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# Impact of prosodic training on Italian as L2 by Hiberno-English speakers: The case of polar questions

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## Abstract

This paper aims at investigating the efficacy of a perception-production training on the production of Italian-L2 yes/no questions by Hiberno-English learners. Our hypotheses are that an intensive prosodic training improves the production of Italian-L2 prosody regarding both 1) the lexical stress patterns and 2) the intonation patterns, in terms of both their phonological composition and the phonetic details of their implementation. Though results are preliminary, the comparison of productions by trained and control subjects shows that, as hypothesized, only the former were able to change the prosodic features of yes/no questions in Italian-L2, improving as for both the lexical stress and the intonation patterns.

**Index Terms:** polar questions, perception-production training, Italian intonation, Hiberno-English intonation, prosody

## 1. Introduction

The phonetics and phonology of the mother tongue (L1) are known to affect learner's capability to perceive and produce segments and prosody in a second language (L2) [1,2]. However, various investigations have shown that learner's production and perception of non-native sounds may improve by means of different types of intensive training. For instance, [3] showed that phonetic instruction may already improve learners' perception of L2 sounds, while [4] showed that a perceptual (identification) training on English vowels was enough to observe an improvement from pre- to post-test in trained subjects', as regards for both the identification and the production ability (as proved by acoustic analysis and evaluation by native speakers). Finally, in respect to production training, other works noticed improvements especially when a feedback was offered to the experimental subjects, for instance in terms of spectrograms showing the main acoustic features of L2 sounds [5] or graphic representations highlighting acoustic (phonetic) differences between L1 and L2 sounds [6]. With regard to intonation, [7] showed that training in the perception of intonation resulted in a statistically significant improvement in the production of English intonation patterns. Furthermore, several studies (e.g., [8]) have highlighted the benefits of providing learners with a visual feedback of some acoustic characteristics of their own productions, through the use of speech visualization software

technology, while imitating a target sentence. However, to our knowledge, no studies have been carried out on Italian L2 prosody learning by Hiberno-English speakers.

This paper aims to investigate the efficacy of a complete, perception-production training on the production of Italian L2 information-seeking yes/no questions by Irish learners, with attention to prosody and, in particular, to intonation.

## 2. La Spezia Italian and Galway Hiberno-English

Italian mainly shows lexical stress on the penultimate syllables, but stress may actually fall on the last four syllables, or even earlier in the case of affixation [9]. Indeed it has a contrastive function. As for intonation, Autosegmental-Metrical accounts (AM which offer phonological descriptions of the association of tonal events with metrically strong syllables and edges of prosodic domains, in terms of pitch accents and boundary tones [10]), showed that patterns differ depending on the variety of Italian taken into account [9], on the basis of a Discourse Completion Task (DCT) data [11].

The variety offered as a model of Italian in this work, which was investigated following the same methods as in [9] is that spoken in La Spezia Italian (close to Genoa). In this variety, information-seeking yes/no questions (antepenultimate and penultimate stress words) are realized by means of a L\*+H L% (52,5% on penultimate and antepenultimate stress words; 39% on final stress ones where, however, the L boundary tone

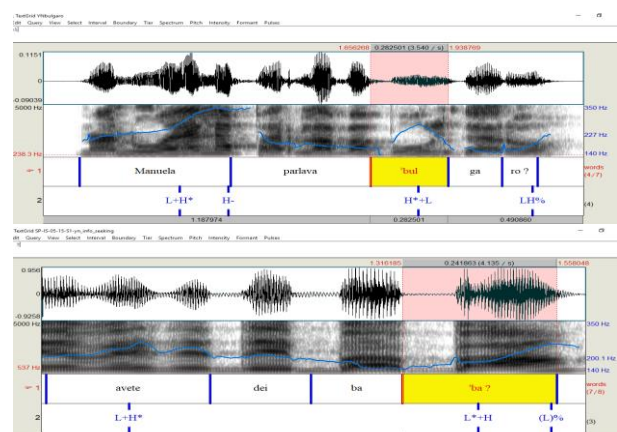


Figure 1. Information-seeking yes/no questions in La Spezia: nuclear pitch accent associated to antepenultimate syllable (upper panel - “Did Manuela speak Bulgarian?”) and final syllable (lower panel - “Do you have any babà?”)

