (the so-called Borer-Chomsky Conjecture, first proposed by Borer [1984] and later adopted by Chomsky [1995]). A variant of this approach is the Cartographic enterprise (Rizzi 1997, 2004; Cinque 1999, 2002; Belletti 2004), which proposes to map all functional heads of the world's languages and postulate rich structures in every extended projection, in every language. On this view variation is largely restricted to the inventory of features rather than their hierarchy (the latter is based on innate factors); it places differences between very close dialects, or even within dialects, under a microscope and focuses on internal variation. Much of this work appeared in the context of consideration of Romance languages (Poletto 2000; Munaro, Poletto & Pollock 2001; Munaro & Pollock 2005, among many others), Romance dialects notably providing a rich array of comparative points for linguistic research (Northern Italian dialects, for instance).

The microparameter approach is in contrast with the macroparameter approach of Baker (1996, 2001) that takes the view that languages differ on a much larger typological axis. This looks at interlinguistic variation. Baker's Polysynthesis Parameter according to which languages must or need not express all theta-roles as morphemes on the verb is perhaps the most well known of all macroparameters. A more recent macroparameter proposed by Baker is the Direction of Agreement parameter (Baker 2008a) according to which the goal of agreement must or need not c-command the agreeing head. Expressed in this way, such parameters are directional rather than bidirectional parameters. Many researchers have proposed a microparametric approach to the properties of polysynthesis (Déchaine 1999; Legate 2002; Kayne 2005; Adger et al. 2009), and it is possible that the Direction of Agreement parameter is amenable to a microparametric approach as well.

Finally, there has recently been a trend to outsource, as it were, parameters to the interfaces, most notably the Phonetic Form (PF) interface. The idea is that parametrization and variation is mostly, possibly entirely, restricted to externalization (Berwick & Chomsky 2011). While Universal Grammar (UG) is stable, modes of externalization are not inherently unique to the language faculty, but rather emerge as recurring principles of design/organization and are thus subject to much historical change (Kandybowicz 2009). For Boeckx (2010, 2012), principles of narrow syntax are not subject to parametrization; nor are they affected by lexical parameters. All 'parameters', and thus inter- and intralinguistic variation, reduce to realizational options (i.e., PF decisions rendered necessary to externalize structures constructed by an underspecified syntactic component). However, since the much quoted proposition that languages differ from each other without limit and in unpredictable ways (Joos 1957: 96) cannot be true, much work remains to be done in order to establish how exactly external parameters are mapped and how they cluster. The message to take home is not that variation has disappeared from linguistic theory but rather that it has shifted to another

component of the grammar, perhaps more in tune with emergent theories of language, but with leaving the internal principles of grammar intact.

2. Overview of articles

Part I brings together articles on sound patterns (phonetics and phonology) and their interface with morphology, syntax and the lexicon. The topics addressed range from the organization of articulatory gestures (Campos-Astorkiza) and syllabic constituents (Scheer) to the interface between phonology and morphology (Torres-Tamarit), syntax (Mazzola, Mayoral Hernández & Alcázar) and the lexicon (Cabrera-Callís). Discussions include two emblematic processes of phonological variation: schwa realization in French and /s/ aspiration in Spanish.

The first contribution, "Sibilant voicing assimilation in Peninsular Spanish as gestural blending" by Rebeka Campos-Astorkiza, also features the Spanish /s/. The voicing of /s/ before a voiced consonant is a well known feature of the Spanish sound system. Following much recent research in phonetics and laboratory phonology, the author investigates the gradient and variable nature of this process, focusing on some of the contextual factors that possibly condition voicing. The author considers /s/ voicing as a case of gestural blending, resulting from overlap between the conflicting laryngeal gestures of the two consonants. On the basis of careful instrumental analysis, she shows that while the prosodic boundary between /s/ and the following voiced consonant has a significant effect on voicing, the location of stress, surprisingly, seems largely irrelevant. The experimental results also reveal a new conditioning factor: the manner of articulation of the following consonant.

The other papers in this section adopt a more formal perspective. Francesc Torres-Tamarit looks at another variable process affecting Spanish /s/ in "Phonology-morphology opacity in Harmonic Serialism: The case of /s/ aspiration in Spanish". This process is subject to much dialectal variation, notably with respect to the interaction – transparent or opaque – between the aspiration of /s/ and its resyllabification across morpheme and word boundaries. The author accounts for different dialectal types within the framework of Harmonic Serialism, a close relative to OT, through the relative ranking of three categories of constraints governing the presence of [s] in coda position, the building of prosodic structure and alignment between morphological and prosodic categories.

Algherese Catalan, spoken in Sardinia, displays a complex process of rhotacism, whereby coronal stops and laterals turn into flaps. While rhotacism has often been described as categorical, Maria Cabrera-Callís shows that its application is variable and subject to morphological and lexical conditionings, pertaining to the borrowed or inherited status of the word and the position of the target consonant within the word. Her paper "Morphologically conditioned intervocalic rhotacism in Algherese

Catalan: An account with lexically indexed constraints" develops an OT account of rhotacism with constraints indexed to lexical classes, reflecting on the adequate formalization of lexical variation.

Sardinia also features prominently in Tobias Scheer's contribution "Muta cum liquida in the light of Tertenia Sardinian metathesis and compensatory lengthening Latin V̆tr > Old French Vrr". Working within the CVCV framework, a development of Government Phonology that only admits sequences of simple onsets followed by simple nuclei, the author offers empirical arguments for the presence of an empty nucleus within stop-liquid onset clusters. Evidence come from two sets of data: the change from [tr dr] to [rr] from Latin to Old French and metathesis in a variety of Sardinian whereby a liquid moves to its left and forms a 'branching onset' with a preceding stop. Variations in the application of Old French gemination and Sardinian metathesis are accounted for by governing and licensing conditions on neighboring segments.

Moving from Old to Modern French, Michael Mazzola turns to the notoriously complex behavior of schwa, especially its variability at word and clitic boundaries as a function of the number of adjacent consonants and syllables. In "Schwa at the phonology/syntax interface", he argues that this variation is best explained by a grammatical model in which the phonological component has direct access to syntactic domains. The realization of schwa is determined by the rhythmic template of French, which interacts with both the lexicon and the syntax. No intermediate prosodic constituency is built, as in other popular models of the syntax-phonology interface, which limit the point of contact to prosodic phonology.

The following chapter, Roberto Mayoral Hernández & Asier Alcázar's paper "Weight effects across verbal domains: The case of Spanish subjects", also lies at the interface between syntax and phonology and offers a nice transition to Part II. It is well known that word order is partially determined by the phonological weight of syntactic constituents. Most research on the interaction between weight and syntactic position has focused on postverbal constituents, heavier ones tending to move away from the verb. The authors look here at another case of word order variation between preverbal and postverbal subjects in Spanish. They show on the basis of corpus data that heavier subjects are attracted to the postverbal position, suggesting that the relevant characterization of the constituent order shift is not 'away from the verb' but 'to the right'. Different correlates of weight are also compared (number of syllables, words or phonemes), yielding a marginal advantage for syllabic weight.

Part II is a collection of articles on variation as pertaining to syntax and semantics. Five articles compare Romance languages or dialects while two articles focus solely on French. Four articles look at interlinguistic variation: one compares European Portuguese with Italian (*sempre,* Amaral & Del Prete), another Romanian with other Romance languages, e.g., French, Italian, Spanish (epistemic indefinites, Fălăuş), another Romanian with Sardinian (polarity fronting, Giurgea & Remberger) and a fourth

article compares Romanian (and Greek) with Spanish (clitic doubling, Marchis Moreno). One article looks at intralinguistic variation, comparing Spanish dialects (ordering in negative expressions, Gutiérrez-Rexach & González-Rivera).

