Tonal specification of speaker commitment in Salerno Italian wh-questions

Riccardo Orrico[1]*, Mariapaola D'Imperio*[2]

[1]University of Salerno, Italy; Aix Marseille University, France
[2]Rutgers University, USA
`rorrico@unisa.it, mariapaola.dimperio@rutgers.edu`

Abstract

The paper addresses the issue of variability in the mapping between intonation and meaning in Salerno Italian. The general hypothesis tested is that variation of both the phonological and phonetic levels of intonation reflects speaker's commitment to the proposition expressed. Here we report an investigation of the intonational meaning in wh-questions in Salerno Italian. Results show that both nuclear pitch accent type and its relative pitch excursion are crucial cues to differentiate between information-seeking and echo wh-questions. Results are interpreted as indicating the presence vs absence of speaker commitment to a salient proposition evoked by the wh-question. Boundary choice, on the other hand, appears to be dependent on speaker specific strategies. Hence, results call for the need of an intonational meaning model that takes into account individual variability.

Index Terms: intonational meaning, Salerno Italian, speaker commitment, wh-questions

1. Introduction

Intonational contours have been described as playing a crucial role in conveying pragmatic meaning, though the exact contribution of intonation in discourse is still matter of controversy. It is commonly assumed that intonation can express the illocutionary force of an utterance. The clearest example is the association made between terminal rises and yes-no questions, while terminal falls would be generally employed to express a statement [1], [2]. Evidence that intonation clearly discriminates across illocutionary types is easy to find in the literature. For instance, pitch accent type has been reported to be a sufficient cue for the expression of sentence modality in different Italian varieties [3]. Such characterization of the meaning expressed by intonation, however, does not account for a number of factors. First, different speech acts appear to share intonational contours, as in the case of the English falling nuclear tune (H* L-L%) that is found in both statements and wh-questions. On the other hand, the same utterance modality can be realized using different tonal patterns [4], [5] (see also [6] for a review).

More recently, building on [7]'s idea that the meaning of a sentence is its potential to update the common ground (the body of information created during a conversation), models and empirical studies have tested the dynamic meaning of intonation in terms of speakers' and listeners' commitment to propositional content. Much of this work has, however, been mainly confined to statements and yes-no questions, as for example in [8], [9], [10], and [11], while little has been done as far as wh-questions are concerned. A model that tries to integrate the meaning of a wh-question tune within a dynamic framework is reported in [12]. Note that in propositional approaches to semantics, an interrogative sentence maps to a (set of) proposition(s) corresponding to its answer(s) [13], e.g. the example in (1a)-(1b).

[[Who came?]] ={John came, Laura came, Mary came, ...} (1a)

[[Did John come?]] ={John came, John didn't come} (1b)

The author proposes a model for the meaning of English tunes by building on the potential of an utterance to determine speakers' assertiveness (i.e., adding a proposition to the common ground), which would be cued by the presence of a L-phrase accent. According to [12], the proposition which the speaker is assertive about in a wh-question is derived from the substitution of the wh-word with an indefinite, as in (2).

Where did you go? [You went *somewhere*] (2)

By the same token, a wh-question realized with a phrasal H- rise would signal the lack of such commitment. In general, [12] attributes the lack of commitment either to the fact that the proposition is already in the common ground, or to a rejection on the part of one of the participants to add it to the common ground. An example of the latter case is represented by echo wh-questions, which are mandatorily rising. Nevertheless, despite the predictions of a commitment-based model, high levels of variability in the tune-meaning mapping is still widely registered. The case of Italian and its varieties is one of the most representative examples in this respect. For instance, [14] and [15] describe a many-to-many mapping between tune and pragmatic function, which can be detected both across and within regional varieties.

A further issue concerning the way in which tunes contribute to meaning is the hypothesis of a direct association between linguistic and attitudinal meanings on one side and phonetical implementation on the other. While information relative to the use of pitch range has been traditionally considered non-pertinent to express pragmatic contrast (see *free-range hypothesis* in [16]), theories arguing for the role of pitch range in expressing meaning have also been proposed. The Biological Codes theory proposed in [17] and [18], for example, claims that variation in pitch range (coded within the Effort Code) is instrumental for expressing focus (at the linguistic level), as well as the speaker's surprise degree (at the paralinguistic level). Evidence of the specification of linguistic meaning in pitch range has also been provided by empirical research, showing that a greater pitch excursion is a crucial cue in the perception of echo or incredulity in questions and statements [19], [20], [21].

