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The effect of early exposure in the production of Salerno Italian question intonation¹

The study explores the effect of early language exposure in the production of question intonation in Salerno Italian. In particular, we tested the hypothesis that exposure to other varieties represents a possible source of variability in nuclear tune choice. Ten speakers from Salerno were selected and divided into two groups according to whether or not they had at least a non-native parent. Information-seeking yes-no questions and information-seeking wh-questions were elicited using a Reading Task. Results show that part of the variability found in the use of intonation can be attributed to the presence vs absence of early exposure. Specifically, such results concern differences in the distribution of tunes mirroring that of the variety to which speakers were exposed. Finally, the study highlights the need of taking into account different sources of variation when investigating a language's intonational grammar.

Keywords: question intonation, Salerno Italian, dialect contact, intonational variation.

1. Introduction

Traditionally, phonology has been conceived in a completely abstract manner, as a way to provide generalization over variation (e.g., Halle, 1985; Lahiri, Marslen-Wilson, 1991). According to this view, variation within the speech signal is considered to be useless noise which is systematically filtered out by listeners. Nevertheless, a long line of research initiated by Goldinger (1998; 2000) has shown that not only does such variation exist, but it is also stored in memory and affects the way speakers produce and perceive future utterances. Indeed, several studies show that an individual's system can adapt to the variability that is present in the input (Pierrehumbert, 2016). Goldinger (1998), for example, using a shadowing task, showed a systematic shifting of speaker productions towards the stimulus, in terms of general acoustic properties. Later research showed that such mechanisms are much more automatic and unintentional than shadow tasks seem to indicate. Delvaux and Soquet (2007), for example, found that the presence of a non-native dialect as ambient noise during a recording session affected the way vowels were produced by participants, and that, crucially, the effect lasted for several minutes after the exposure.

¹ This paper is the result of a close collaboration of the three authors. Specifically, Riccardo Orrico wrote sections 2 and 4, with relative subsections; Violetta Cataldo wrote sections 1 and 3, with relative subsections. Discussion and conclusion (sections 5 and 6) were written by all three authors. Mariapaola D'Imperio also supervised and provided corrections for the writing of all the parts of the paper.

General patterns of variation in the production and perception of intonation have also been attested (Mennen, 2004; Cangemi, Krüger & Grice, 2015; Orrico, D'Imperio, 2020a). Additionally, a number of recent studies have shown that speakers are able to accommodate their intonational contours to other varieties of their native languages in a great deal of detail, both in direct imitation experiments (Cole, Shattuck-Hufnagel, 2011; D'Imperio, German, 2015, and German, 2012 for different varieties of English; D'Imperio, Cavone & Petrone, 2014 for varieties of Italian) and in semi-spontaneous interactions (Savino, 2017). Research has also shown the impact of two major factors affecting the way people use language, i.e. cognitive traits (Kidd, Donnelly & Christiansen, 2018) and linguistic environment. As for the role of cognitive traits, recent studies have investigated how they shape the way language is processed by an individual. Among cognitive factors, we find working memory capacity (Yu, Grove, Martinovic & Sonderegger, 2011), attentional abilities (Kim, Hazan, 2010; Kong, Lee, 2018), autistic-like traits in neurotypical population (Yu et al., 2011; Jun, Bishop, 2015) and, more recently, empathy (Esteve-Gibert, Schafer, Hemforth, Portes, Pozniak & D'Imperio, 2020; Orrico, D'Imperio, 2020a).

Moreover, the linguistic environment, which refers to the linguistic input that an individual is exposed to during her life, shapes the phonological system of individuals. The present study is concerned with this source of variability and, more specifically, with early exposure to a non-native variety.

The effects of a certain degree of exposure to a non-native input are well known as far as L2 acquisition is concerned. Second Language Acquisition (SLA) models such as the Speech Learning Model (SLM; Flege, 1995) and the Perceptual Assimilation Model-L2 (PAM-L2; Best, Tyler, 2007) claim that non-native sounds are perceived, and consequently more or less likely to be acquired, with reference to the similarity or dissimilarity with the speaker's native sounds. Crucially, a highly variable L2 input, in terms of multiple speakers, accents, and phonetic contexts (Best, 2015) is responsible for achieving phonological distinctiveness and constancy (Best, Tyler, Gooding, Orlando & Quann, 2009). Such phonetic variation in the L2 input is considered as responsible for learning advantages in both beginners and advanced learners (Iverson, Pinet & Evans, 2012).