Part II begins with Patrícia Amaral & Fabio Del Prete's contribution entitled "On truth persistence: A comparison between European Portuguese and Italian in relation to *sempre*", where the authors analyze a non-temporal interpretation of the adverb *sempre* "always" in European Portuguese and Italian. This adverb expresses persistence of the truth of a proposition over time and displays specific contextual constraints (TP-*sempre*). The authors show that, despite an overlap in the contexts in which TP-*sempre* may occur in both languages, its distribution is not exactly the same in European Portuguese and Italian. In view of these data, Amaral & Del Prete propose that TP-*sempre* is a modal operator of confirmation in both languages, but that it is more restricted in Italian in that it has a plan presupposition only in this language.

Anamaria Fălăuş in her contribution "Pick *some but not all* alternatives!" shows that while many languages have epistemic indefinites, their interpretation may vary depending on the language. Among the parameters of variation, one distinction plays a crucial role, namely the modal inference they sustain. It concerns the extent of variation ('freedom of choice') in the quantificational domain, which can be *total* or *partial*. In her paper, Fălăuş provides further support in favor of the distinction between total and partial variation and argues that it is possible to exploit this difference to derive not only the interpretive properties of epistemic indefinites, but also their distribution. To this end, Fălăuş focuses on the Romanian epistemic determiner *vreun* and discusses new data concerning its use in the context of imperatives. The author shows that *vreun* requires partial variation, and as such is excluded from contexts in which a total variation inference is possible.

In "Polarity fronting in Romanian and Sardinian" Ion Giurgea & Eva-Maria Remberger compare Romanian and Sardinian in relation to polarity fronting. They argue that, while verum focus (i.e., focus on the polarity component of the sentence) involves movement and a checking operation in the left periphery, in Romanian polarity fronting is realized as head-movement of a verbal complex to Fin with a focus-probe but in Sardinian, an entire phrase headed by the lexical predicate (verbal non-finite form or non-verbal predicate) is fronted before the auxiliary. In Romanian, the movement operation licenses VS orders for predications in which VS is not allowed as a neutral order (i-level predicates, iteratives, generics). In Sardinian, the authors argue that the result order is obtained by two movement operations, head-raising of (V+) T+S to Foc and movement of the predicate phrase to SpecFoc. Giurgea & Remberger also present the semantics of polarity focus, distinguishing several types of focus (informational, emphatic, contrastive).

The next article by Javier Gutiérrez-Rexach & Melvin González-Rivera "Degree quantification and scope in Puerto Rican Spanish" looks at a common feature of Caribbean Spanish, namely the possibility of preposing a degree delimiter before a negative term. The authors present a detailed empirical analysis of the Puerto Rican

case and show that this possibility is due to a combination of syntactic and semantic factors that pertain to the syntax and interpretation of degree restriction. The authors propose that placement (preposition) of the degree delimiter is allowed by a Deg raising operation nevertheless restricted by general syntactic locality constraints. This property seems to suggest potential fruitful avenues for further research: for example, to determine whether it would be possible to establish microparametric variation within the Caribbean area with respect to the degree raising operation.

Mihaela Marchis Moreno in "'Minimal link constraint' violations: Move vs. Agree" continues the long-standing discussion on whether clitics in clitic doubling constructions should be regarded as being similar to affixes expressing subject–verb agreement or rather as reflexes of movement. She argues that a crosslinguistic comparison of clitics shows that, although clitics come in different flavors either as phi-features or as determiners, they are all the result of an overt feature movement to repair violations of the Minimal Link Constraint (MLC). Raising constructions in Greek, Romanian and Spanish are claimed to use clitic doubling as a strategy to avoid minimality effects and, on the basis of a parallelism between clitic doubling and raising, the author concludes that they are the outcome of two different operations Move vs. (Long Distance) Agree, yet both are sensitive to MLC and regulated by a phase-based locality condition (the Phase Impenetrability Condition).

The next article "On subjunctives and islandhood" by Léna Baunaz & Genoveva Puskás discusses the relation between selection, subjunctive mood and extraction facts in French. The authors show that the degree of permeability observed in subjunctive clauses with respect to, e.g., wh-extraction is apparent, and is only indirectly related to the indicative/subjunctive alternations. Baunaz & Puskas examine different verb classes in French and show that the behavior of various types of wh-phrases in extraction contexts is not directly linked to the mood of the embedded clause. They propose (i) that the indicative-subjunctive distribution is a property of predicates which has to be distinguished from the property involved in complementizer selection (the subjunctive-indicative alternation can be accounted for in terms of the emotive–cognitive property of the matrix predicate); and (ii) that islands effects, that is, the degree of permeability of the embedded clauses can be related to the properties of the selected complementizer. In other words, the possibilities of extraction of a wh-phrase from an embedded clause can be accounted for by the size of the complementizer, which acts as a more or less strong blocker for wh-extraction from the clause it selects. The authors conclude that mood 'selection' and complementizer selection are two independent properties of the main predicate.

Lisa A. Reed in "When control can't be a fact" identifies a class of French verbs that has the interesting characteristic of disallowing simple Control, ECM, and small clause complementation, apparently universally. It is argued, on the basis of a novel application of certain tests developed in previous literature, that what distinguishes these verbs is the lexical semantic feature of selecting for a Possible Fact-denoting clausal complement. The metaphysical feature of truth indeterminacy – unique to Possible

Facts – is used to explain why they cannot be realized as simple Control, or for that matter, simple ECM or small clause complements.

Part III deals with diachronic variation. Three papers focus on syntactic change, one on sound change, starting with the latter. In "Prevocalic velar advancement in Chilean and Proto-Romance", Carolina González first investigates synchronic and diachronic issues related to various cases of velar advancement in prevocalic position, distinguishing velar fronting, palatalization and coronalization. Connecting historical developments in Proto-Romance with contemporary Chilean Spanish, the author proposes a diachronic scenario in which a palatal stage occurs between velar fronting and coronalization. The first two stages are assimilatory in nature, whereas coronalization is motivated by phonetic factors disfavoring palatals. The conditions applying in different waves of palatalization in Proto-Romance are also elucidated. This analysis departs in several respects from other recent accounts of palatalization and it is formalized within OT.

The second article is by Mary Aizawa Kato. In her paper, "The role of the copula in the diachronic development of focus constructions in Portuguese", she shows that Old and Classic Portuguese had two positions for contrastive focus: one at the sentence initial position, followed by the verb, a 'V2' sort of pattern (XPVS), and one at the sentence final position, constituting the Romance post-verbal subject (V(XP)S). Kato analyzes the role of the copula in the innovations that occurred in Modern Portuguese focus structures: (a) the expansion of cleft constructions, from wh-clefts to *that*-clefts, (b) from inverse clefts to canonical clefts and (c) the reduction of *that*-clefts, a grammaticalization that affected only Brazilian Portuguese (BP). In European Portuguese (EP), XPVS and V(XP)S survive together with modern clefts while in BP clefts and reduced clefts took over the old constructions completely.

In "The French wh interrogative system: Evolution and clefting" Sandrine Tailleur shows that the contemporary system of French wh interrogatives is complex and that speakers have access to over five different variants of wh questions. Through the study of the evolution and usage of all variants, the author shows that the wh+*est-ce que* variants are at the center of the system's evolution. They explain why so many variants have been preserved, and they are also the trigger of a possible structural change affecting the interrogative left periphery. Assuming a diglossic approach, some registers of French lack wh movement, and now produce wh interrogatives that are similar to syntactic clefting. Such an analysis predicts that wh in situ is to be expected, since it is part of the same register – grammar – as the wh *est-ce que*.

