

# Prosodic and Rhythmic Aspects of L2 Acquisition



Prosodic and Rhythmic Aspects  
of L2 Acquisition:  
The Case of Italian

Edited by

Anna De Meo and Massimo Pettorino

**CAMBRIDGE  
SCHOLARS**

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P U B L I S H I N G

Prosodic and Rhythmic Aspects of L2 Acquisition: The Case of Italian,  
Edited by Anna De Meo and Massimo Pettorino

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# INTRODUCTION

## INTERLANGUAGE PROSODY

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### 1. Prosodic aspects of communication

The word “prosody” refers to some features of speech, traditionally defined as “suprasegmental”, which include stress, rhythm, tone and intonation. The non-discrete nature of the prosodic elements and the assumption about their purely expressive function has overshadowed the importance of these aspects of the language for a long time. However, since the 1980s, studies in experimental phonetics and applied linguistics (sociolinguistics, discourse analysis, pragmatics, systemic-functional linguistics) have led to their re-evaluation, as studying language in context has allowed linguists to point out the distinctive and contrastive functions of prosody and to highlight its contribution to the syntactic, semantic and pragmatic characterization of the message in spoken communication.<sup>1</sup> One of the most reassessed prosodic features has been intonation, i.e. the melodic movement of an utterance depending on the control over the glottal mechanism activity. For this trait of human language, acquired in the very early months of life,<sup>2</sup> elements of interlinguistic variability, both structural and functional, and universal characteristics were identified.<sup>3</sup>

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<sup>1</sup> Dorothy Chun, Debra M. Hardison and Martha C. Pennington, “Technologies for prosody in context: Past and future of L2 research and practice”, in *Phonology and second language acquisition*, eds. G. J. Edwards Hansen and Mary L. Zampini (Amsterdam: John Benjamins, 2008), 323-46; Julia Hirschberg, “Pragmatics and Intonation,” in *The Handbook of Pragmatics*, eds. Laurence R. Horn and Gregory Ward (Oxford: Blackwell Publishing, 2006), 515-37.

<sup>2</sup> According to Sarah Hawkins, “The most global properties of the baby’s to-be-native language are prosodic and some of these may even be learned at or before birth. Rhythm and pitch patterns can be heard in utero, since they are what is left in the signal when the mother’s voice reaches the uterus, low-pass filtered through

In recent years studies in both language acquisition and language education have included prosody, especially intonation,<sup>4</sup> focusing attention on the L1-L2 relationship and on the problem of prosodic transfer.<sup>5</sup> Even so, rhythmic, tonal, intonational and accent related systems, all elements characterizing language-dependent prosody, are still rarely taught<sup>6</sup> and yet they are the basis of human communication.

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her body". Sarah Hawkins, "Auditory Capacities and Phonological Development: Animal, Baby and Foreign Listeners", in *The Acoustics of Speech Communication*, ed. James M. Pickett (Needham Heights, MA: Allyn and Bacon, 1999), 183-98.

<sup>3</sup> Jacqueline Vaissière, "Phonetic explanations for cross-linguistic prosodic similarities", *Phonetica* 52 (1995):123-30; Jennifer Fitzpatrick, "On intonational typology", *Methodological issues in language typology*, ed. Peter Siemund, *Sprachtypologie und Universalien Forschung* 53 (2000): 88-96; Alan Cruttenden, "Falls and rises: meanings and universals", *Journal of Linguistics* 17 (1981): 77-91.

<sup>4</sup> Katsura Aoyama and Susan G. Guion, "Prosody in second language acquisition: Acoustic Analyses of duration and F0 range", in *Language experience in second language speech learning: In honor of James Emil Flege*, eds. Oke-Schwen Bohn and Murray J. Munro (Amsterdam: John Benjamins, 2007), 282-97; Dorothy M. Chun, Debra M. Hardison and Martha C. Pennington, "Technologies for prosody in context: Past and future of L2 research and practice", in *Phonology and second language acquisition*, eds. Jette G. Edwards Hansen and Mary L. Zampini, (Amsterdam: John Benjamins, 2008), 323-46; Pavel Trofimovich and Wendy Baker, "Learning second-language suprasegmentals: Effect of L2 experience on prosody and fluency characteristics of L2 speech", *Studies in Second Language Acquisition* 28 (2006): 1-30; Ineke Mennen, "Bi-directional interference in the intonation of Dutch speakers of Greek", *Journal of Phonetics* 32 (2004), 543-563; Jürgen Trouvain and Ulrike Gütte, eds., *Non-native Prosody. Phonetic Description and Teaching Practice* (Berlin/New York: Mouton de Gruyter, 2007); Wolfgang Grosser, "Aspects of intonation L2 acquisition", in *Current Issues in European Second Language Acquisition Research*, eds. Bernhard Kettemann and Wilfried Wieden (Tübingen: Gunter Narr Verlag, 1993), 81-94.

<sup>5</sup> Kees De Bot, "The transfer of intonation and the missing database", in *Crosslinguistic Influence in Second Language Acquisition*, eds. Eric Kellerman and Michael Sharwood Smith (New York: Pergamon Press, 1986), 110-19; Laurent Rasier and Philippe Hiligsmann, "Prosodic transfer. Theoretical and Methodological Issues", *Nouveaux cahiers de linguistique Française* 28 (2007), 41-66; Empar Devis Herraiz, "La prosodia nell'interferenza tra L1 e L2: il caso delle interrogative polari tra veneti e catalani", *Estudios de fonética experimental* 16 (2007), 119-46.