The general idea behind this work is that a viable intonational meaning model should account for different kinds of variability and its sources. This would be accomplished only by deeply investigating the linguistic levels and interfaces that

are affected by it, as well as its sources. Specifically, our goal is to take both inter-speaker and intra-speaker variability into account. Hence, in this study we propose a novel analysis of wh-question intonation for the variety of Italian spoken in Salerno (SI). The general hypothesis tested here is that the variability found in wh-question tunes can be accounted for by considering both the way in which the question updates the common ground and, on the other, the interplay between phonetic and phonological elements.

Previous work on SI has primarily focused on intonation in yes-no questions and has unveiled, on the one hand, the potential of nuclear configuration to reflect speaker's commitment while showing, on the other, high levels of individual variability [22], [23]. Two pragmatic types of wh-questions are considered here, i.e. information-seeking wh-questions (wh-IS), which imply the commitment of the speaker to a salient proposition, and echo wh-questions (wh-E), implying absence of commitment. We specifically predict that (i) intonation in SI has a crucial role in discriminating these two pragmatic types, additionally (ii) both phonological (tune choice) and phonetic aspects of intonation (pitch range) are predicted to affect the end result and, finally, (iii) that these mappings are modulated by variability at the individual level.

2. Method

Productions of a set of wh-questions analyzed here were taken from the SI section of the *Interactive Atlas for Romance Intonation* corpus [24]. The corpus consists of productions from 4 speakers (2 males and 2 females), elicited using two different techniques i.e., Discourse Completion [25] and Reading Task. In both of these tasks, the pragmatic condition of each utterance was defined by giving the speakers information about the conversational situation (linguistic and situational context). The speaker had to first read the sentence and then to spontaneously react to the situation.

We selected two types of wh-questions, i.e. wh-IS in which the wh-question has the function of asking for new information, and wh-E, in which the wh-question echoes a previous utterance to ask for clarification/repetition. Two different sub-types of wh-E were analyzed i.e., unheard and counter-expectational wh-E. In the unheard sub-type, the speaker failed to hear the information, while in the counter-expectational one the speaker is surprised by the information. Phonological analyses were performed using the tenets behind the Autosegmental-Metrical approach to intonation and using a ToBI-like annotation system (see [3], [15], [22], [23]). Pitch range measurements were performed by extracting the distance between local F0 maxima and minima in the nuclear pitch accent region, which was then transformed in semitones (ST) for the statistical analysis.

3. Results

3.1. Phonological analysis

Intonational analyses revealed that wh-IS can be realized in SI through different nuclear configurations. This confirms the high variability of tunes reported in [15]. Specifically, three main and highly frequent nuclear patterns were found, i.e., a falling tune, labelled as H+L* L-L%, a falling-rising tune, labelled as

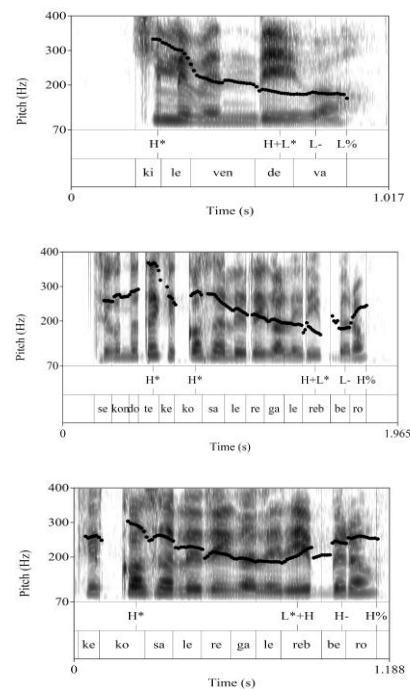H+L* L-H%, and a rising tune, labelled as L*+H H-H%. Figure 1 reports an example for each one of these tunes[1].