undergoes total truncation) or, alternatively, by a H\*+L LH% (35% on penultimate and antepenultimate stress words; 61% on final stress ones, of which almost one third of cases show the H boundary tone truncation [12]). Notably, the materials offered as a model for intonation during teaching and training included a H\*+L LH% pattern in penultimate and antepenultimate stress words (Fig.1, upper panel) and L\*+H (L)% in final stress words (Fig.1, lower panel). Phonetically, the former corresponds to a fundamental frequency (F0) peak around the middle of the syllable, followed by a low F0 stretch and a final rise; the latter is implemented as a rise in the case when it is associated with a final syllable.

As for English, it is well-known that lexical stress placement is a highly complex matter, due to the fact that the language is accentual with moveable and/or variable stress assignment, which can be unpredictable. Furthermore, word stress seems to be rather more flexible in Irish accents in comparison with English of England, involving delayed placement of stress in contrast to other varieties of the language [16]. However, to our knowledge no studies have been carried out on the Galwegian variety. Information on Hiberno-English intonation patterns were collected by means of an adaptation of the DCT used for investigating Italian varieties, including that spoken in La Spezia (in line with [9,13]) and the analysis was carried out by taking into account the IViE transcription conventions, developed at Cambridge University as part of a project on variation in English in the British Isles [14,15].

Data show that information-seeking yes/no questions in Galway Hiberno-English are realized by means of a finally falling pattern, which is analysed as H+H\* L% (about 43,7% of cases – Fig. 2, upper panel), or by a finally rising one, labelled as H+H\* H% (about 50% of cases – Fig 2, lower panel: see [13]).

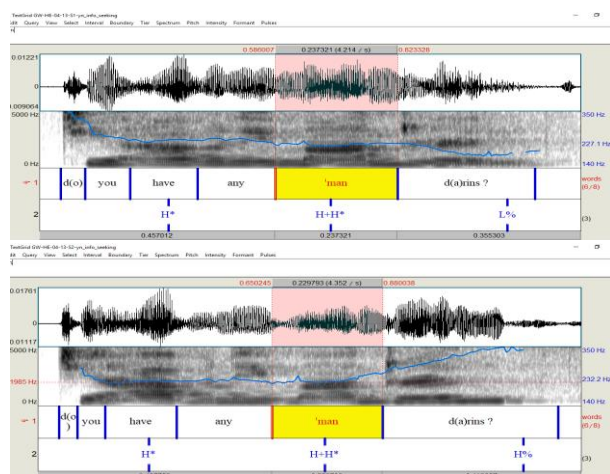


Figure 2. Information-seeking yes/no questions in Galway (by the same speaker) - “Do you have any mandarins?”

Phonetically, a usually small F0 variation is observed from the prenuclear to the nuclear syllable, with the latter being level or somewhat rising from a slightly lower F0 onset in comparison to the former; in few cases a not steep fall seems to be realised from prenuclear to nuclear syllable. Thus, the main difference

between patterns actually relates to the postnuclear F0 track, which is falling in the former and rising in the latter pattern.

### 3. Testing prosodic training

#### 3.1. Goals and hypotheses

This paper focuses on Italian spoken as L2 by Irish learners and aims at investigating the efficacy of a perception-production training on the production of the lexical stress and the intonation pattern. Our hypotheses are that an intensive, explicit training improves productions in Italian L2 as regards the realization of 1) the expected stress pattern, especially in the case of less prototypical stress positions (e.g., final stress); 2) the intonation pattern as to both its phonological composition and its phonetic implementation. In particular, trained speakers are expected to detect different pitch accents and boundary tones, thus changing the intonational and prosodic features in their productions.

#### 3.2. Methods

To test our hypotheses, we selected 5 participants according to the following criteria: age (16-27), origin (County Galway), years studying Italian (1), level of competence in Italian (A2-CEFR) and we divided them into two groups: the experimental group (3Females) and the control group (2Females). Both groups had the same Italian teacher, a speaker of La Spezia Italian, but while the first group undertook a 6-week explicit intonation training (8 sessions of 24 contexts/utterances each, about 2 hours per week; i.e. 192 situations/utterances in total, although in the present work we focus on the training related to information-seeking yes/no question and target words including only one type of nuclear syllable); meanwhile, the control group was engaged in normal conversation classes.