<sup>6</sup> Dorothy M. Chun, *Discourse intonation in L2: From theory and research to practice* (Amsterdam: John Benjamins, 2002); Jürgen Trouvain and Ulrike Gut, eds., *Non-native prosody: phonetic description and teaching practice*, (Berlin: Mouton de Gruyter, 2007); Jesús Romero-Trillo, *Pragmatics and Prosody in English Language Teaching* (Dordrecht: Springer, 2012).

## 2. Prosody and L2 Italian

Although second language acquisition studies show a growing sensitivity towards prosodic competence, which is an element considered crucial for the identification of a non-native pronunciation<sup>7</sup> and for message understanding,<sup>8</sup> much remains to be studied with reference to the Italian language.

Italian is not among the most widely spoken languages in the world in terms of native speakers, but it is so for the number of language courses devoted to foreigners,<sup>9</sup> who start studying it for both cultural and professional reasons (Foreign Language - FL).<sup>10</sup> The large-scale immigration experienced in Italy since the 1980s also posed the problem of spontaneous or mixed learning of Italian as a second language (L2) by subjects who vary in terms for age, mother tongue, level of literacy, level of integration in the arrival social context, migration project duration, motivation etc.<sup>11</sup> An ever increasing number of people use Italian as a

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<sup>7</sup> Janet Anderson-Hsieh, Ruth Johnson and Kenneth Koehler, "The Relationship Between Native Speaker Judgments of Nonnative Pronunciation and Deviance in Segmentals, Prosody, and Syllable Structure", *Language Learning* 42/4 (1992): 529-55.

<sup>8</sup> Tracey M. Derwing, Murray J. Munro, "Accent, comprehensibility and intelligibility: Evidence from four L1s", *Studies in Second Language Acquisition* 19 (1997), 1-16; Tracey M. Derwing, Murray J. Munro, Grace Elaine Wiebe, "Pronunciation instruction for 'fossilized' learners: Can it help?", *Applied Language Learning* 8 (1997), 217-35.

<sup>9</sup> Data published in the survey *Italiano 2000*, sponsored by the Italian Ministry of Foreign Affairs, show that Italian language is the fifth most studied foreign language in the world. Cf. Tullio De Mauro and Massimo Vedovelli, *Italiano 2000. I pubblici e le motivazioni dell'italiano diffuso fra stranieri* (Roma: Bulzoni, 2003).

<sup>10</sup> See also Massimo Vedovelli, *L'italiano degli stranieri. Storia, attualità e prospettive* (Roma: Carocci, 2002).

<sup>11</sup> Monica Barni and Andrea Villarini, *La questione della lingua per gli immigrati stranieri: insegnare, valutare e certificare l'italiano L2* (Milano: Franco Angeli, 2001); Beatrice Iori and Sergio Neri, eds., *L'italiano e le altre lingue, Apprendimento della seconda lingua e bilinguismo dei bambini e dei ragazzi immigrati* (Milano: Franco Angeli, 2005); Fernanda Minuz, *Italiano L2 e alfabetizzazione in età adulta* (Roma: Carocci, 2005); Antonella Benucci, ed., *L'italiano libera-mente. L'insegnamento dell'italiano a stranieri in carcere* (Perugia: Guerra, 2008); Stefano Rastelli, *Italiano di cinesi, italiano per cinesi. Dalla prospettiva della didattica acquisizionale* (Perugia: Guerra, 2010); Massimo Vedovelli, Stefania Massara and Anna Giacalone Ramat, *Lingue e culture in contatto. L'italiano come L2 per gli arabofoni* (Milano: Franco Angeli, 2001);

vehicle of communication, from foreign students and tourists to job-seeking immigrants (from Africa and Asia, as well as Latin America and eastern Europe), political and environmental refugees, unaccompanied minors, children joining their immigrant parents, and undocumented migrants who have escaped extreme poverty, or ethnic strife and political oppression in their own countries.

This volume therefore stems from the need to deeply study problems regarding the suprasegmental level of L2 Italian. It addresses, in particular, the variability related to oral discourse genres, the communicative contexts, the pragmatic functions, the native/non-native interaction, the relation between interlanguages and varieties of L1 Italian (dialects, regional varieties, etc.), the influence of mother tongues, the speaker's specific characteristics, the teachability of prosody, the sociolinguistic issues related to the foreign accent perception, and the impact of technology.

### 3. Between Practice and Theory

This book opens with an overview on the possible approaches to the study of the rhythmic-prosodic skills acquisition in a second language (*Linking Practice and Theory*), carried out through the application of diverse analytical tools and models.

Patrizia Sorianello proposes an acoustic-instrumental study on synthesized and spontaneous speech, with the aim of investigating the production and perception of prosodic boundaries. The complexity of doing this research is caused by various factors, such as temporal rules (pauses and variation in speech tempo) and melodic criteria, e.g. intonational variations, pitch range and pitch reset. The first step in this experimental survey, carried out on the natural speech of L1 Italian speaking subjects and Polish L2 Italian speakers (level A2), all living in Bari, south east Italy, shows the profound difference in language production existing between native and non-native speakers: variations in the number of syllables of Tonal Units (TU) and in the speech rate, and a different use of pauses, both silent or filled, were observed. In particular, the non-native speech, using short TUs, long silent pauses and non-verbal items, appear prosodically disorganized. A perceptual test then conducted on L1 and L2 Italian synthesized speech (tone flattened, devoid of silent and filled pauses, and modified combining both manipulations) verified

the ability of native listeners to identify the position of intonational boundaries. In this regard, listeners used different perceptual strategies, which varied according to the native or the non-native nature of the listened stimuli. However, listeners' perception was not only influenced by prosody, but also by the overall fluency level.