Christina Tortora, in her contribution "On the relation between functional architecture and patterns of change in Romance object clitic syntax", shows that complement clitic pronouns (OCLs) in Romance are not all created equal: diachronic change in OCL syntax can at first affect some clitic forms, but not others. Tortora examines two cases of variation and change in OCL syntax from two different Romance varieties. The author examines the change in progress in OCL-infinitive order in Fassano

(Ladin) varieties, and the variation in the OCL-types which participate in a non-standard imperative construction in Spanish. Tortora explores the idea that variation and change in these apparently unrelated cases is the result of the same underlying fact, namely, that the different OCL forms occupy distinct functional heads within the functional hierarchy of the clause, within the stretch of functional architecture dubbed the 'clitic placement domain'. The Functional Hierarchy Hypothesis for clitic placement provides a framework in which to understand how syntactic variation and change affects the different OCLs in a predictable way.

Part IV contains three articles involving interactions across dialects and languages. At play here is variation at the individual level: between speakers of different varieties interacting together (McLeod), monolingual and bilingual speakers (Hsin), L2 speakers at different levels of proficiency (Millard & Lonsdale). In the chapter "Investigating the effects of salience and regional dialect on phonetic convergence in Spanish", Bethany MacLeod first contributes to our understanding of the factors affecting phonetic accommodation between different speakers. Pairs of speakers from two dialects of Spanish – one from Madrid and one from Buenos Aires – were tested before and after engaging in a conversation that exposed them to the other variety. The participants also performed a task designed to measure the perceptual salience of four dialectal differences. The author shows that the perceptual salience of dialectal differences affects both the magnitude and the direction of phonetic change from pre- to post-conversation: participants make greater changes on the more salient differences (diverging or converging) and are more likely to converge on the less salient differences.

Still in the area of linguistic influence, Lisa Hsin investigates interlinguistic influence in Spanish-English bilingual acquisition. In her paper "English questions, Spanish structure: A shared-structure account of interlinguistic influence in bilingual first language acquisition", the author argues that English wh-questions are acquired at an accelerated rate by English-Spanish bilingual children in comparison with monolinguals. This unusual finding is explained as the result of structure sharing between Spanish and English: the acquisition of English wh-questions requires syntactic projections for which Spanish provides independent evidence, hence the acquisitional advantage observed in bilinguals. This analysis in turn suggests a model of bilingual acquisition involving a closer relationship than generally assumed between the child's two languages.

Finally, Benjamin Millard & Deryle Lonsdale focus on L2 speakers and models of oral proficiency testing, an important but difficult area in language teaching. In their chapter "French oral proficiency assessment: Elicited imitation with speech recognition", the authors present a new and more effective method for measuring individual variations in oral proficiency in French. This method comprises two main ingredients: a methodology called elicited imitation, consisting in the repetition of aurally presented sentences, and automatic speech recognition used to score the repeated sentences. The results of the automatic scoring system were shown to correlate with a high degree to human scorers. The possibility of implementing an accurate and fully automated

assessment process will have considerable impact on the ever expanding domain of L2 teaching and testing.

3. Conclusion

The articles in this volume illustrate the richness and complementarity of topics, methods and formalisms explored within Romance linguistics. Formal, experimental and corpus-based approaches are all represented, as well as different theoretical frameworks. Articles are tied together by common empirical or analytical issues addressed in contrasting ways. The realization of Spanish /s/ across different morpho-prosodic contexts is explored from two perspectives: intradialectal phonetic variability (Campos-Astorkiza) and interdialectal variation in a constraint-based formal framework (Torres-Tamarit). The interface between syntax and phonological units is approached formally (Mazzola) and experimentally (Mayoral Hernández & Alcázar). Other common topics include focus, explored from a crosslinguistic (Giurgea & Remberger) or diachronic and dialectal perspective (Kato), clitics (Marchis Moreno, Tortora) and modality and presuppositions (Fălăuş, Amaral & Del Prete, Baunaz & Puskas).

This volume is also quite representative of some of the recent trends observed in general linguistics. Strong emphasis is put on interfaces, frontiers between established subareas of linguistics being increasingly blurred. For instance, syntax meets historical linguistics and sociolinguistics (Tailleur), beyond its traditional connections with morphology and semantics. New research avenues are also explored, such as phonetic convergence in interactions between speakers of different dialects (MacLeod). Finally, the inclusion of an article on language learning (Millard & Lonsdale) attests to the necessity of a continuing dialogue between general and applied linguistics.

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PART I

Sound patterns

Sibilant voicing assimilation in peninsular Spanish as gestural blending

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Voicing assimilation of /s/ before a voiced consonant is a widely reported feature of the Spanish sound system. This process is often described as stylistically determined, gradient and variable. However, there is a scarcity of non-impressionistic data supporting these claims. Following previous approaches to assimilation, we analyze voicing assimilation in Spanish as an instance of gestural blending. Taking this as a point of departure, this study presents an acoustic analysis of this assimilatory process in Peninsular Spanish, focusing on the main phonetic correlates in relation to the production of voicing, and tests the effect of different factors that have been shown to influence gestural organization. Our results show that the manner of articulation of the following consonant and the type of prosodic boundary intervening between /s/ and the triggering consonant affect the degree of voicing assimilation, while stress does not seem to play any role.

1. Introduction

1.1 Description of the phenomenon

Voicing assimilation of the sibilant fricative /s/ before a voiced consonant is a well-documented feature of the Spanish sound system. The examples in (1) show that this process occurs within and across words (# indicates a word boundary).

(1)	[izla]	“island”			
	[mizmo]	“same”			
	[razɣo]	“feature”	vs.	[rasko]	“I scratch”
	[loz#βotes]	“the cans”	vs.	[los#potes]	“the small drinks”

This process is often described as stylistically determined, gradient and variable (e.g., Navarro Tomás 1977; Hualde 2005). Region is often cited as one of the factors that influence /s/ voicing assimilation, given that a number of Spanish dialects aspirate or lose /s/ in the relevant position, i.e., before another consonant. Another potential

determining factor of the voicing process is speech rate or style. According to some impressionistic descriptions of the phenomenon, the likelihood of /s/ voicing before a voiced consonant either decreases as the speech rate decreases or as speakers move into more formal registers (Navarro Tomás 1977; Torreblanca 1978). Unfortunately, despite the frequent reference to Spanish /s/ voicing assimilation in the literature, there is a scarcity of non-impressionistic data supporting claims regarding its gradient and variable nature.[1] Moreover, there have been very limited attempts at understanding what factors condition the assimilation of /s/ based on instrumental data (see Section 1.2). The current study presents an acoustic analysis of this assimilatory process in Spanish and tests the effect of two prosodic factors, stress and boundaries, on the realization of the process. Furthermore, we offer an account of voicing assimilation as an instance of gestural blending.

1.2 Previous studies and analytical framework: Predictions

Even though /s/ voicing assimilation in Spanish is widely accepted and frequently referred to, there is a scarcity of empirical data and, consequently, no detailed phonetic analysis of the actual realization of this voicing phenomenon. Fortunately there has been some recent focus on instrumentally studying /s/ assimilation by Schmidt & Willis (2010) and Romero (1999). Schmidt & Willis (2010) present acoustic data from Mexican Spanish regarding the degree of /s/ voicing assimilation in different environments, including before a voiced consonant within the same word. The authors find an absence of voicing in 37% of the contexts where /s/ occurred before a voiced consonant. This leads them to conclude that this assimilatory process is not categorical for Mexican Spanish. The authors find that all speakers had instances of incomplete voicing assimilation in those cases where full assimilation would be expected.