These models succeed to predict the likelihood of acquiring L2 phonetic categories making reference to an acquisition situation which typically involves a condition of L2 immersion in L2-dominant environments. Similar effects are pointed out within the Foreign Language Learning (FLL) framework as well. Indeed, even in a classroom setting, which typically takes place in an L1-dominant environment, a key factor appears to be the exposure to a rich and phonetically variable L2 input (Tyler, 2019).

Clearly, as noticed by Bohn and Bundgaard-Nielsen (2009), learners may vary greatly in their degree of previous exposure to the foreign language (FL); indeed, exposure appears to be intertwined with other individual factors, namely the linguistic environment within the family, prior FL classroom instruction, exposure to film or TV, periods of study abroad.

On the other hand, SLA and FLL studies normally set the native monolingual norm as the point of reference learners may achieve as improving their L2/FL proficiency. The target for learners in the Common European Framework of Reference for Languages (CEFR; Council of Europe, 2001) is represented by a proficiency level which can be compared to a native-speaker or near native-speaker competence. But this native standard or the consequent notion of “nativeness” are rarely unproblematic for both L2 and L1 studies. Indeed, several factors need to be considered as potential sources of variability even when dealing with monolingual speakers. Among these, consistent exposure to non-native diatopic varieties should also be taken into account as a possible source of variability. In this regard, Romera and Elordieta (2013) identify a process of accommodation to an L2 variety of Spanish (Majorcan Catalan) by adult monolingual speakers of Peninsular Spanish; in particular, transfer phenomena at the intonational level from the L2 variety to the native one lead to such accommodation. The authors highlight that, different from between-language settings, interference phenomena are likely to take place in situations of contact between language varieties, since the latter are structurally more similar and might only differ from each other in terms of prosodic and/or intonational features.

2. Intonational variation in Italian

Starting from the 1990s, a growing interest in the intonational phonology of Italian has spurred, and, to date, detailed information is available for a number of varieties. A great deal of studies has been conducted on Southern varieties: Neapolitan Italian (*inter alia*, D’Imperio, 1999; 2000; 2002), Bari Italian (Grice, Savino, 1997; Gili Fivela, Savino, 2003; Savino, Grice, 2011), Palermo Italian (Grice, 1991; 1995; Grice, D’Imperio, Savino & Avesani, 2005 and, more recently, Gili Fivela, Iraci, 2017) and Salerno Italian (Orrico, 2020, see §2.1). Furthermore, a large number of studies has been published also for the varieties spoken in Tuscany, especially those spoken in Pisa, Florence, and Siena (e.g., Marotta Sorianello, 2001; Avesani Vayra, 2003; Gili Fivela, 2008). Several studies have also been dedicated to the comparison of different varieties. Within the AM approach, Grice et al. (2005) includes four regional varieties (Naples, Bari, Florence, and Palermo) by covering commonalities and differences in intonational inventories. A greater number of varieties have been reviewed in Savino (2012) and Crocco (2013), in which an analysis of question intonation across Italy was reported. Finally, Gili Fivela and colleagues (Gili Fivela, Avesani, Barone, Bocci, Crocco, D’Imperio, Giordano, Marotta, Savino & Sorianello, 2015), offer a description including thirteen varieties, underlying the strong variation across Italian intonational systems.

While earlier studies (e.g., Grice et al., 2005) have been conducted with the aim of clustering together different varieties by areal features, more recent ones have failed to find support for a general geographical classification. This is the case of Savino (2012), which puts into question the traditional point of view classifying

Northern varieties as expressing yes-no questions with a final rise, while Southern ones would make use of nuclear pitch accent alone. This represents a major starting point for understanding the source of variation within Italian varieties and how to account for it. However, Savino's treatment of the final rise in questions in some Italian varieties as a mere stylistic choice (e.g., read speech, without marked pragmatic context), appears too simplistic and experimental support for this argument is needed.