Milena Romano chooses a sociolinguistic perspective. Taking into account the complex situation of contemporary Italian, characterized by neostandard and regional varieties beside the standard language, the author shows the process of suprasegmental skills and metalinguistic awareness development related to the diatopic, diaphasic, diamesic and diastratic variability, through a questionnaire and a perceptual test based on television speech. The observations, conducted in Catania, Sicily, compared young adult immigrants and foreign students coming from different European and non-European countries. The results show that the use of television texts for teaching purposes allows delocalisation of spoken Italian and overcoming of the regional variant as to rhythmic-prosodic and phonetic traits.

In Laura Mori's study, prosodic analysis becomes a tool for interpreting the functional value of morpho-syntactic structures; she investigates the use of the right-dislocated construction *ce + lo*. In particular, she focuses on this cataphoric pronoun cluster when, followed by the inflected verb form *avere* (to have), it signals in advance the sentence comment, with regard to the speech production of Moroccan immigrants, spontaneous learners of Italian. *Averci*, sociolinguistic variant of *avere* frequently attested in popular informal registers of spoken Italian, is preceded by the accusative clitic *lo* in the interlanguage of the considered subjects. This construction appears as an anomalous reduplication in discourse, since the right-dislocated clitic phonological word just anticipates the comment. Mori considers such use of language as structurally and pragmatically marked, and since marked sentence structures usually exploit prosodic prominence configurations, she instrumentally analysed the morpho-syntax/intonation interface for evaluating the informative value of the construction under investigation. Results confirm that, as assumed, non-native speakers use the clitic cluster as a verbal-agreement marker and as a tool for emphasizing the informative relevance of the linguistic unit in focus position as well.

Pellegrino and Caruso present some preliminary "prosodic explorations" in the speech of deaf immigrants. After a comprehensive overview of the medical literature devoted to the analysis of the prosodic and vocal features of deaf people's oral productions, the authors synthesize the results of three task-based tests, used to examine the L2 Italian prosodic

competence of the deaf participants. If, on the one hand, they underline the impact of the hearing deficit on the speaking skills of deaf immigrants, on the other hand they prove the deaf person's ability to manage some prosodic features and their pragmatic awareness that communication develops through informative chunks. Moreover, this study also highlights the social role that linguists could play in helping those who are in need of a specific language education, thus completing the assistance of medical care given to these hearing-impaired speakers. In the end, Pellegrino and Caruso suggest that further research on spontaneous speech production is needed, and solicit a major involvement of linguists in this kind of studies.

A completely different approach is taken by Domenico Russo, who argues against the possibility of comparing the characteristics of native speech with those of a non-native one, which he labels as "ethnic". According to the author, the extreme variability of L1 and L2 speeches, together with the effect of an "unconscious camouflage", revealed in all the productions, makes "neutral" comparisons between native and L2 corpora almost impossible, in terms of voice quality at both the segmental and the prosodic level.

#### **4. Prosodic Transfer from L1 to L2**

The second part of the book, *The Role of L1*, emphasizes the relationship between the mother tongue and L2, and investigates the presence of transfer in the prosody interlanguage development.

Celata and Costamagna analyze the interlanguage prosodic tuning of native Estonian speakers, who are acquiring the Italian singleton-geminates consonant contrast. This study is based on the spectro-acoustic analysis of read and repeated speech, of both isolated words and short sentences in Italian, and particularly investigates the temporal relationship between vocalic segments and adjacent consonants. The singleton-geminate consonantal opposition occurs in both involved languages, even if it is rendered in different ways: it is binary in Italian (short and long) and ternary in Estonian (short, long and extra-long). In the interlanguage of the Estonian participants, an adaptation to the Italian phonological system was observed as regards the stop consonants, while for continuous consonants there rather seems to be a transfer effect from the L1, especially as far as rhotic sounds are concerned.

Romito and Tarasi analyze a corpus consisting of spontaneous and read speech produced by adult immigrants, speaking Chinese, Romanian, Polish and Albanian as their L1s. All the subjects involved in this study come from Calabria, southern Italy, and learned Italian as a second

language in a non-guided learning context. Thanks to acoustic, perceptual, musical and automatic speech recognition-related analysis, the authors state that speakers tend to keep their L1 rhythmic and segmental patterns in different ways, which varies depending on the L1 typological characteristics. Furthermore, the authors propose an “Italian index”, that is, a modality of visual representation of the distances between the different segmental and suprasegmental features existing amid L1 Italian and the various interlanguages. Major differences are those related to the varieties produced by Chinese and Polish speakers, while Albanian speech productions are the closest to the L1 Italian, being characterized by dissimilarities limited to duration of vocalic and consonant elements within stressed syllables speech productions.