The training was devoted to improving the learners' competence in terms of both phonological/pragmatic awareness and phonetic implementation capabilities. In class, the teacher provided learners with explicit instructions, concerning the phonetics and phonology of intonation of the variety of Italian offered as a model, that is La Spezia (Genoa) Italian, and the interpretation of the main acoustic correlates of prosody (mainly F0) offered in PRAAT. Then, by following and rearranging the instructions in their intonation training activity [17], learners were required: a) to imitate audio examples and to record their own productions; b) to compare their own prosodic cues with those of an Italian native speaker and to identify possible mistakes; c) to repeat step b in order to eliminate mistakes and to improve their performance. For each sentence, learners were asked to perform a-c three times and to perform the whole task twice.

Both groups performed a pre- and a post-test, in which data were collected by means of a reading task. Target sentences (there were 7 of them for each categories the training focused on, e.g., information-seeking yes/no questions) were composed by the same number of syllables and included paroxytone, paroxytone and oxytone target word (respectively, *médico* ‘doctor’, *rimèdio* ‘remedy’, *Memé*

‘Memé’ – a first name). They were elicited by means of specific contexts (very similar to those offered during the DCT – see 2), presented over a PC monitor in random order. Participants were asked to understand the contexts and interpret the corresponding target sentence accordingly for 5 times.

L2 productions were analysed in respect to the word stress and the intonational pattern realized (within the AM framework) as well as to its phonetic correlates. As for the latter, the attention was focused on the F0 range used by speakers in the implementation of the nuclear and postnuclear syllable(s) (from the end of the prenuclear to the end of the final syllable), taken as a rough indicator of the range of F0 modulation and of the pattern implemented. Labelling and measurements were performed in PRAAT. Statistical measurements (ANOVAs) were performed in SPSS.

### 3.3. Results

#### Stress pattern

In pre-test, both control and experimental subjects produce some target words with an incorrect stress pattern. Most errors are detected in the realization of final stress words (by all control subjects and experimental subject F1) and, to a lesser extent, of penultimate stress words (by one control subject and by the experimental subject F1) – see Fig. 3. However, a deeper analysis reveals that, when subjects fail to produce parts of the items exemplifying a specific stress position, they only do so during the first realization(s) and seem therefore, to correct themselves during pre-test already.

In post-test, experimental subjects always produce the correct stress pattern, while control subjects keep failing to produce stress in final position – see Fig. 3.

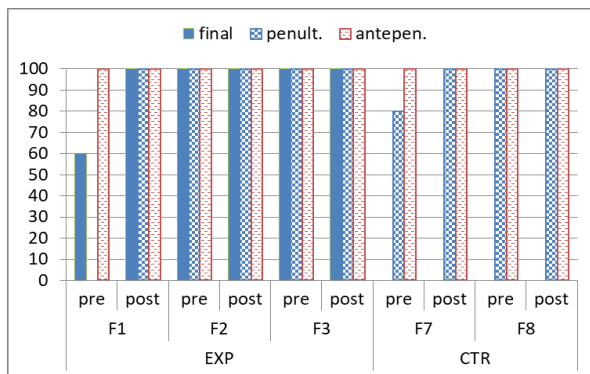


Figure 3. Percentage of realized stress position by all speakers in pre- and post-test productions

#### Intonation

In pre-test, all subjects seem to refer to a H+L\* H% pattern – see Fig. 4. In penultimate and antepenultimate stress words, this corresponds to either a very shallow fall from the prenuclear to the nuclear syllable or a very gradual fall (which may end up in a sort of low F0 plateau) from the previous F0 peak; a postnuclear rise is then realized – see Fig. 5, upper panel.