Additionally, a crucial aspect that recent studies on Italian intonation have brought to the attention of the research community is the intra-varietal variability. As an example, within the data analyzed by Gili Fivela and colleagues, consistent intra-varietal contours have been found only for some very specific functions (e.g., counter-expectational wh-questions), while others present high levels of variety internal variability, especially in the case of yes-no questions. Gili Fivela (2008) in her description of the intonational system of Pisa Italian had already proposed that a one-to-one mapping between a specific pragmatic category and a specific tune cannot be found. Extending the scope of the research to a much higher number of varieties, similar results have been obtained. Additionally, a point that might be inferred from Gili Fivela et al.'s (2015) description, even if not explicitly addressed in that study, is the impact of speaker-specific use of intonation.

What is more, a point that is particularly stressed in Gili Fivela et al. (2015) is that while some phonological features might be shared by geographically distant varieties, at the same time, differences might be found across varieties spoken within the same region. This points out to the fact that behind the uncontroversial differences across varieties in both their phonological nature of intonational events and their phonetic implementation, there is a phenomenon of 'mixing of patterns' throughout the varieties. The authors speculate that this might be due, at least to a certain extent, to a process of interference among varieties. In this respect, the study of Gili Fivela and Nicora (2018) on Liguria and Tuscany varieties, takes a first step in the investigation of varieties of spoken Italian in contact conditions. The relation among the varieties, in terms of phonetic similarity, is explored comparing the La Spezia variety with other geographically neighboring varieties, namely Imperia, Genoa, Florence and Pisa Italian. The area under investigation is considered as being divided by an isogloss detected for vernaculars. Particular attention is paid to contact among the varieties and to the process by which those varieties may have influenced each other in terms of intonational features. The authors identify a possible common origin for information-seeking yes-no questions on the phonetic level, which leads them to suggest the need to abandon the idea of intonational isoglosses.

2.1 Salerno Italian (SI)

With specific reference to the variety spoken in Salerno, recent investigations have unveiled a strong intra-varietal variability in the way specific tunes are used to express and identify specific meanings (Orrico, Savy & D'Imperio, 2019a; Orrico, 2020; Orrico, D'Imperio, 2020a; Orrico, D'Imperio, 2020b). In fact, the picture yielded by analyses

focusing on Salerno Italian does not differ much from the general picture of Italian varieties. Specifically, these studies show that, on the one side, there are functions (such as broad and narrow focus statements) that are produced by Salerno Italian speakers using specific tunes in a consistent way, with very little variation reported. On the other side, *wh*- and *yes-no* questions, for instance, appear to show significant variation so that, in some specific cases, a general predictable pattern is hard to define. Higher levels of variation, however, have been attested for SI *yes-no* as opposed to *wh*- questions, hence different pictures should be drawn for the two modalities.

In the case of *wh*-questions, a clearer pattern emerges from the tune-function mapping. Specifically, as reported in Orrico and D'Imperio (2020b), the use of pitch accents in nuclear position is a strong predictor of the expression of speaker commitment to salient propositions evoked by the *wh*-questions, specifically with falling ($H+L^*$) accents indicating the presence of speaker commitment, while rising (L^*+H) accents would indicate that the speaker is rejecting such commitment. A different scenario is however registered for boundary tones, which do not appear to be dependent on specific pragmatic meanings, but on speaker-specific choice.

Moreover, results for SI *yes-no* questions show the absence of a one-to-one form-meaning mapping, confirming what has been argued by Gili Fivela et al. (2015) for several Italian varieties. Specifically, different tunes appear to be used to express different pragmatic functions in SI questions (i.e., information-seeking, confirmation-seeking, echo, and counter-expectational questions), with the most frequent nuclear tune being a rise-fall-rise, notationally expressed as a $L+H^*$ HL-H%. Significantly, this specific tune is the most frequent one in all conditions, except for counter-expectational instances. The function expressed, therefore, does not allow to establish a stable correspondence between tune and meaning, rather it appears that variability depends on individual speakers.