Romero (1999) analyzes /s/ voicing assimilation in Castilian Spanish using articulatory data. The author reports results regarding the magnitude of the laryngeal gesture, which corresponds with the degree of voicing, and the timing between the laryngeal and the oral gesture peaks for /s/. Romero finds that the magnitude of the laryngeal gesture for sequences of /s/ followed by a voiced consonant is in between that for single voiced consonants and that for sequences of /s/ followed by a voiceless consonant. This leads Romero to conclude that voicing assimilation in not categorical since single (underlyingly) voiced consonants have a higher degree of voicing than assimilated /s/. As for the timing of the laryngeal and oral gestures, Romero finds that the laryngeal gesture peak in sequences of /s/ followed by a voiced consonant occurs between the oral gesture peaks for /s/ and the following consonant, rather than being synchronized with

1. Here, I am solely concerned with /s/ voicing before a voiced consonant. Previous studies have looked at intervocalic /s/ voicing in some Spanish dialects, for example in Quiteño Spanish (Lipski 1989; Colina 2009; Chappell 2011). This type of voicing is beyond the scope of the current project.

the oral gesture of /s/ as it is the case in single consonants. Romero argues that this indicates a mutual influence between the two consonants, which results in gestural blending in the laryngeal configuration. He concludes that, based on its phonetic pattern, /s/ voicing assimilation is a gradual process and, thus, does not correspond with the traditional phonological account.

Previous studies have analyzed assimilation processes in different languages as the result of increased gestural overlap. According to these studies, gradient assimilatory effects derive from changes in gestural magnitude and timing, which lead to greater overlap among adjacent gestures (Browman & Goldstein 1989). Gestural blending is the result of increased overlap between gestures specified for the same articulator (Browman & Goldstein 1989). Under this approach, voicing assimilation stems from blending of two overlapping laryngeal gestures (Munhall & Löfqvist 1992; Jun 1995). Thus, taking Romero's results into account and following previous analyses of assimilation, we model /s/ voicing assimilation in Spanish as the result of gestural blending due to an intense overlap between the conflicting laryngeal gestures for /s/ and a following voiced consonant. One of the advantages of modeling Spanish voicing assimilation as increased gestural overlap is that we can consider factors that have been shown to affect gestural magnitude and organization as possible conditionings on the degree of assimilation and make predictions about the expected results. Previous research has identified two prosodic factors that influence gestural composition and organization, namely stress and prosodic boundaries.

Previous studies have found that gestural magnitude is greater in stressed positions (Beckman et al. 1992; Pierrehumbert & Talkin 1992). Related to the current study, Cooper (1991) found that stress influences the magnitude of glottal gestures in both time and space for English, with stressed positions favoring larger gestures. Changes in gestural magnitude of stressed elements affect the degree of overlap with adjacent (unstressed) elements. Assuming that greater gestural magnitude results in more overlap with adjacent elements, we would expect more assimilation to be triggered by stressed than unstressed consonants. Applying this to Spanish /s/ assimilation, we predict that more voicing assimilation will take place when stress falls on the syllable following /s/ (/rasgó/) than on the syllable containing /s/ (/rásgo/). Regarding the influence of prosodic boundaries on gestural organization, previous studies have found that there is less temporal overlap among gestures separated by, or adjacent to, a prosodic boundary, indicating that gestures are pulled apart across a phrasal boundary (Byrd et al. 2000; Byrd & Choi 2010). Furthermore, prosodic boundaries of different strengths (e.g., phrase boundary vs. word boundary) display differences in the magnitude of their effects, with degree of overlap decreasing as we move into higher prosodic boundaries (Byrd & Salzman 1998; Parrell et al. 2013). It is also relevant to note here that, despite claims that major prosodic boundaries can block processes in a categorical manner (Nespor & Vogel 1986), a number of studies have shown that in fact the effect of such boundaries is gradient in the sense that their presence reduces the magnitude of the process rather than completely preventing it from taking place (Holst

& Nolan 1995; Zsiga 1995; Byrd & Saltzman 1998). With these findings in mind, we expect the degree of /s/ voicing assimilation in Spanish to decrease as we move to higher prosodic boundaries, from word internal position to a word boundary to an intonational phrase boundary. In addition, the presence of a major phrase boundary is predicted to not block assimilation but rather limit the degree of its application.

2. Experimental design

The experimental materials were designed to answer three research questions in relation to the nature and characteristics of /s/ voicing assimilation in Spanish. The first, and most basic, question is whether this assimilatory process is gradient as previous descriptions have claimed. The next two questions address the issue of what factors condition the degree of assimilation. More precisely, we ask whether stress and the presence of a prosodic boundary have any influence on the result of the assimilation process.

2.1 Experimental materials

In order to answer these issues, three sets of stimuli were created. The first corresponds to the voiced vs. voiceless condition and includes real words which contain /s/ before a voiceless or a voiced consonant. As the examples in (2a) show, this set allows comparing the behavior of /s/ in assimilating and non-assimilating environments. The second set, stressed vs. unstressed condition, includes minimal pairs of words that have the same segmental material, including /s/ before a voiced consonant, but differ in the location of their stress. The examples in (2b) show that the stress can fall either on the syllable that contains /s/ (e.g., /sésʏe/) or on the syllable that immediately follows /s/ (e.g., /sesʏé/). This second set allows us to test the hypothesis that the degree of assimilation will be greater when the stress falls on the triggering consonant rather than on /s/. The third and final set of stimuli corresponds to the word internal vs. word boundary vs. intonational phrase boundary condition. As can be seen in (2c), this group includes sequences of /s/ followed a voiced consonant within a word, across words and across an intonational phrase boundary. These stimuli allow for a comparison of the degree of /s/ when different boundaries occur between the trigger voiced consonant and the target /s/. Intonational phrase boundaries are marked with a comma and display a falling pitch contour in the speakers' production.

(2) Experimental materials
   a. Voiced vs. voiceless condition

/sésge/	vs.	/péske/
/rásge/	vs.	/ráske/
/músgo/	vs.	/búsko/
/désde/	vs.	/péste/

b. Stressed vs. unstressed condition

/sésge/	vs.	/sesgé/
/rásge/	vs.	/rasgé/
/atísbe/	vs.	/atisbé/
/désde/	vs.	/desdén/

c. Word internal vs. word boundary vs. prosodic phrase boundary condition (## signals an intonational phrase boundary)

/atisbámos/	vs.	/mis#bótas/	vs.	/cámbialas##bótas/
/desdéña/	vs.	/los#dedos/	vs.	/límpialos##dédos/
/rasgámos/	vs.	/las#gómas/	vs.	/búscalas##gómas/

All target words were inserted in sentences (see Appendix). The sentences, in random order, were read 5 times by six female speakers of Northern Peninsular Spanish, giving us 110 tokens per subject. The participants were recorded using a head-mount microphone (with an internal USB sound card) and a laptop computer, as they read the sentences from the computer screen. Note that Northern Peninsular Spanish is characterized by a lack of /s/ weakening so that this fricative does not undergo aspiration or deletion in this variety (Hualde 2005). Note that the six subjects form a relatively homogenous group. They are all between 25 and 30 years of age, live in the same area of Northern Spain (Bilbao region) and have some post-secondary education, either at the university level or some professional degree. All these social factors were controlled for because it cannot be discarded that /s/ voicing assimilation may display variation based on any of these features. However, testing their relevance is not within the scope of this project, which focuses only on potential linguistic conditionings.

2.2 Data analysis

In order to quantify the degree of /s/ assimilation, we measured three acoustic cues to voicing, namely the duration of the preceding vowel, the duration of the fricative and the amount of voicing during the fricative. Vowel duration was measured from the beginning of the formant structure to the beginning of the frication noise as seen in the spectrogram. The fricative duration was taken from when the frication noise started in the spectrogram until it receded. Finally, the duration of any glottal pulses during the fricative was taken by observing the presence of a voicing bar in the spectrogram and periodicity in the waveform (cf. Rohena-Madrazo 2011). Studies have shown that any of these three cues (or a combination of them) might be used to signal voicing differences in obstruents (Stevens et al. 1992). The spectrogram in Figure 1 illustrates these measurements for a token of the word /atisbé/.