In the studies of Alfano, Crocco, Savy, and Baele, the attention shifts towards Belgian learners of Italian as foreign language (B1, B2, C1 levels of the CEFR), all speaking Dutch as L1. Spontaneous and semi-spontaneous dialogues, elicited through the “spot the difference” technique, compose the corpus used for two surveys. Alfano, Crocco and Savy’s purpose is to analyze the pragmatic and prosodic realization of L1 and FL Italian requests, and deals especially with the query\_y move realization for direct requests, which is the most frequently used pragmatic move in each of the three examined groups. Analysis outcome shows that the general competence in FL does not significantly correlate with the pragmatic skills improvement, whereas a high proficiency level matches with a more appropriate use of intonation.

Baele focuses on yes-no questions, divided into two groups: conversational moves, or queries, and confirmation requests for given information, or check moves. The pragmatic difference under analysis is expressed in L1 Italian trough prosody. This study, based on the analysis of comparable read speech corpora uttered in Belgian Dutch and Italian, showed a prosodic transfer from L1 to the FL concerning boundary tones and tonal categories, which appears stronger in B1 and B2 learners.

## **5. Prosody as a Pragmatic Phenomenon**

The third part of the book, *Prosody and Pragmatics*, illustrates the role that prosody plays in the interpretation of pragmatic meaning in native-non-native interaction, in the realization of L2 Italian narrations, description and argumentation, and its influence on repetitions and message persuasiveness.

Maffia, De Meo and Pettorino compare narration and description in the semi-spontaneous speech of two native Italian speakers and two adult

immigrants having different L1s—Swahili and Wolof—with different competence levels in L2 Italian (respectively A2 and B1 of the CEFR). Subjects were asked to perform three linguistic tasks, characterized by different rhythmic-prosodic features and having similar trends in L1 and L2: the description of a picture; a visually guided storytelling, requiring the production of a short narration elicited by a comic strip; and the narration of an emotionally involving personal experience. Results showed that in L2 Italian the description is defined by a lower speech rate and longer and more frequent silent pauses, maybe due to a greater difficulty encountered by the speakers in the discourse planning. These problems are, however, minimized in the narration, thanks to the temporal sequence of events, which is used as a guiding pattern for the structuring of the utterance. The personal and more involving narration was presented with a more fluent speech than in the other two tasks, and with a higher percentage of articulated sequences, especially for the learner having the lowest level of competence in L2 Italian. Generally speaking, a relationship between the degree of variability of the statement and the level of L2 proficiency was found: for the lowest level, sentences are more diversified in terms of rhythm and prosody, depending on the task typology.

Luisa Salvati's aim was to investigate the prosody production in the argumentative speech of Chinese learners of L2 Italian, involved in an intercultural debating with Italian speakers. This study points out two important considerations concerning the relationship between prosody and second language acquisition. The first one deals with intercultural debating as a valid tool for collecting L2 spontaneous speech corpora, and as an effective task affecting L2 learners' cognitive and communicative skills. The second one concerns the importance of the spectro-acoustic analysis, since its results not only show the relevant role played by prosody in L2 Italian spontaneous speech, but its socio-phonetic and pragma-phonetic interpretation also allows observation how non-native speakers use and manage voice in order to persuade.

Vitale, De Meo, Pettorino deal with non-native Italian speakers' persuasiveness from an experimental perspective. Through an acoustic-perceptive analysis carried out on radio speech of French, Russian, Chinese and Italian speakers, the study aims at identifying the acoustic perceptual correlates of persuasiveness, in order to verify whether a persuasive communication depends on the degree of foreign accent, or whether it is rather related to language-independent variables. Spectro-acoustic analysis and perceptive test outcome point out that foreign-accented Italian speakers seem to be limited in the achievement of a



persuasive speech and that, by contrast, for both native and non-native speakers a less varied and more flattened tone favours persuasiveness.

Repetition is under investigation in the study by De Marco and Soriano, who offer a general overview of the different functions of this communicative strategy. The analysis was carried out on a corpus consisting of image descriptions and semi-structured interviews between native and non-native speakers of Italian; the L2 subjects were four Turkish and two Spanish speakers, all having an A1 level of competence in Italian, and one American with a B2 level of the CEFR. Thanks to the phonetic markedness of repetitions in terms of duration, F0 contour, intensity changes, pauses and glottalizations, prosody has been used to disambiguate some of the functions emerging in the corpus. “Self-repair”, “stalling”, “expanding” and “control over the form or meaning” were the most frequent kinds of repetitions noticed in the corpus, and the various functions they cover are sometimes different for A1 and B2 speakers. The B2 participant uses “self-repair” for organizing discourse, just as native speakers do, while A1 subjects use the same strategy as a self-correction of lapses. In most cases, planning problems are revealed by “stalling” repetitions, while, by contrast, conversation is favoured by “expansions”; the main function of the “control over the form or meaning” is to ask for agreement about the accuracy and adequacy of the repeated element.

## 6. Technology meets L2 Prosody

In the fourth part of this volume, *Technology and Prosody Recognition*, technology meets prosody in two specific areas: i.e. second and foreign language teaching, and speech synthesis systems that allow a computer to transform a written text in natural language, artificially reproducing the human voice.

Martin introduces the theme of technology in the service of prosody teaching. As a matter of fact, prosody is a fundamental factor in message decoding, and it should therefore undoubtedly also have a primary role in the teaching of an L2 oral skills. Since the 1960s, several computer software packages have been developed with the purpose of helping learners to acquire proper oral skills. However, according to Martin, these tools are limited regarding the phonological insight in their implementations. All these types of software, which usually provide a graphical display of teacher and learner’s F0 curves, allow learners to imitate a model and then graphically compare it with their own performances. For various reasons this approach has not achieved satisfactory results, e.g. the lack of phonological and rhythmic information useful to evaluate the curve

appropriateness. In order to address the latter issue, Martin presents a new set of functions implemented in the WinPitch software that allows learners' productions to be stylized on a model utterance, in terms of F0 curve and rhythmic structure, through automatic morphing. Learners can thus imitate their resynthesized voices and be provided with instruction on the elements requiring corrections and adjustments.