In fact, the analysis of individual speaker behavior shows that some of the variation can be explained by allowing intonational meaning models to take into account speaker heterogeneity within a language community. Even if speakers share their native language, they are characterized by different socio-indexical features and have been exposed to different linguistic input interacting with their common phonological system. Much more clarity regarding this point has been reached in perception. In fact, perception experiments conducted by Orrico and colleagues (Orrico, Savy, & D'Imperio, 2019b; Orrico, D'Imperio, 2020a) have been specifically designed to test for group-based differences in the identification of the epistemic bias in question tunes². Despite the difficulties of measuring the degree of exposure of an individual to other systems (see §1 for a discussion about this), the participants were divided into two groups according to whether or not they experienced exposure by living in other cities for prolonged periods of time or by being raised by non-SI

² Biased questions are non-canonical questions, i.e. they depart from the norm by not only asking for information, but they also convey an epistemic bias (i.e., an expectation) about the truth of the proposition p expressed in the question. The bias conveyed in a *yes-no* question can be positive or negative, depending on whether the speaker is expressing an expectation towards the truth of p or the truth of $\neg p$.

families. Results show that listeners without those specific experience of exposure classify different types of question bias on the basis of boundary tone type (H% or L%), while listeners who underwent those types of exposure base their judgments on pitch accent type (L+H* or L*+H).

While perception results allow us to classify tune-meaning mapping according to specific grouping of listeners, the production studies reported above failed to find specific generalizable traits which would account for the way different speakers within a language community behave. This means that the question of where production variation comes from and how it could be integrated in a generalizable model is still wide open.

2.2 Variability in questions

This study investigates SI question intonation production (both yes-no and wh-questions) and, more specifically, the impact that early exposure to non-SI varieties has on their realization. This section will review some of the literature on yes-no and wh-questions in Italian varieties, by highlighting differences and commonalities between SI and such varieties.

The literature reviewed in the previous section reports that the highest levels of variability across Italian varieties are encountered for yes-no questions, while for wh-questions, much more stability has been registered. With specific reference to yes-no questions, the main issue in previous studies has been the status of the rising/high boundary tone: since the first investigations, it was made clear that for some varieties, especially Southern ones, the prototypical yes-no question tune is marked by a L% boundary (Grice et al., 2005). However, Savino (2012) and Gili Fivela et al. (2015), both conducting studies on a high number of varieties, attested both versions of terminals in the majority of the varieties under investigation. Despite this observation, quantitative data from Savino (2012) show that many varieties, regardless of geographical position, make a large use of L%. This is the case of Turin, Venice, Parma, Bari, Naples, Catanzaro, and Palermo, all of which show an accentual rise (L+H*/L*+H) ending in a low (L%) boundary tone, as opposed to others, e.g. Bergamo, Milan, Lecce, Perugia, and Cagliari, which prefer rising H% terminals.

Data from both Gili Fivela et al. (2015) and Orrico et al. (2019a) show that the picture depicted for SI is much more variable: both rising and falling boundaries are attested in this variety, with very similar distributions. The same appears to be the case for Genoa, Rome, and Florence. Variability in yes-no question tunes appears to be also related to the nuclear pitch accent, though a greater intra-variety consistency is revealed, as opposed to the variability within boundary realization. Both rising and falling accents have generally been attested in nuclear position: falling accents (H*+L/H+L*) characterize, for example, the varieties spoken in Milan, Bergamo,

Pisa, and Lecce, while accentual rises appear much more frequently in Naples, Bari, Palermo, Venice, Turin, and Salerno³.

Among varieties using a rising accent in nuclear position, an additional divide can be drawn between those using L^*+H and those using $L+H^*$. The late-peak variant appears to be typical of Naples, Turin, Venice, and Palermo, while the early-peak variant is mostly attested in Bari. Despite the different phonological notation might be due to variety-internal reasons (see Grice et al., 2005), a review of the literature shows that there is, everything else being equal, (at least) a phonetic difference between the two rising accents, with the Bari Italian one being realized with a peak around the middle of the stressed vowel, while the late-peak variant, used in Venice or Neapolitan Italian, is realized with a peak at the offset of the vowel. Again, as reported above, both rising accents are attested in SI and, despite the distributional differences discussed above, none of them appears to be the most frequent, hence representative of the variety.