Using these acoustic measurements, four dependent variables were calculated: vowel duration, fricative duration, percentage of voicing during fricative and voicing category. The vowel and fricative duration variables were directly taken from the measurements. The voicing duration was used to calculate the percentage of voicing during

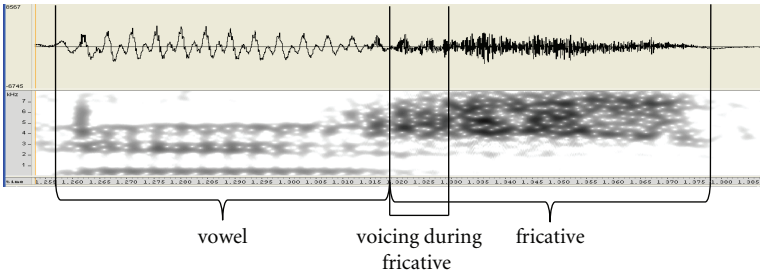

Figure 1. Spectrogram illustrating the three acoustic measurements (vowel and fricative duration and voicing during the fricative) for the word /atisbé/.

the fricative.[2] Finally, following Smith (1997), the voicing category for each /s/ was coded as unvoiced, partially voiced or fully voiced based on the percentage of voicing. The unvoiced category includes those tokens that have less than 20% of voicing during /s/. This is based on the distribution of the percentage of voicing for the voiceless sequences, i.e., tokens with /s/ followed by a voiceless consonant (cf. Cuartero 2001). As Figure 2 shows, 20% was the cut-off for the unvoiced category because most of the tokens with voiceless sequences fall below this percentage. Only 8 tokens, which come mainly from 2 speakers, have more than 20% of voicing during /s/ for the voiceless sequences. As for the two other voicing categories, partially voiced tokens are those

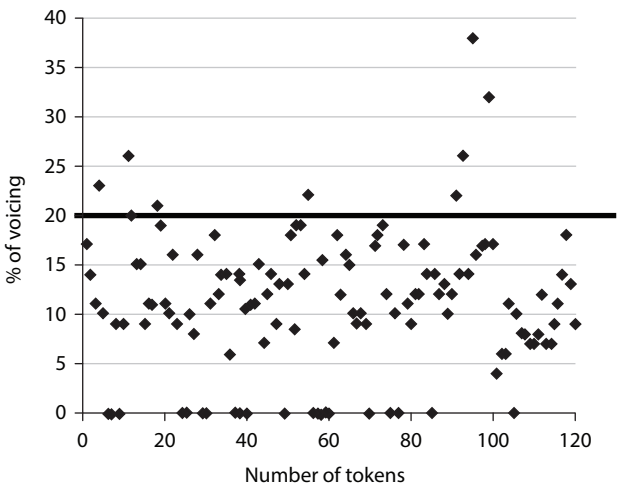

Figure 2. Distribution of the percentage of voicing for voiceless sequences, i.e., /s/ followed by a voiceless consonant.

2. In those cases where voicing was not complete during the entire fricative, any voicing occurred at the beginning of /s/. Cases of voicing at the offset of /s/ were very rare and for those instances, all voicing was added together.

than have between 20% and 90% of voicing and fully voiced tokens are those with over 90% of voicing (cf. Smith 1997).

The four dependent variables were subject to a series of statistical analyses to evaluate the effect of stress and prosodic boundaries on them. The possible effect of token and subject was also taken into account. For the three continuous variables, i.e., vowel and fricative duration and percentage of voicing, within each condition (voicing, stress, boundary) a series of three-factor ('condition', token, speaker) ANOVAs were conducted. Within the boundary condition, further LSP post-hoc tests were carried out to obtain pair-wise comparisons of the three boundary types. For the voicing category variable, crosstabs and chi-squares were calculated within each condition. The significance level for the statistical analyses was set at 0.05.

3. Results

3.1 Voiced vs. voiceless condition

The voiced vs. voiceless condition compares words containing sequences of /s/ followed by a voiced obstruent and a voiceless obstruent. This condition tests the nature of the voicing assimilation process, more precisely whether it occurs categorically or rather it is a variable process. The results of a three factor ANOVA on each of the continuous dependent variables show that the voicing of the consonant following /s/ has a significant effect on the duration of both the preceding vowel and /s/ and on the percentage of voicing during /s/ ($F(1, 239) = 59.07$, $p < .001$; $F(1, 239) = 171.34$, $p < .001$; $F(1, 239) = 295.16$, $p < .001$). Table 1 shows the means for these three variables. These results are in the expected direction: the vowel is longer when the obstruent is voiced, /s/ is longer when the following obstruent is voiceless and there is a higher percentage of voicing before a voiced obstruent. The ANOVA results further show that there is an effect of token but no interaction between token and the voicing of the following consonant, except for the vowel duration variable ($F(3, 239) = 8.76$, $p < .001$). This indicates that all the tokens show the same pattern explained above, except the pair *musgo/busco*, for which there is not a significant difference in vowel duration. The unexpected

Table 1. Means (ms.) for preceding vowel and fricative duration and percentage of voicing.

	Voicing of following C	Mean	SD
V duration	voiced	67	18
	voiceless	57	12
/s/ duration	voiced	50	10
	voiceless	61	11
% voicing	voiced	57	35
	voiceless	11	7

Table 2. Number of tokens for each category depending on the voicing of the following obstruent ($p < .0001$).

		Following C voicing	
		voiced	**voiceless**
Category	unvoiced	24	112
	partially	51	8
	voiced	42	0
Total # tokens		117	120

behavior of this pair could stem from the vowel quality since it contains a high vowel (/u/), while the other pairs contain non-high vowels (/e a/). High vowels tend to be inherently shorter than non-high vowels, and previous studies have shown that duration differences due to the voicing of a following obstruent tend to be smaller for shorter than longer vowels (Laeufer 1992). This observation could explain why the voicing effect on the vowel duration for *musgo/busco* is almost non-existent. The factor speaker also had a significant effect on the three dependent variables but, looking at the pattern for each speaker separately, all the subjects behave similarly, i.e., they all display the durational patterns explained above, except for speaker AR, who does not show a significant difference in vowel and fricative duration depending on the voicing of the following obstruent.

As expected, there is a significant correlation between the voicing category of /s/ and the voicing of the following obstruent ($p < .001$). Furthermore, cross tabulations for the distribution of the voicing categories depending on the voicing of the following obstruent reveal that there is variation in the degree of voicing assimilation of /s/. As Table 2 shows, most tokens are unvoiced when the following obstruent is voiceless. However, when the following obstruent is voiced, only a third of the tokens is fully voiced; the rest are either unvoiced or partially voiced, i.e., most of the tokens are not completely voiced. As can be seen in Figure 3, all speakers show variation in the degree of voicing assimilation before a voiced obstruent, although we find some individual differences. For example, speaker AR has mainly unvoiced tokens before a voiced obstruent, while speaker GS has either partially or fully voiced tokens but not unvoiced ones. Finally, all tokens show variation in the amount of voicing before a voiced obstruent.