Figure 1: *F0 contours for wh-IS questions, uttered by the speaker AV. Top panel shows the question* Chi le vendeva? *[Who used to sell them?] uttered with a H+L* L-L% nuclear tune. Middle and bottom panels show the question* (Secondo te) che cosa le regalerebbero? *[(In your opinion) what would they offer her?] uttered with a H+L* L-H% (middle) and L*+H H-H% (bottom) nuclear tunes.*

Much less variability was registered for wh-E. Specifically, all instances of echo questions were found to be realized with a rising (L*+H) nuclear accent, which could combine with different edge tone configurations. Interestingly, a crucial difference was found between counter-expectational and unheard wh-E. Counter-expectational questions were typically realized with a L*+H H-H% tune (though HL-L% boundaries were also attested). An example of rising pattern is reported in Figure 2 below (top panel). Note, additionally, that the F0 excursion (pitch span) within the nuclear configuration in the counter-expectational rise is much greater than the wh-IS rise reported in the bottom panel of Figure 1 above (uttered by the same female speaker). Unheard wh-E questions, on the contrary, were found to be realized with a nuclear L*+H plus a falling H(*)L- phrase accent combination, which could be followed by either a H% or a L% boundary tone. This notation is generally used to indicate a hat pattern, attested also in other southern varieties (see [26] for Neapolitan Italian). Specifically, this tune includes a nuclear pitch accent (L*+H) that is aligned early in the utterance (here with the wh-word), followed by a falling phrase accent (H(*)L-) that is secondarily associated with the last stressed syllable in the utterance. Interestingly, this particular tune has been described in [26] as a yes-no question tune. An example is reported in Figure 2 (bottom panel).

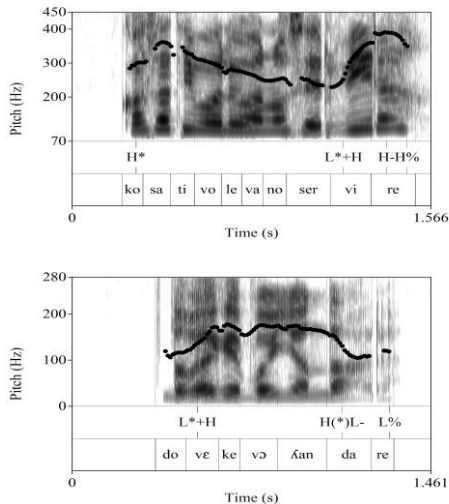[1] Additionally, a L*+H HL-L% rise-fall was attested, though in a much lower percentage of cases.

Figure 2: *F0 contours for the counter-expectational wh-E utterance* Cosa ti volevano servire? *[What did they want to serve you?] uttered with a L*+H H-H% nuclear tune (top), uttered by the same speaker as the examples in Figure 1 (AV) and for an unheard wh-echo utterance* Dov'è che voglio andare? *[Where is it that I want to go?] uttered with a L*+H H(*)L-L% by VM (bottom).*

3.2. Distribution of nuclear tunes

Results reported in the previous section show that different nuclear configurations were found to express a wh-question in SI, though not all of them occur with the same frequency. The realizations found in wh-E, however, help better characterize the way in which intonation is used to modulate the pragmatic contribution of a wh-question. Specifically, it has been reported that the crucial cue for signaling a wh-E is the presence of a L*+H nuclear pitch accent. Looking back at wh-IS, it is possible to note that the distribution of pitch accents is again a crucial cue for identifying the pragmatic type. In other words, despite different tunes are observed, frequency of occurrence of H+L* nuclear accents is by far higher than L*+H instances in the same condition.

Figure 3 reports the overall distribution of tunes. Note that the two echo conditions were always realized with a rising nuclear pitch accent and either a falling or rising edge. For wh-IS questions, on the other hand, higher variability was registered, though the H+L* nuclear accent occurred more frequently.
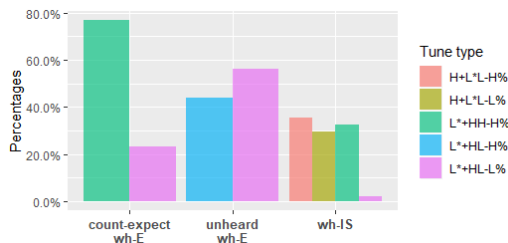

Figure 3: *Overall distribution of nuclear tune types according to pragmatic condition.*

As for the specific contribution of edge tones, no specific association between edge type and pragmatic type can be determined from the data analyzed. Rather, it appears that the

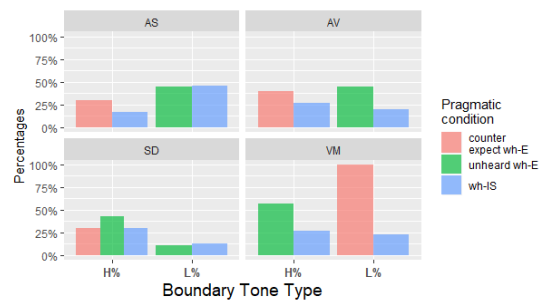choice of boundary tone depends on speaker specific strategies, as shown in Figure 4 below.