In the study by Salza, de Groot and Zovato, technology is applied to speech synthesis. In particular, they present the improvement of the Loquendo Text-to-Speech (LTTS ®) phonetic mapping technique, used for mixed language text reading obtained through the modification of the default output of the Automatic Phonetic Mapping (APM) module, which runs in the multilingual synthesis system. This module allows each L1 voice to speak any L2 language provided by the system, using L1 phonetic system as the basis for choosing L2 phonemes: for this purpose, a distance function exploiting weightings assigned to each articulatory-phonetic feature is used. However, since the acoustic-prosodic return of the APM concatenations is not always satisfactory, rules for choosing L1 candidate phonemes to be mapped onto the L2 phoneme has been defined in an Experimental Phonetic Mapping (EPM) prototype. More specifically, L1 phonemes are selected taking into account L1 and L2 phonetic systems, the frequency of occurrence of the candidate phoneme in the L1 speech database, and the similarity evaluation on a phonetic sequence longer than the single phoneme. Examples of the EMP use, having fluent, intelligible and plausible pronunciation of L2 Italian, are provided for the French-to-Italian and German-to-Italian mappings.

## 7. Conclusions

All recent studies in spoken communication emphasize the importance of the suprasegmental level in conversational interaction, and the prosodic competence may be undoubtedly considered more crucial than the lexical and the morpho-syntactic ones in conveying the proper interpretation of utterance meaning and function. The contribution of this field of study to second language acquisition research is crucial, as prosody is not merely related to the big divide between native and non-native speakers, in terms of their accuracy and efficacy in production, but it also deals with the input domain control. Prosody may influence in a decisive way the input perception and decoding, with negative effects on L2 language acquisition.

This volume is the first study introducing the prosodic development of Italian as a second/foreign language, and it covers a wide range of topics, offering different standpoints from which the complexity and variety of

the issue become clear. Studies have been conducted at various levels of analysis, from the micro-prosody of the syllable to the macro-prosody of the pitch contour of the sentence or the rhythm of the entire text, and there are reflections and discussions with reference to different research fields, i.e. language acquisition and teaching, pragmatics, sociolinguistics, computational linguistics, conversation analysis, communication disorders.

In this volume the editors decided to deal with the prosodic interlanguage phenomena from a multiplicity of methodological approaches and theoretical perspectives. All the work, albeit using different research methods and having their strengths and weaknesses, shares the common goal of contributing to the understanding of interlanguage prosody and to the development of communicative proficiency in a second language.



# **PART I**

## **LINKING PRACTICE AND THEORY**



# CHAPTER ONE

## PROSODIC FEATURES IN NATIVE AND NON-NATIVE SPEECH SEGMENTATION

PATRIZIA SORIANELLO  
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### 1. Introduction

In communicative dynamism, intonational phrasing is a reliable device which allows listeners to encode the information structure and the planning of spoken discourse. The prosodic boundary's identification is of great importance to the detection of coherent stretch of speech (for both semantic and syntactic levels) with a global melodic cohesion. There has been a considerable number of studies dealing with the phonetic description of prosodic boundaries in recent decades<sup>1</sup>. The topic was discussed from many points of view, in production as well as in perceptual perspective, employing either natural speech or a synthesized one. However, in other

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<sup>1</sup> Cf. Lise Menn and Suzanne Boyce, "Fundamental frequency and discourse structure", *Language and Speech* 25 (1982): 341-83; Jan Roelof de Pijper and Angelien A. Sanderman, "On the perceptual strength of prosodic boundaries and its relation to suprasegmental cues", *Journal of Acoustical Society of America* 96 (1994): 2037-47; Stephen Schuetze-Coburn and Elizabeth G. Weber, "Units of intonation in discourse: a comparison of acoustic and auditory analyses", *Language and Speech* 34 (1991): 207-37; Mark Swerts, "Prosodic features at discourse boundaries of different strength", *Journal of Acoustical Society of America* 101 (1997): 514-21; Mark Swerts and Ronald Geluykens, "The prosody of information units in spontaneous monologue", *Phonetica* 50 (1993): 189-96; Mark Swerts and Ronald Geluykens, "Prosody as a marker of information flow in spoken discourse", *Language and Speech* 37/1 (1994): 21-43.

studies, the prosodic boundaries' detection was accomplished using sophisticated automatic algorithms or prediction models.<sup>2</sup>

Several studies investigated the acoustic correlates of prosodic phrase boundaries. At present, it's widely accepted that the realization of a prosodic boundary is affected at least by two groups of factors. On the one hand there are temporal criteria including pauses and variations in speech tempo,<sup>3</sup> while on the other are melodic criteria such as intonational variations, pitch range and pitch reset. In addition, a minor role is generally attributed to changes in voice quality (i.e. laryngealization) and energy variations (i.e. loudness). Previous research has widely shown that prepausal lengthening, local changes in F0 contours, and pause duration are used for demarcative purposes: a boundary tone is melodically realized with a noticeable pitch variation aligned with the edges of tone units (henceforth TU), through the lengthening of the TU final syllables, or also by the insertion of a pause. These features co-occur in different ways, signalling boundaries of various prosodic strength. It should be remarked that, to a certain extent, these acoustic parameters are used in a similar way across language to mark prosodic breaks.<sup>4</sup> Intonational boundaries need to be studied combining, in close synergy, acoustic measurements and perceptual evaluations, albeit that the agreement values are not always concordant, as repeatedly demonstrated by the ratings of agreement obtained during the annotation of prosodic markers accomplished by using both acoustic cues and listeners' judgements, by expert and non-expert researchers.