3.2 Stressed vs. unstressed condition

The stressed vs. unstressed condition compares the degree of voicing depending on whether stress falls on the syllable containing /s/ or on the triggering obstruent (/rásge/ vs. /rasgé/). It tests whether stress is a factor that conditions the variability of the degree of assimilation. The statistical results show that stress has a significant effect on fricative and vowel duration ($F(1, 240) = 29.06$, $p < .001$; $F(1, 240) = 12.282$, $p = .001$)

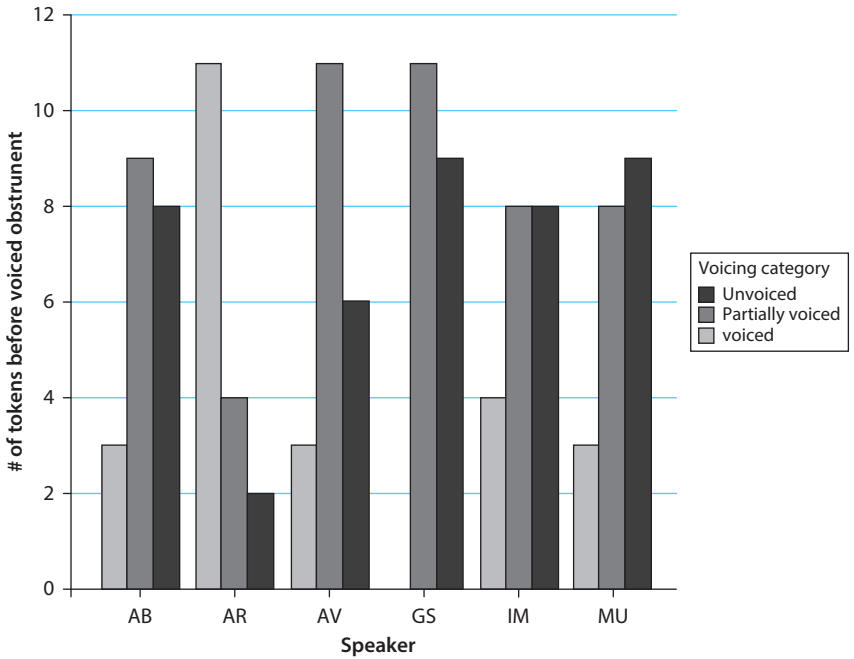

Figure 3. Distribution of the voicing categories before a voiced obstruent for each speaker.

Table 3. Means (ms.) for preceding vowel and fricative duration and percentage of voicing according to stress.

	Stress location	Mean	SD
/s/ duration	unstressed	57	13
	stressed	51	10
V duration	unstressed	75	16
	stressed	70	17
% voicing	unstressed	55	36
	stressed	53	35

but not on the percentage of voicing. Table 3 summarizes the means for each of the continuous variables depending on the location of stress. These durational patterns are surprising because both the vowel and the /s/ are longer when they are part of the unstressed syllable. According to our hypothesis, we would expect more voicing when stress follows /s/, i.e., when /s/ is unstressed. Given that more voicing correlates with shorter /s/ duration and longer vowel duration. We find, however, that only the vowel seems to conform to this prediction. Furthermore, these results are also surprising given that stressed elements tend to be longer than unstressed ones, whereas we find

Table 4. Number of tokens for each voicing category depending on the location of stress (chi-square p = 0.83).

		Stressed	Unstressed
Category	unvoiced	27	27
	partially	53	50
	voiced	38	43
Total # tokens		118	120

the opposite. A possible explanation could be that the fricative is being lengthened by a following stress and that the durational results derive from the interaction between the durational requirements for voicing and those for stress, more precisely, from opposing durational requirements.

The ANOVA results also indicate that there is an effect of token but no interaction with stress, except for fricative duration ($F(3, 240) = 7.62$, $p < .001$). This suggests that all tokens follow the pattern discussed above, with the exception of the pair *sésge/sesgé*, for which there is no fricative duration difference between stressed and unstressed tokens. Finally, we find an effect of speaker and an interaction between stress and speaker for the three continuous variables. Independent analyses for each speaker verify that they all follow the general pattern, i.e., stress tends to have an effect on fricative and vowel duration but not on percentage of voicing.

Contrary to our prediction, there is no relation between stress and the voicing category (chi-square p = 0.83), which means that stress does not influence the occurrence of one category over another. Table 4 shows that the distribution of the different categories is very similar for stressed and unstressed tokens. Moreover, as reported in the previous section, there is variation in the degree of voicing, since, although all tokens include sequences of /s/ followed by a voiced obstruent, only a third of them display complete voicing assimilation. The lack of relation between stress and the voicing category holds for all tokens and all speakers, except for GS. For this speaker, there are no unvoiced tokens for the stressed position, which explains why she displays a correlation between stress location and voicing category (chi-square p = 0.027).

3.3 Recoding for a new factor: Manner of articulation of following obstruent

Although the results for the stress condition were unexpected, careful observation of the data during the analysis allowed us to identify another possible conditioning on the amount of voicing assimilation. This new factor is the manner of articulation of the triggering voiced obstruent. Spanish voiced stops undergo lenition to approximants after a continuant segment, a process known as spirantization (Hualde 2005). All our stimuli contain voiced stops after /s/ and thus, were realized as lenited approximants. Martínez Celdrán (1991, 2008) identifies two types of lenited consonants in Spanish that differ in their articulatory and acoustic characteristics. The different realizations of the Spanish

approximants go from variants with more open, i.e., more vowel-like articulations, to variants with closer, i.e., more plosive-like articulations (Martínez Celdrán 2004). Thus, the author establishes two categories: open approximants or close approximants. Close approximants are produced with the articulators very close to each other, almost touching, but without the tight closure that characterizes stops (Catford 1977) and that gives rise to the stop burst. Acoustically, close approximants correspond with a period of lack of energy, except for some voicing bar in the low frequencies, but without an explosion bar. Open approximants are produced with less constriction, which results in continuous formant structure but with decreased amplitude. According to Martínez Celdrán, Spanish approximants result from the lenition of voiced stops, but their specific realizations are diverse because lenition is a gradient process.

Following this two-way distinction for approximants, I recoded the data from the stress condition (see Section 2.1 above) according to whether the obstruent following /s/ was produced as an open or a close approximant. Figure 4 illustrates the acoustic characteristics of these two types of approximants with two tokens from our data set. It is interesting to note that these two examples correspond to different repetitions of /atisbé/ by the same speaker. The newly recoded data was submitted to a one-factor ANOVA and crosstabs with chi-square to evaluate the effect of the manner of the following obstruent on the four dependent variables, i.e., fricative and vowel duration, percentage of voicing and voicing category. Token and speaker were not included as factors since the number of tokens is not evenly distributed across these two factors.

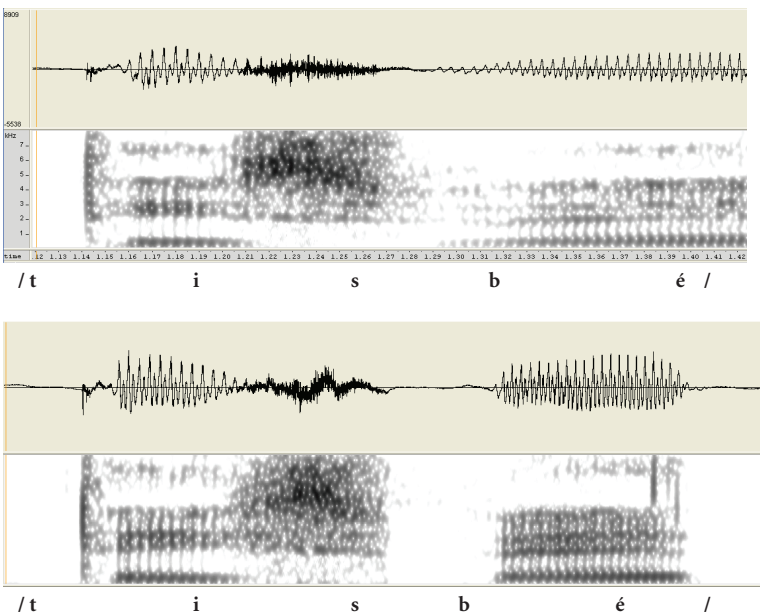

Figure 4. Open (top panel) and close (bottom panel) approximant realizations of /atisbé/.