Figure 4: *Distribution of boundary types according to pragmatic condition and speaker.*

Note that for the two wh-E conditions the use of boundary type appears to reflect speaker specific mappings i.e., speaker VM was the only one to use a L% in counter-expectational questions. Moreover, for unheard echo, speakers AS and AV preferred the use of L% whereas speakers VM and SD preferred H% in the same condition. As for wh-IS questions, all speakers were found to variably use both boundaries without any specific preference.

3.3. The role of pitch range

As reported above, while wh-E were always realized with a rising L*+H accent, wh-IS can show either a rising (L*+H) or a falling (H+L*) nuclear accent. We additionally reported that the L*+H rise in the two conditions presented different pitch span, with greater excursion for wh-E items. Hence, in this section, we report more detailed information about the realization of L*+H span in different pragmatic conditions for wh-question utterances. Figure 5 shows a boxplot with pitch span values in the three conditions.
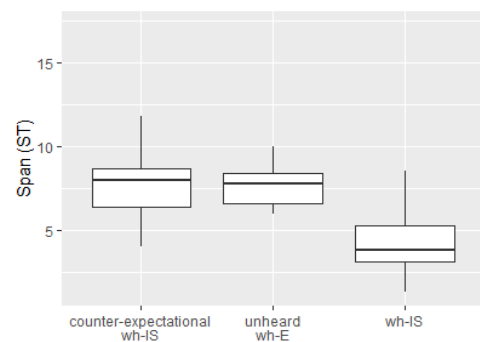

Figure 5: *Pitch span values in ST for nuclear L*+H in different wh- types.*

The boxplot in Figure 5 clearly shows the presence of an effect of pitch span in the expression of different meanings within wh-questions. Specifically, information-seeking wh-questions were realized with a narrower pitch span within the L*+H accent, while counter-expectational and echo questions pattern together, carrying a wider excursion. The trend was confirmed by statistical analysis. A linear mixed-effect model containing Span as dependent variable, Pragmatic condition as independent variable and by-Speaker and by-Item random slopes and intercepts was fitted. Results showed that Pragmatic condition is a predictor of Span ($F_{(2, 3.99)}$; 23.34; $p = .006$). It hence appears that speakers use both pitch accent type and pitch

span to keep pragmatic categories of wh-questions apart. This suggests that phonetic information concerning the relative excursion of a tonal event might be crucial for determining the meaning of a tune.

4. Discussion

In this study, we reported the results of a production investigation in SI with the aim of testing the hypothesis that wh-question tune variability can be accounted for by assuming that intonation mirrors speakers' commitment. Specifically, we found that nuclear pitch accent type choice is determined by the role of wh-questions in the discourse. While H+L* was found to correlate with wh-IS type, L*+H was found to be the only option available to SI speakers to express a wh-E question. Building on the proposal by [12], it might be argued that H+L* signals speaker commitment to the set of propositions derived from the wh-question (*Where* did you go? [You went *somewhere*]). On the other hand, L*+H indicates lack of speaker commitment.

This characterization of L*+H, however, would not account for the meaning of the same accent in the L*+H H(*)L-L% used in unheard wh-E. In this case, in fact, the meaning brought about by intonation is that of framing the wh-question in a yes-no structure of the type 'Did you ask me *p*?'. In other words, and borrowing from [27]'s characterization of rising wh-questions, the speaker is signaling that a proposition *p* has not been added to the common ground, despite that it should have been the case, and she is then putting it up for question. It appears that this reading is brought about not by the phonological nature of the accent, but rather by its location. Namely, in the data analyzed here, the nuclear pitch accent in unheard echo questions was located early in the utterance and, specifically, on the wh-word. Interestingly, this pattern is very frequent in yes-no questions, supporting the point that unheard echoes are formally structured as framed in a yes-no structure.

Moreover, we found that wh-E are also characterized by a greater pitch span within the nuclear pitch accent. In the specific case of counter-expectational questions, pitch span within nuclear L*+H might be the only cue that discriminates them from some instances of wh-IS. The role of pitch range within the nuclear pitch accent in expressing echo-questions has also been attested in other Italian varieties [15], [21]. Furthermore, a correlation between an expanded pitch span and the expression of speaker incredulity with reference to a proposition has been found for other modalities in both American English [19] and the variety of Italian spoken in Bari [20]. Note also that this use of pitch range is also compatible with [17]'s predictions about the use of the Effort Code.