As for *wh*-questions, a more consistent use of intonation has been found, both within and across varieties. Gili Fivela et al. (2015) report that the main pitch accent used in this condition is $H+L^*$, which can be followed by either terminal rises or falls. For some varieties, mainly Southern ones, it appears to be possible to have rising pitch accents too, which are generally followed by a rising boundary tone⁴. The same, as shown above, is registered within SI. Rising nuclear tunes have often been linked to specific pragmatic meaning of *wh*-questions and, specifically, with reference to echo and incredulous questions (Gili Fivela et al., 2015; Crocco, Badan, 2016; Orrico, D'Imperio, 2020).

In the present study we aim at exploring the impact of the presence versus absence of early exposure to a non-SI variety in adult SI speakers. The specific hypothesis tested is that a certain degree of non-SI input would affect question intonation variability (both nuclear pitch accent and boundary tone) for both *yes-no* and *wh*-questions. The non-SI varieties targeted in this study are Venice, Foggia, Bari, and Neapolitan Italian.

3. *Method*

The following sections provide information about the dataset used for the study, the participants and the methodology used for the analysis.

³ Both for nuclear pitch accents and boundary tones, difference might be found in the literature with reference to specific varieties. Investigations for Bari Italian, for example, report that also falling accents might be used in questions, which are more commonly used to express a positive bias of the speaker (Savino, Grice, 2011) or high boundary tones in the same variety (Gili Fivela et al., 2015). The same is true for SI: some of the instances of nuclear pitch accents in *yes-no* questions are considered as falling H^*+L accents by Gili Fivela et al. (2015). This, however, might be also due to labeller-specific differences.

⁴ Falling terminals after a rising accent have also been attested for southern varieties, as for example in Cosenza and Pescara Italian (Soriano, 2001; Gili Fivela et al., 2015). These varieties, however, show both rising and falling tunes as well.

3.1 Corpus and dataset

For the present production study, a limited dataset coming from two larger corpora has been used. Specifically, these corpora were collected and used in previous studies aimed at investigating the learning process of prosodic features by Italian learners of Spanish and English as Foreign Languages (Savy, Luque Moya, 2014; Orrico, Cataldo, Savy & Barone 2016; Luque Moya, Savy, 2017; Cataldo, Orrico & Savy, 2017). Both corpora include data in Salerno Italian L1.

The dataset used in the present study consists of Italian neutral, information-seeking yes-no questions, with SVO syntactic order (18 items), as shown in (1) below, and information-seeking wh-questions with fronted wh- (9 items), as shown in (2).

- (1) *La rondine ama volare?* [Does the swallow love to fly?]
- (2) *Dove vive la rondine?* [Where does the swallow live?]

Productions were elicited using a Reading Task. Each question type for each target word was inserted in a situational context in order to both ease the naturalness of productions and control the pragmatic modality of utterances. Speakers were asked to read silently the contexts and then to read aloud the target question. Further information about the corpus building and the recording session are provided in Savy, Luque Moya (2014) and Orrico et al. (2016).

3.2 Speakers

Participants had to complete a sociolinguistic questionnaire. We selected 10 subjects, all female students at the University of Salerno, aged from 19 to 25 (mean: 21.5). They were all born and raised in Salerno and had never lived abroad or in other Italian cities. We later divided them into two equally balanced groups according to whether or not they had experienced early exposure to other systems (non-SI varieties of Italian). Specifically, we labelled as *Early-Exposed* (EE) those speakers who had at least one parent that was a non-native Salerno Italian (SI) speaker and as *Non-Early-Exposed* (NEE) all the others. Among the 10 speakers, half belonged to the NEE group. Of those non-native parents, two came from Naples, one from Venice, one from Bari and one from Foggia.

Clearly, during the lifetime, speakers can be explicitly and/or implicitly exposed to or come in contact with different non-native varieties and languages. The degree of such exposure and contact is not easy to quantify. Accordingly, in this study we limit our considerations to the effects of early exposure, i.e. the exposure to a non-SI variety spoken by one of subjects' parents (see §1).

3.3 Analysis

The intonational analysis was carried according to the Autosegmental-Metrical approach (Pierrehumbert, 1980; Ladd, 2008) and annotations were performed using a ToBI-like system (Grice et al., 2005; Gili Fivela et al., 2015, Orrico, 2020). We

specifically labelled nuclear pitch accents and boundary tones. The total amount of productions is 270 (18 items for information-seeking yes-no questions and 9 items for information-seeking wh-questions * 10 speakers).