Table 5. Means (ms.) for preceding vowel and fricative duration and percentage of voicing according to the manner of articulation of the following obstruent.

	Manner of following C	Mean	SD
/s/ duration	open	54	14
	close	54	11
V duration	open	73	15
	close	72	15
% voicing	open	60	35
	close	41	34

The results indicate that the manner of the following obstruent has a significant effect on the percentage of voicing during /s/ ($F(1, 236) = 14.46$, $p < .001$) but not on the fricative or vowel duration. Note that this is exactly the opposite to what we found for the stress condition, where stress had an effect on the durational values but not on the percentage of voicing. Table 5 shows that the percentage of voicing is higher when the following obstruent is an open approximant than a close one. Vowel and /s/ durations are very similar preceding both approximants.

Evaluation of the crosstabs and chi-square results reveal that there is a relation between the manner of the following obstruent and the voicing category for /s/ ($p = .003$). This suggests that manner of articulation is a factor that conditions which category obtains. Table 6 includes the number of tokens and percentages for each voicing category depending on whether the following approximant is open or close. Notice that here it is more important to look at the percentages, rather than the number of tokens, because the number of observations is uneven since we did not include manner of articulation as a factor in the initial experimental design. Table 6 shows that when the following approximant is close, there is a higher percentage of unvoiced realizations, but when the following approximant is open, the percentage of fully

Table 6. Number of tokens and percentages for each voicing category depending on the manner of articulation of the following obstruent (chi-square $p = .003$).

			Manner of following C	
			close	**open**
Voicing Category	unvoiced	# tokens	25	29
		% within fol C manner	**35.2%**	**17.4%**
	partially voiced	# tokens	31	72
		% within fol C manner	**43.7%**	**43.1%**
	fully voiced	# tokens	15	66
		% within fol C manner	**21.1%**	**39.5%**
Total # tokens			71	167

voiced productions is higher. The percentage of partially voiced tokens is the same for a following close or open approximant.

3.4 Word internal vs. word boundary vs. prosodic phrase boundary condition

This condition tests whether the presence (or absence) of different prosodic boundaries between the trigger consonant and /s/ influences the degree of voicing assimilation. The three conditions being compared are the absence of a boundary (word-internal position), the presence of a word boundary and the presence of an intonational phrase boundary. Inclusion of this latter type of boundary allows for testing whether such a boundary functions as a blocker of the assimilation process or not. The statistical results show that the type of boundary has a significant effect on the three continuous dependent variables, i.e., on the vowel and fricative duration and the percentage of voicing ($F(2, 266) = 221.21$, $p < .001$; $F(2, 266) = 230.58$, $p < .001$; $F(2, 266) = 146.1$, $p < .001$). Figure 5 includes the means for the vowel and /s/ duration and the percentage of voicing for each of the three boundary conditions. Let us consider each dependent variable separately.

Figure 5 shows that the vowel is longest next to an intonational phrase boundary. This is due to the fact that vowels (and consonants) are lengthened when they occur in the vicinity of a major prosodic phrase (Wightman et al. 1992) and not due to an effect of voicing. As for the other two conditions, vowel duration is greater word internally than when a word boundary is present. This seems to be in line with the expected results: longer vowels are associated with more voicing so that a longer vowel word internally would correlate with more /s/ voicing in that context. Results from the post-hoc test reveal that these vowel duration differences among boundary types are all significant ($p < .01$ for all the pair-wise comparisons). The statistical results also show that there is an effect of token and speaker. Examination of each token type and speaker separately show that the durational pattern for all of them is the same as discussed above (longest vowel in the intonational boundary context and shortest vowel across words) but there are some individual differences regarding the strength of the differences.

Figure 5 shows that the longest /s/ occurs next to an intonational phrase boundary, arguably due to phrase-final lengthening (see above). Comparing /s/ duration word-internally and across words, we find that the fricative is longer in the former prosodic condition. A longer fricative correlates with voicelessness, suggesting that the degree of voicing is less word-internally. This runs counter to our prediction. However, the statistical results from the post-hoc tests reveal that, while the difference between the intonational boundary condition and the other two is robust ($p < .001$), the difference between the word internal and across words positions is less so with a p-value of 0.046. Speaker, but not token, also comes up as a significant factor in the ANOVA results. Individual analyses for each speaker indicate that all speakers show the /s/ durational pattern discussed above (see Figure 5), except for speaker AV who displays very similar durations for /s/ in all prosodic conditions.

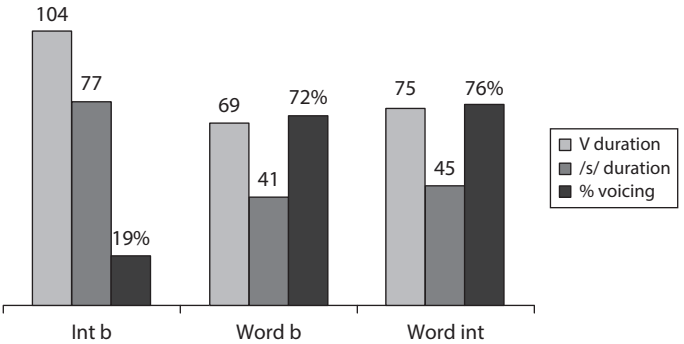

Figure 5. Mean vowel and /s/ duration (ms) and percentage of voicing for each boundary condition.

Figure 5 shows that the lowest percentage of voicing occurs across an intonational phrase boundary. This figure also suggests that the percentage of voicing is higher word-internally than across words, matching our prediction. However, taking into account the results from the post-hoc tests, we find that the difference in percentage of voicing between these two prosodic conditions is not statistically significant. This means that, although the data seem to follow the expected trend, it does not reach statistical significance. Finally, there is an effect of speaker, but not of token, on the percentage of voicing. This effect seems to derive from two facts. First, although all speakers display the same pattern, some speakers have greater differences between the word internal and word boundary conditions, with the latter having less percentage of voicing that the former. Second, speaker AV has more similar percentages than other speakers across the three conditions, mirroring her behavior for fricative duration.

To conclude this section, the crosstabs and chi-square results show that there is a relation between the voicing category and the type of prosodic boundary (chi-square $p < .001$). But, as Figure 6 indicates, differences in the voicing category depending on the boundary type seem to come from the intonational phrase boundary condition, since the two other conditions show almost exactly the same distribution of voicing categories. This means that, while the intonational boundary is set apart in terms of the occurrence of the voicing categories, word-internally and across words we find no differences. All tokens and speakers display the same relation between the voicing category and the boundary type, following similar patterns, except for AV, who does has more similar distributions across the three boundary conditions. A final and relevant fact to notice is that, as Figure 6 reveals, there are partially and fully voiced tokens in the presence of an intonational phrase boundary. This indicates that the presence of a major prosodic boundary does not rule out the occurrence of some degree of assimilation. The implications of these results are discussed in the next section.

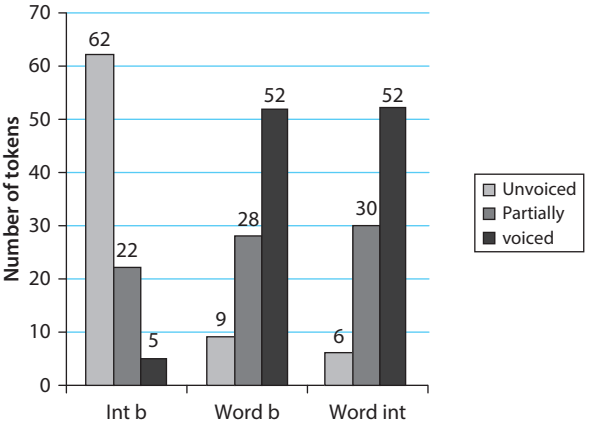

Figure 6. Number of tokens for each voicing category according to the prosodic boundary type.