In final stress words which are correctly realized as such, subjects (basically only experimental ones) produce a rising

F0; however, when subjects realize final stress as penultimate stress (mainly, but not only, control subjects) they produce a low, or even falling, F0 on the metrically strong syllable and a following steep rise, similar to what they do in the case of most penultimate and antepenultimate stress words. For this reason, all subjects are taken to refer to one phonological pattern, that is H+L\* H%, independently of the more or less steep rise which is actually realized on the final stressed syllable; that is, the rise is interpreted as due to the quite strong F0 modulation realized on the nuclear pattern as a whole rather than to the implementation of a specific, rising nuclear pitch accent (see Fig. 6 for a plot on pitch span).

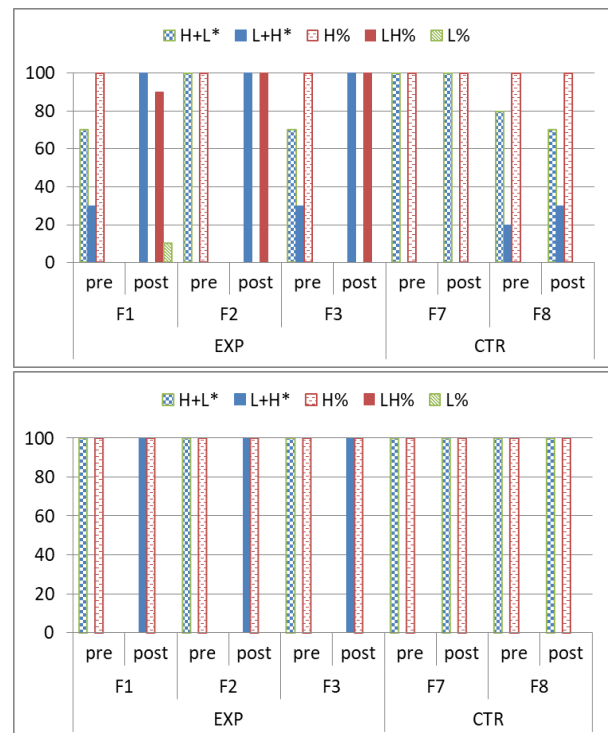


Figure 4. Percentage of pitch accents and boundary tones produced by all speakers in pre- and post-tests: words with penultimate/antepenultimate (above) and final stress (below)

In post-test, the phonological pattern referred to and realized by control subjects is basically the same as observed in pre-test, while experimental subjects switch to different patterns – see Fig. 4. In particular, they switch from a falling-rising to a clearly rising-falling-rising pattern in the case of penultimate and antepenultimate stress target words (the pattern is analysed as L+H\* LH% – see Fig. 5, lower panel); in the case of final stress words, they switch to a rising pattern (the analysis is L+H\* H%).

In fact, experimental subjects realize a rising pitch accent independently of the target word stress pattern. Thus, after training, subjects seem to refer to a different pitch accent phonological category (that can then be hypothesized also in the case of final stress words) and to a different category as for regards the boundary tone too.

Finally, as for the pattern implementation, only trained subjects show a significant change in the F0 range used for nuclear pattern as a whole – see Fig 6.



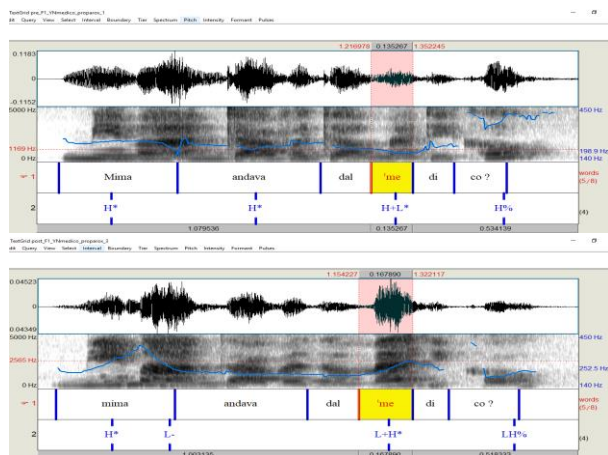


Figure 5. Pre- (above) and post-test productions (below) by experimental subject F1: target word with antepenultimate stress position