Given the theoretical framework outlined above, we predict that question tune variability in production is a function of having been exposed to (at least) a non-native variety of Italian. Given the varieties EE speakers were exposed to, we also predict effects for variety-specific exposure. Specifically, for yes-no questions we predict: i) higher percentage of L% boundaries in speakers exposed to Venice, Neapolitan and Bari Italian as opposed to NEE; ii) higher percentage of L*+H pitch accents in speakers exposed to Neapolitan and Venice Italian; iii) higher percentage of L+H* in speakers exposed to Bari Italian. For wh-questions we predict: i) lower overall levels of variability and ii) higher percentage of falling tunes in speakers exposed to Bari and Neapolitan varieties⁵.

4. Results

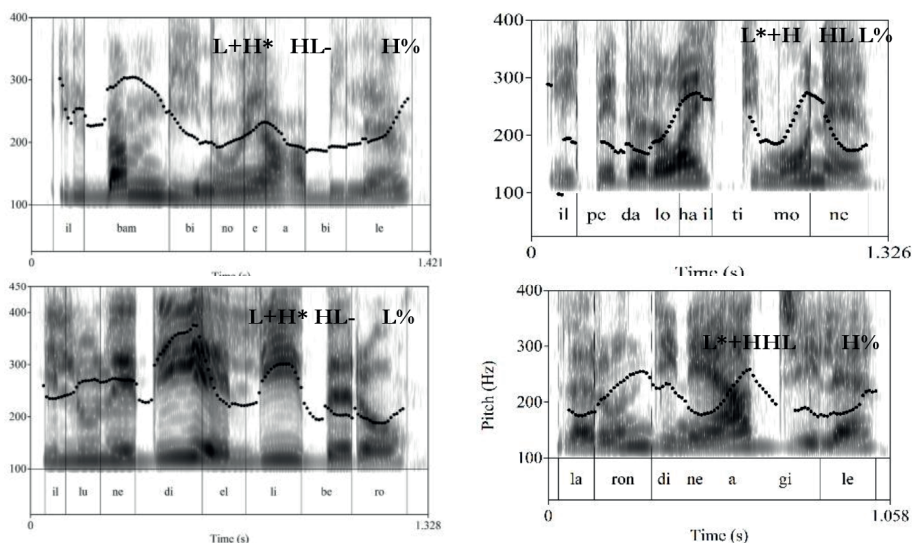
Intonational analyses of the productions of the 10 Salerno Italian speakers showed that the predictions formulated above were largely confirmed. Specifically despite keeping the pragmatic function of the utterances elicited the same, we found high levels of variability in the question tunes, which can be partly explained as a function of exposure to non-SI phonological systems. The next sections report results for the two question types separately.

4.1 Yes-no questions

In line with previous investigations of the intonation of SI questions, the analyses of the productions reported here uncovered several intonational contours that can be used by SI speakers to express an information-seeking yes-no question. Focusing on the nuclear configuration alone, we found four different nuclear tunes within the dataset analyzed. Specifically, we found that yes-no questions can be expressed by means of two phonologically different rising nuclear pitch accents, i.e. an early L+H* and a later L*+H, which can combine with either a falling (HL-L%) or a rising (HL-H%) edge tone configuration. Figure 1 below reports an example for each of the four yes-no question tunes attested.

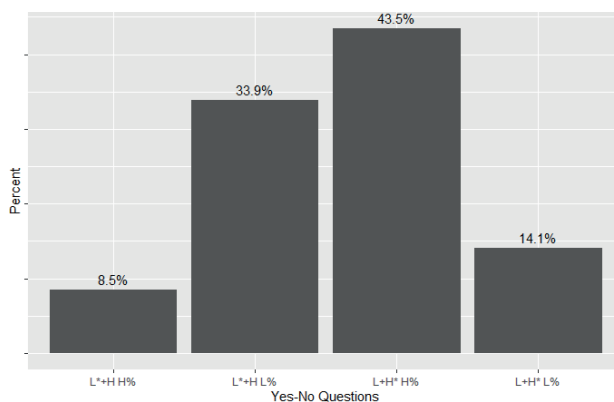
⁵ Predictions about varieties for which no information was available in the literature are missing.