No conclusive results were obtained concerning the use of boundary tones. Note that previous literature on Italian intonation has argued that the use of tone boundaries often reflects speech style (e.g., spontaneous vs read speech) rather than a specific pragmatic choice (inter alia [28]). Nevertheless, previous investigations of SI have pointed towards the pragmatic valence of boundary tones. Specifically, [22] reported that no differences in the relative frequency of L% vs H% were registered by manipulating the spontaneity of a spoken utterance, though no specific tests have been carried out to address this point. Here and in previous investigations, it appears that the use of boundary tones is strictly linked to speaker-specific strategies to encode meanings.

Finally, the characterization of wh-question tune meaning proposed here is compatible with intonational meaning theories arguing for intrinsic general meanings, beyond speech act specification, which would be carried by tonal elements (either pitch accents or individual tones). For instance, the use of H+L* to express speaker commitment is generally found in broad focus statements, which are reported to be expressed by the H+L* L-L% tune in SI [15], [23]. Additionally, [23] reports that L*+H in yes-no questions is used to signal that the speaker is not biased towards a specific polarity (different from what happens with the rising L+H* accent, used to signal that the speaker is, to a certain extent, committed towards the truth of the proposition). This is compatible with the use of L*+H in wh-questions registered here signaling lack of speaker commitment. Furthermore, [23] also reports that a greater pitch excursion within the L+H* accent in yes-no questions is interpreted as conveying a stronger positive bias towards the answer to the question than a smaller excursion within the same accent. This, together with the use of pitch span in wh-questions registered here, might suggest that the meaning of an expanded span within the nuclear pitch accent is that of enhancing the meaning of the accent itself. In the specific case of wh-questions, it might be argued that the incredulity reading comes about as an implicature stemming from greater span signaling lack of commitment. This adds further evidence to the fact that pitch accent type in SI might also reflect speaker's epistemic stance with reference to a salient proposition brought up in the discourse.

The data presented in this paper add to the literature on intonational meaning by also highlighting the factors that might potentially affect the relationship between intonation and pragmatics. Results point towards the fact that, in order to reach an exhaustive knowledge of the pragmatic role of intonation, models should take into account a number of different factors concerning both the type of meanings and the element within tunes that are responsible for their expression (both at the phonological and the phonetic level). Additionally, a crucial aspect that needs to be taken into account is variability at the individual level. There is increasing evidence that individual differences are pervasive and affect the way users make use of linguistic means to express meaning within a linguistic community [29], [30]. To the best of our knowledge, no available intonational meaning model is able to account for the interplay of all these factors. Future work should address these issues, especially concentrating on the potential sources of individual variability.

5. Conclusions

An intonational analysis of a corpus of Salerno Italian wh-questions was reported here with the aim of addressing the issue of how variability found in intonation of these questions can be explained by considering its role in the expression of speaker commitment to a salient proposition evoked by the question. The novelty of this approach is that it takes into account both phonological and phonetic specification, such as pitch accent and edge tone type on one side and local pitch span on the other. Results suggest that the pragmatic value of a wh-question is tonally expressed by a strict interplay between phonetics and phonology within the nuclear pitch accent. Moreover, while the pragmatics of a wh-question can explain the variability found in nuclear accent distribution, boundary tones appear to be strictly dependent on speaker specific strategies. These results call for the need of an intonational meaning model encompassing both phonology and phonetics on one side as well as including variability at the individual level on the other.

6. References

[1] Pierrehumbert, J., & Hirschberg, J. (1990). The meaning of intonational contours in the interpretation of discourse. In Intentions in communication, 271-311.

[2] Ladd, D. R. (2008). Intonational phonology. Cambridge University Press.

[3] Grice, M., D'imperio, M., Savino, M., & Avesani, C. (2005). Strategies for intonation labelling across varieties of Italian. In Jun, S.A. (Eds.) Prosodic typology: The phonology of intonation and phrasing, Oxford: Oxford University, 362-389.

[4] Hedberg, N., & Sosa, J. M. (2002). The prosody of questions in natural discourse. In Speech Prosody 2002, International Conference.

[5] Grabe, E. (2004). Intonational variation in urban dialects of English spoken in the British Isles. Regional variation in intonation, 9-31.

[6] Cole, J. (2015). Prosody in context: a review. Language, Cognition and Neuroscience, 30(1-2), 1-31.