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<sup>2</sup> See among others, Franco Cutugno and Leandro D'Anna, "Segmenting the speech chains into tone units human behaviour versus automatic processes", in Maria Josep Solé, Daniel Recasens and Joaquín Romero (eds.), *Proceedings of the 15th International Congress of Phonetic Sciences, Barcelona, Spain 3-9 August 2003*, Barcelona 2003, Universitat Autònoma de Barcelona, 1233-36; Agnieszka Wagner, "Acoustic cues for automatic determination of phrasing", in *Proceedings of the 5<sup>th</sup> International Conference on Speech Prosody, Chicago, Illinois May 11-14, Illinois 2010*, University of Illinois Press, accessed June 2012, <http://speechprosody2010.illinois.edu/program.php/papers/100196.pdf>.

<sup>3</sup> See Li-Chiung Yang, "Duration and pauses as phrasal and boundary marking indicators in speech", in Maria Josep Solé, Daniel Recasens and Joaquín Romero (eds.), *Proceedings of the 15th International Congress of Phonetic Sciences, Barcelona, Spain 3-9 August 2003*, Barcelona 2003, Universitat Autònoma de Barcelona, 1791-94.

<sup>4</sup> Cf. Alan Cruttenden, "Falls and rises: meaning and universals", *Journal of Linguistics* 17 (1981): 77-91; Michael D. Tyler and Anne Cutler, "Cross-language differences in cue use for speech segmentation", *Journal of Acoustical Society of America* 126 (2009): 367-76.



Prosody has an important role in language learning and use. Despite the great quantity of studies devoted to this topic in first language (conventionally designed as L1), non-native use of prosodic cues in speech segmentation received far less scholarly interest. In more recent years, however, prosody in second language (L2) has received growing attention in more experimental directions. One line of research attempted to define the perception of foreign accents<sup>5</sup> and, more generally, the mastery of prosody by groups of non-native subjects.<sup>6</sup> There is common consent that L1 plays a consistent role in L2 prosody's acquisition. In this specific view, Chen and Fon<sup>7</sup> analyzed the prosodic features of Mandarin speakers' English production; the reported observations claimed that in L2, both the prosodic grouping patterns and the pitch accents assignment followed

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<sup>5</sup> For instance, Philippe Boula de Mareuil, Giovanna Marotta and Martine Adda-Decker, "Contribution of prosody to the perception of Spanish/Italian accents," in Bernard Bel and Isabelle Marlien (eds.), *Proceedings of the 2nd International Conference on Speech Prosody* Nara, Japan, 23-26 March 2004, Nara 2004, 681-684, explored the role of segmental and suprasegmental cues in the realization of a Spanish/Italian foreign accent employing a prosodic transplantation tool. Anna Kaglik and Philippe Boula de Mareuil ("Polish-accented French prosody in perception and production: transfer or universal acquisition process?", in *Proceedings of the 5th International Conference on Speech Prosody, Chicago, Illinois 11-14 May 2010, Illinois 2010, Illinois University Press* accessed June 2012, <http://speechprosody2010.illinois.edu/program.php/papers/100987.pdf>) focused on the mastery of prosody by a group of Polish learners in French second language; results suggested that the acquisition of the L2 prosody did not seem to be constrained by the age of the first exposure to the L2.

<sup>6</sup> See, among others, Matthias Jilka, "The contribution of intonation to the perception of foreign accent. Identifying intonational deviations by means of F0 generation and resynthesis" (Ph.D. Diss., University of Stuttgart, 2000); Robin M. Queen, "Bilingual intonation patterns: Evidence of language change from Turkish-German bilingual children", *Language in Society* 30 (2001): 55-80; Boula de Mareuil, Marotta and Adda-Decker, "Contribution of prosody", 681-84; Jürgen Trouvain and Ulrike Gut, eds., *Non-Native Prosody. Phonetic description and teaching practice*, (Berlin: Mouton de Gruyter, 2007); Mark Swerts and Sabine Zerbian, "Prosodic transfer in Black South African English", in *Proceedings of the 5th International Conference on Speech Prosody Chicago, Illinois 11-14 May 2010, Illinois 2010, Illinois University Press* accessed June 2012, <http://speechprosody2010.illinois.edu/program.php/papers/100198.pdf>.

<sup>7</sup> Sally Chen and Janice Fon, "Prosodic features of non-native English production" in Wai-Sum Lee and Eric Zee (eds.) *Proceedings of the 17th International Congress of Phonetic Sciences*. China 17-21 August 2011, Hong Kong 2011: City University of Hong Kong, 456-59.

different strategies. Bahler et al.<sup>8</sup> considered indeed the role of F0 in listeners' segmentation of French speech, i.e. the identification of words final boundaries, in native English and native French, divided into two proficiency groups; the findings of a perceptual test, comprehending different synthesized stimuli, proved that only native speakers are able to use F0 rise as a cue to word-final boundary in French.