#### 4. Discussion on the effect of training

Trained subjects improve more than control ones as in respect to lexical stress pattern they realize in post-test, thus confirming our first hypothesis. Though these results should be confirmed by the analysis of more data (subjects), as experimental and control groups already differ in pre-test where the former shows a lot of final stress realization, contrary to the latter. Nevertheless, data suggest that improvement from pre-test to post-test cannot be ascribed to training only, as two different situations are detected. On the one hand, the presence/absence of training may be seen as crucial in affecting subjects productions in those cases where no correct item was produced in pre-test. This is the case for one experimental subject who originally shows difficulties in realizing penultimate stress words but who then, after training, shows 100% of correct stress patterns in post-test. Meanwhile, all control subjects, who cannot correctly produce final stress words in pre-test, do not learn how to realize the expected stress position. On the other hand, no specific effect of training is hypothesized in the case where subjects failed to produce only part of the items representing a specific stress position in pre-test (basically in their first realization(s)) and did not fail any item in post-test. Indeed, in such cases auto-correction seems to take place, independently of an explicit and focused training.

As to the intonation pattern, only trained subjects seem to be able to change its phonological composition and its phonetic implementation in order to modify it in the direction of the model Italian pattern, thus confirming our second hypothesis too. In fact, experimental subjects in pre-test and control ones in both pre- and post-test realize a slightly falling or a low pitch accent, reaching a low target from a variably high pre-nuclear syllable. In many cases an appropriate analysis of the pitch accents they produce seems to be  $L^*$ , but a bi-tonal analysis, i.e.  $H+L^*$ , is preferred in order to account for 1) the quite strong variability observed in pre-nuclear syllable  $F_0$  values (suggesting the presence of a target in various cases), 2) the low  $F_0$  values reached during the nuclear syllable and 3)

the supposed familiarity with bi-tonal pitch accents (given the  $H+H^*$  accent found in their mother tongue).

However, after training experimental subjects seem to refer to a different phonological category as for both pitch accent ( $L+H^*$ ) and boundary tone (at least for penultimate and antepenultimate stress positions, where a  $LH\%$  is found), and to implement them differently.

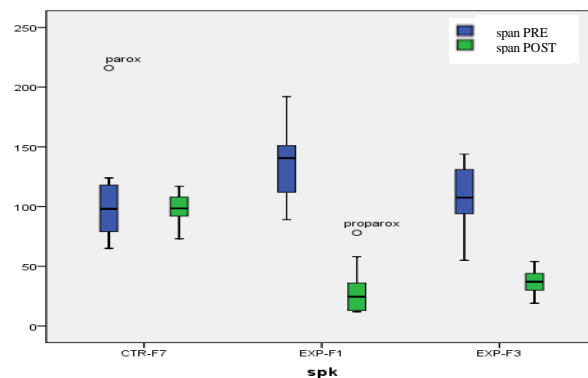


Figure 6. Pitch span used for the rise on the final syllables in pre- (blue) and post-test productions (green) by 1 control (left) and 2 experimental subjects (middle and right): target words with penultimate and antepenultimate stress

The change in phonological category corresponds to a quite appropriate phonetic implementation in the case of finally stressed target words, while in the case of other stress patterns it corresponds to a rise throughout the syllable which is quite different from the rise-fall associated to the syllable in La Spezia Italian (that is  $H^*+L$ ). Thus, subjects seem to resort to a pitch accent including a peak within the syllable in their own mother tongue (similar to the  $L+H^*$  they realize in Italian L2), even though this accent shows quite a different phonetic implementation details in comparison to the pitch accent offered as a model in penultimate and antepenultimate stress words (i.e.,  $H^*+L$ ). On the contrary, the boundary tone seems to be easily detected and reproduced in pre-test and in post-test by experimental subjects only. Finally as for the pattern implementation, trained subjects only show a change in pitch span used for the rise on the nuclear pattern.

#### 4. Conclusions

This paper focused on Italian spoken as L2 by Irish learners in order to investigate the efficacy of a perception-production training on the production of the lexical stress and the intonation pattern expected in Italian. To test our hypotheses, we selected 10 participants and had a group performing an explicit perception-production training, as opposed to the control group who attended conversation classes.

Results confirm our hypotheses, in that only trained subjects were able to change the prosodic features of their yes/no questions in Italian-L2, improving their production of both the lexical stress and the intonation pattern; as for the latter, both the phonological composition and the phonetic implementation were more Italian-like after training.

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