4. Discussion and conclusions

In relation to the nature of /s/ voicing assimilation in Spanish, the present results show that it is not a categorical process, but rather gradient and incomplete in many cases. This is similar to previous findings reported by Romero (1999) and Schmidt & Willis (2010). Recent experimental studies on voicing assimilation in other languages have also found the process to be gradient. For instance, in Greek, /s/ assimilates in voicing to a following consonant very much like Spanish /s/. Traditionally, this process had been described as categorical and restricted by prosodic structure (Nespor & Vogel 1986). However, several acoustic studies have shown that Greek voicing assimilation is gradient (Arvaniti & Pelekanou 2002; Baltazani 2006). Based on these results, voicing assimilation in Greek has been analyzed as the result of increased gestural overlap, an analysis that we have extended to voicing assimilation in Spanish. According to this model, increased gestural overlap between two adjacent and contradictory glottal gestures results in gestural blending and, consequently, gradient surface assimilation. An important difference between our approach and more traditional phonological accounts is that whether assimilation is optional, or its application variable, is not an issue. The gestural blending model captures the variability of the process, which could result in no voicing at all or in 100% voicing, with all other percentages in between as possible outcomes. Thus, the question is not whether assimilation takes place or not, but rather to what extent the involved laryngeal gestures overlap: there could be no or minimal overlap, or total overlap.

Given our model, factors that affect gestural composition and overlap may also influence the outcome of voicing assimilation. The experimental results reported in the previous section analyzed the role of stress and prosodic boundaries. Stress has

been shown to condition the degree of voicing assimilation to a very limited extent. It affects vowel and fricative duration but with much speaker variability and without a clear pattern. More importantly, stress location does not predict the voicing category, suggesting that, at least for our data, stress does not play a significant role in determining the outcome of the voicing assimilation. Other studies on voicing behavior in Peninsular Spanish have also found that stress was not a conditioning factor on the results. González (2002) analyzes coda stop devoicing in this dialect and found no effect of stress. Similarly, Torreira & Ernestus (2011) did not find an effect of stress on the amount of intervocalic /s/ voicing in Madrid Spanish.

There seem to be at least two possible explanations for this limited effect of stress. First, voicing assimilation and stress impose partially conflicting requirements. Increased voicing correlates with shorter fricatives and longer vowels, while stress tends to result in lengthening of all elements under its influence. In our data, unstressed vowels and fricatives have longer durations that stressed ones, which is surprising given the lengthening tendency of stress cross-linguistically. It is interesting to note here that Borzone de Manrique & Massone (1981), analyzing the acoustic features of intervocalic fricatives in Argentine Spanish, also found that these sounds were longer in unstressed position than in stressed position. These results further point to the unexpected behavior of Spanish fricatives in relation to stress, something that would benefit from further research. The second explanation for the lack of an effect of stress is that the relevant position to find such an effect is post-stress, rather than pre-stress, which is the one tested in the experiment reported here. Previous studies have shown that elements in post-stress position undergo greater gestural reduction. Looking at Spanish spirantization from an articulatory perspective, Cole et al. (1999) found that the greatest degree of gestural reduction for voiced stops occurs in contexts following (as opposed to preceding) a stressed vowel. Remember that our hypothesis stated that a larger glottal gesture for a stressed voiced stop would result in more assimilation of a preceding /s/. However, the relevant condition to get different degrees of assimilation might be whether /s/ undergoes extreme gestural reduction (in post-stress positions) or not (in other positions). In our data, /s/ is either stressed or pre-stressed, i.e., /s/ might be too close to the stress to display any differences based on this factor.

As for the effect of prosodic boundaries, the type of boundary intervening between /s/ and the triggering consonant has been found to influence the degree of assimilation, i.e., there is less assimilation across than within an intonational phrase boundary. Although this result is expected, the actual nature of the effect is contrary to previous accounts of sandhi phenomena: the presence of an intonational phrase boundary does not categorically block the assimilatory process but rather it reduces the amount of assimilation. This suggests that degree, rather than the presence or absence, of assimilation may function as a cue to the occurrence of an intonational phrase boundary and be of relevance, for example, where there is no pause between the two phrases. Assimilation word internally tends to be greater than across words but there

is not a significant difference between both conditions. Romero (1999) found no differences between word internal and across words contexts in his articulatory study of Spanish voicing assimilation. On the other hand, Slis (1986) found that in Dutch voicing assimilation occurs less frequently across words than within words, as we predicted. Coming back to our data, the small difference between the word internal and word boundary conditions might be due to the shape of the stimuli. All our stimuli with assimilation across words include sequences of a determiner followed by a noun (e.g., *los dedos*). In Spanish, there is a great connection between the function and lexical words in such combinations. The function word, a determiner in this case, does not bear its own stress, indicating that such combinations form a phonological phrase. A word boundary in other types of combinations might show a stronger influence on the degree of assimilation, for instance in sequences of first name and last name, where the first element tends to not be deaccented in Spanish.

Finally, the manner of articulation of the following obstruent emerges as a conditioning on the degree of voicing assimilation. This factor was not included in the original design of the experiment but, after examining the data, it became apparent that manner was playing some role in the outcome of the process. The results indicate that whether the following consonant is an open or a close approximant affects the percentage of voicing during /s/ and correlates with the voicing category. More precisely, open realizations correlate with higher percentages of voicing and more fully voiced tokens than close realizations. Given that this effect was not predicted by the original gestural blending model proposed in Section 1.2, the question that arises is why manner of articulation conditions the degree of voicing assimilation and how it fits within our framework. The aerodynamics of voicing during obstruent production might shed light into this issue. The difference between subglottal and supraglottal pressure needed for voicing is harder to maintain during a closer oral constriction, given that supraglottal pressure increases more rapidly during such a constriction than during a closer one. This results in weaker voicing amplitude or devoicing during closer constrictions, if the absence of any adjustments in order to keep full voicing (Westbury & Keating 1986). From a gestural perspective, the laryngeal gesture has a lesser magnitude and duration during closer constrictions. Coming back to open vs. close approximants, voicing is harder to maintain during the latter than the former, correlating with differences in the magnitude of their laryngeal gesture. An open approximant would a great laryngeal gesture, which would in turn result in greater overlap with adjacent gestures. The gestural blending model is capable of capturing this effect of manner of articulation. Under our model, gestural blending between two adjacent laryngeal gestures can result from changes in their timing pattern or in their magnitude, both of which affect the degree of overlap between blended gestures. An interesting prediction of the previous explanation is that sonorant consonants would trigger a greater degree of assimilation than obstruents, under the assumption that sonorants present a smaller constriction degree. This is something to be tested. However, we can compare this prediction to Recasens & Mira (2012) results for Catalan voicing assimilation. The

authors find that sonorants do in fact trigger less assimilation than obstruents, although they predicted the opposite.

To conclude, this paper presents experimental data that helps us understand the nature of /s/ voicing assimilation in Spanish. Despite its recurrent presence in descriptions of the language, few studies have provided instrumental data as to the actual effects of this assimilatory process. Here, we have shown that /s/ voicing assimilation is gradient, and that its degree is conditioned by different factors, including prosodic structure and the manner of articulation of the following obstruent. These results are important because they allow us to develop a model of voicing assimilation based on careful acoustic analysis of the data: the gestural blending model of voicing assimilation captures the behavior this Spanish phenomenon displays. Furthermore, there are issues that stem directly from the results and conclusions reached here. The effect of a triggering sonorant needs to be explored, given that our model predicts that they should lead to a higher degree of assimilation. Similarly, post-stressed positions should be investigated as the gestural reduction observed in those positions could result in more assimilation. In addition, the perceptual consequences of this assimilation need to be explored in future research.

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