Another line of research analyzed the time effects of L2 exposure on adult learners' acquisition of prosody and fluency features.<sup>9</sup> Finally, a certain number of researches focused on the contribution of prosodic cues in native and non-native subjects in segmenting speech chain into Tus.<sup>10</sup> Despite the different aims pursued by these studies, some recurrent traits emerged. First, all studies confirmed that prosody is a strong linguistic feature for speech segmentation, regardless of the language; both native and non-native subjects try to signal acoustically the edges of intonational units, in order to make easier discourse comprehension. However, there is at least one notable difference. During a segmentation task based on listening impression, native speakers can rely on a more varied number of linguistic phenomena, including syntax and semantics; on the contrary

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<sup>8</sup> Carly L. Bahler, Caitlin E. Coughlin and Annie Tremblay, "Differential contribution of prosodic cues in native and non-native speech segmentation", in Wai-Sum Lee and Eric Zee (eds.) *Proceedings of the 17th International Congress of Phonetic Sciences*. China 17-21 August 2011, Hong Kong 2011: City University of Hong Kong, 276-79.

<sup>9</sup> Cf. Pavel Trofimovich and Wendy Baker, "Learning second language suprasegmentals: effects of L2 experience on prosody and fluency characteristics of L2 speech", *Studies in second language acquisition* 28 (2006): 1-30; Pavel Trofimovich and Wendy Baker, "Learning prosody and fluency characteristics of second language speech: The effect of experience on child learners' acquisition of five suprasegmentals", *Applied Psycholinguistics* 28 (2007): 251-76; Jasone Cenoz, "Pauses and hesitation phenomena in second language production," *ITL: Review of applied linguistics* 127-28 (2000): 53-69; Riikka Ullakonoja, "Pausing as an indicator of fluency in the Russian of Finnish learners", in Plinio A. Barbosa, Sandra Madureira and César Reis (eds.) *Proceedings of the 4th International Conference on Speech Prosody*, Campinas Brazil, 6-9 May 2008: Campinas, Brazil 2008: Editora RG/CNPq, 339-42.

<sup>10</sup> Cf. Irina Nesterenko, "Prosodic annotation in spontaneous Russian: perceptual annotation and automatic classification, speech prosody", in Rüdiger Hoffmann e Hansjörg Mixdorff (eds.), *Proceedings of International 3rd Conference on Speech prosody*, Dresden, Germany 2-5 May 2006, TUD PRESS, accessed June 2012, [http://aune.lpl.univ-aix.fr/~sprogis/sp2006/contents/papers/PS5-29\\_110.pdf](http://aune.lpl.univ-aix.fr/~sprogis/sp2006/contents/papers/PS5-29_110.pdf). Amina Mettouchi et al., "Only prosody? Perception of speech segmentation in Kabyle and Hebrew", *Nouveaux cahiers de linguistique française* 28 (2007): 207-18; Tyler and Cutler, "Cross- language differences," 367-376.

non-native subjects rely above all on prosodic cues. At the production level, non-native speakers tend to transfer the prosodic patterns of their mother tongue to the second language, even after long period of L2 exposure. Nevertheless, the amount of prosodic divergence seems to depend, to some extent, on the learner's level of proficiency.

## **2. Aim**

This study deals with the issue of the prosodic phrasing in Italian as second language. Most previous research in the area of L2 prosody's acquisition has focused on a single dimension. For this reason, the present study had wider aims. Our analysis was performed in both production and perception perspective. The former attempted to explore in detail the phonetic realization of prosodic boundaries, in Italian L1 (It-L1) and Italian L2 (It-L2). The main purpose of this experimental step was to verify whether perceptual results were supported by speech production data. In particular, we investigated the way in which Polish learners, with low proficiency in Italian, use acoustic cues during the production of a prosodic boundary. In other words, the study seeks to ascertain to what extent, native and non-native speakers of Italian differed according to the prosodic boundary marking.

The latter analysis intended to test the perceptual role conveyed by acoustic indices in the realization of a prosodic boundary. In this paper we will argue that production and perception investigations are the proper empirical basis to define prosodic phrasing as well as to evaluate the differences emerged in the speech production of unexperienced learners of Italian L2. Listening experiments with Italian natives and with Polish learners were performed to detect intonation boundaries under different experimental conditions.

We presumed that the phenomenon under investigation needs special prosodic-acoustic cues and that subjects have a sort of metalinguistic assessment of the prosody of their native language, a prerequisite lacking in non-native learners. The results will be discussed in the following sections.

## **3. Methodology**

Two groups of subjects were recruited from a university community: a native Italian-speaking group (It-L1) consisting of three female speakers of Bari Italian aged between 20-23 and a native Polish-speaking one (It-L2) with no previous exposure to the Italian language. These latter were

Erasmus students (1 male and 3 females) aged between 21 and 26 years. At the time of testing, all participants were attending university in Bari, a southern Italian town. The Italian proficiency level of the Polish speakers was equal to A2, as performed by certification. Both groups were asked to describe a set of picture postcards, the Polish subjects were also asked to talk freely about their experience of studying in Italy. Digital recordings were made in a suitable silent room by means of a Tascam DR-07 (.wav files, sampling frequency of 22 KHz, 32 bits). The speech material under study consisted of excerpts of spontaneous speech. The corpora were segmented into dialogic turns and then into TUs and labeled with a sequential abbreviation containing the identification of learner's name, native language and speech typology. The acoustic analysis was accomplished by means of PRAAT. As a whole, we examined 105 TUs for IT-L1 and 120 TUs for It-L2. The following parameters were measured for each TU: (i) syllable length; (ii) articulation and speech rates;<sup>11</sup> (iii) the length of pauses and their placement; (iv) temporal duration of stressed and unstressed vowels (considered in both final and non-final position); and (v) pitch range and intonational contour.