[7] Stalnaker, R. (1978) Assertion, in P. Cole (ed.), Syntax and Semantics Vol 9: Pragmatics, pp. 315-322. Academic Press, New York.

[8] Gunlogson, C. (2004). True to form: Rising and falling declaratives as questions in English. Routledge.

[9] Gunlogson, C. (2008). A question of commitment. Belgian Journal of Linguistics, 22(1), 101-136.

[10] Portes, C., Beyssade, C., Michelas, A., Marandin, J. M., & Champagne-Lavau, M. (2014). The dialogical dimension of intonational meaning: Evidence from French. Journal of Pragmatics, 74, 15-29.

[11] Prieto, P., & Borràs-Comes, J. (2018). Question intonation contours as dynamic epistemic operators. Natural Language & Linguistic Theory, 36(2), 563-586.

[12] Bartels, C. (2014). The intonation of English statements and questions: A compositional interpretation. Routledge.

[13] Hamblin, C. (1973). Questions in Montague English.Foundations of Language 10(1), 41–53

[14] Gili Fivela, B. (2008). Intonation in production and perception: The case of Pisa Italian. Edizioni dell'Orso.

[15] Gili Fivela, B., Avesani, C., Barone, M., Bocci, G., Crocco, C., D'imperio, M., Giordano, R., Marotta, G., Savino, M. & Sorianello, P. (2015). Intonational phonology of the regional varieties of Italian. In Frota, S., Prieto, P. (Eds.) Intonation in Romance. Oxford University Press, 140-197.

[16] Liberman, M. & J. Pierrehumbert (1984) Intonational Invariance under Changes in Pitch Range and Length, in M. Aronoff and R. Oehrle, eds, Language Sound Structure, MIT Press, Cambridge MA. 157-233.

[17] Gussenhoven, C. (2002). Intonation and biology. Liber Amicorum Bernard Bichakjian (Festschrift for Bernard Bichakjian), 59-82.

[18] Gussenhoven, C. (2016). Foundations of intonational meaning: Anatomical and physiological factors. Topics in Cognitive Science, 8(2), 425-434.

[19] Hirschberg, J., & Ward, G. (1992). The influence of pitch range, duration, amplitude and spectral features on the interpretation of the rise-fall-rise intonation contour in English. Journal of phonetics.

[20] Savino, M. & Grice, M. (2011). The perception of negative bias in Bari Italian questions. In S. Frota, P. Prieto & G. Elordieta (Eds.) Prosodic categories: Production, perception and comprehension. Springer, Dordrecht, 187-206.

[21] Crocco, C. & Badan, L. (2016). 'L'hai messo dove il focus?' Un'analisi prosodica delle domande eco wh. In Savy, R. & Alfano, I. (Eds.) La fonetica nell'apprendimento delle lingue= Phonetics and language learning (pp. 191-207). Officina 21.

[22] Orrico, R., Savy, R., D'Imperio, M. (to appear). Salerno Italian: intonational phonology and dimensions of variation. Studi AISV 5.

[23] Orrico (2020) Individual variability in intonational meaning identification: The role of cognitive and sociolinguistic variables. *PhD Thesis.*

[24] Prieto, P., Borràs-Comes, J., & Roseano, P. (Coords.) (2010-2014). Interactive Atlas of Romance Intonation. Web page: <http://prosodia.upf.edu/iari/>.

[25] Blum-Kulka, S., House, J., and Kasper, G. (1989). Investigating cross cultural pragmatics: an introductory overview. In S. Blum-Kulka, J. House, and G. Kasper (eds), Cross-Cultural Pragmatics: Requests and Apologies. Norwood, NJ: Ablex, 1–34.

[26] D'Imperio, M. (2002). Italian intonation: an overview and some questions. In Probus 14(1): 37–69.

[27] Truckenbrodt, H. (2012) Semantics of intonation. In: Maienborn C., Heusinger, K.V., Portner, P. (Eds.), Handbook of Semantics. de Gruyter, Berlin.

[28] Savino, M. (2012). The intonation of polar questions in Italian: Where is the rise?. In Journal of the International Phonetic Association, 42(1), 23-48.

[29] Kidd, E., Donnelly, S., & Christiansen, M. H. (2018). Individual differences in language acquisition and processing. Trends in cognitive sciences, 22(2), 154-169.

[30] Yu, A. C., & Zellou, G. (2019). Individual differences in language processing: Phonology. Annual Review of Linguistics, 5, 131-150.