## **4. Acoustic findings**

### **4.1. Speech rate**

Overall, the verbal production of Italian L2 showed a low degree of textual and prosodic cohesion. It therefore presented a high index of disfluency which was manifested by prolonged use of pauses, interruptions, false starts and repetitions. In order to quantify the degree of disfluency found in the two samples, verbal fluency was considered in a comparative way. With regard to speech rate, L1 and L2 differed. A first indication in this sense comes from the computation in syllables of the temporal extension of TUs. To this purpose, we counted only the syllables phonetically realized. In Italian L2, TUs were shorter. In the same direction, even articulation and speech rates were significantly slower than those of L1 speakers, as shown in Table 1-1.

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<sup>11</sup> Articulation rate was defined as the number of syllable per seconds, excluding pause time.

Language	TU	Articulation rate	Speech rate
It L1	6.9 (2.3)	5.1 (1.3)	4.6 (1)
It L2	4.8 (2)	3.6 (0.9)	2.7 (0.8)

**Table 1-1: Mean values in syllables of TU length, Articulation and Speech rate. Standard Deviation values in brackets.**

In detail, in Polish subjects TUs included 4.8 syllables while in Italian natives the length of TUs was 6.9. These results clearly indicate that speech rate varied depending on the considered sample (native or non-native Italian). Still more evident was the difference concerning speech rates. In Polish learners, speech rate was slower, perhaps because of their high rating of pauses. If so, the low speech rate values observed seemed to be directly correlated to pauses, but also to a lower articulation rate. This was only the first macroscopic effect of the high degree of disfluency which characterizes non-native speech production.

## 4.2. Pauses

The number and duration of pauses found in non-native corpora was consistently high. As is known, pausing is also a frequent phenomenon in native language, since it is connected to the physiological mechanisms of breathing, but also to the needs of syntactic and textual planning.<sup>12</sup> The pauses are not all alike, for this reason we distinguished silent pauses by filled ones; these latter are manifested through vocalization (i.e. *ehm*, *mhm*) or vowel prolongation (i.e. *c'è un lago<o>*).<sup>13</sup> What is interesting to note is that over our entire corpora, all the pauses, regardless of typology, were more numerous and also longer in L2 (Table 1-2).

Speech sample	Silent pauses	Filled pauses
It L1	42%	16%
It L2	55%	38%

**Table 1-2: Percent distribution of pauses by type.**

<sup>12</sup> Cf. Danielle Duez, "Silent and non-silent pauses in three speech styles", *Language and Speech* 25 (1982): 11-28.

<sup>13</sup> A silent pause is a moment of silence, conventionally longer than 200 ms, while a filled pause is any occurrence of hesitation.

In the Polish learners' production there was a high percentage of silent pauses, precisely 55%, while in L1 we found 42%. The presence of filled pauses was 16% in L1, but 38% in L2.<sup>14</sup> On this point, we noted a considerable variation between the two corpora.

In non-native speech, the pauses frequently interrupted the syntactic units, and a pause sometimes interrupted the word. The most conspicuous differences concerned filled pauses, so demonstrating the presence of verbal planning difficulties. This occurs when the learner shows uncertainty about the choice of words, or when the lexical form of a word is not known or temporarily unavailable. Consequently, the greater the number of pauses, the lower the index of textual cohesion. Table 1-3 shows the duration of pauses.

Speech sample	Silent pauses	Filled pauses
It L1	500 (270)	616 (280)
It L2	580 (241)	613 (261)

**Table 1-3: Mean pauses duration (in ms) and Standard Deviation values (in brackets).**

Coherently, as far the silent pauses were concerned, in L2 there was greater average length; by contrast, the duration of filled pauses was controversial: tendentially silent pauses had a longer duration in L2, but temporal difference was not always appreciable. In It-L2, the length of silent pauses went from 250 ms to 1000 ms; the mean length was 580, and most of the pauses were between 400 and 750 ms. The true disagreement did not just concern the duration of pauses, but rather their statistical impact as well as the functions provided. In Italian L1, many pauses were used for emphasis and stylistic effects,<sup>15</sup> while in Italian L2 a great number

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<sup>14</sup> In native Polish spontaneous dialogues the percent rates of silent pauses is of 49.4% whereas for filled pauses the average result is 22.5% (cf. Maciej Karpiński and Ewa J. Nowikow, "Prosodic and gestural features of phrase-internal disfluencies in Polish spontaneous utterances", in *Proceedings of the 5<sup>th</sup> International Conference on Speech Prosody Chicago Illinois 11-14 May 2010* Illinois 2010, Illinois University Press, accessed June 2012, <http://speechprosody2010.illinois.edu/program.php/papers/100152.pdf>.

<sup>15</sup> These results are consistent with those already found in other research carried out for Italian language. Cf. Massimo Pettorino and Antonella Giannini, "Analisi delle disfluenze e del ritmo di un dialogo romano", in *Italiano parlato. Analisi di*