Figure 1 - *Tunes attested for yes-no questions: Il bambino è abile? [Is the kid skilled?] uttered with a L+H* HL-H% nuclear tune (top left); Il lunedì è libero? [Is Monday free?] uttered with a L+H* HL-L% nuclear tune (bottom left); Il pedalo ha il timone? [Does the pedalo has the wheel?] uttered with a L*+H HL-L% (top right), La rondine è agile? [Is the swallow agile?] uttered with a L*+H HL-H% nuclear tune (bottom right)*



The frequency of occurrence of each of the four tunes was also measured. Figure 2 shows that the most frequent tune is the rise-fall-rise with an early peak pitch accent (L+H* HL-H%), which alone accounts for almost half of the total occurrences (43.5%). The second most frequent tune is the rise-fall with a late peak pitch accent (L*+H HL-L%). Finally, the other two tunes are by far less represented within the corpus analyzed.

Figure 2 - *Percentage of occurrence of yes-no question tunes⁶*

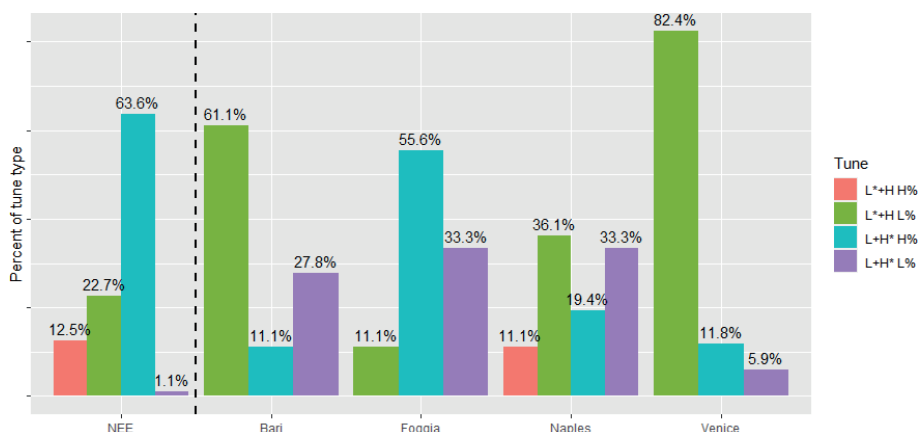


⁶ Here and in the following plots, label for tunes within plots have been shortened for convenience: the HL-phrase accent has been omitted since it stays the same in the four tunes.

These data also appear to be very consistent with previous investigations, both in terms of relative frequency of occurrence of the four yes-no question tunes and in terms of probabilistic distributions of the boundary type as a function of the nuclear pitch accent preceding it. In fact, Orrico et al. (2019a) reported that a falling edge tone configuration is much more likely to be found in combination with L^*+H accents, while a rising edge correlates with the presence of a $L+H^*$. Here, though we report data from a larger number of speakers, the relative distribution appears to be the same.

In order to test the hypothesis that the variability found in these data could partly be explained by early language contact, we observed the distribution of the yes-no tunes as a function of speakers' exposure to a non-SI variety⁷. The plot in Figure 3 shows the distribution of the four tunes according to the specific variety EE speakers were exposed to.

Figure 3 - *Distribution of yes-no question tunes as a function of exposure to non-SI varieties*



As a general result, the NEE group shows a clear preference for the use the rise-fall-rise $L+H^*$ HL-H% tune, while the other tunes are much less represented within this group, with only the L^*+H HL-L% going beyond 20%. As for the EE groups, different distributions are found according to the specific variety they were exposed to. Specifically, speakers with exposure to Bari and Venice Italian show a clear preference for the rise-fall with a late-peak accent, i.e. L^*+H HL-L%, and they rarely use rise-fall-rise tunes. Additionally, the speaker exposed to Bari Italian makes a higher use of $L+H^*$ HL-L% tune, as opposed to NEE speakers. As for the speaker exposed to Foggia Italian, she shows a consistent use of the $L+H^*$ pitch accent,

⁷ We also tried to fit a generalized linear mixed model with the data that we collected, which showed some statistically significant effects. The strongest effect found was that of boundary tone as a function of exposure, showing that tunes with H% boundaries are used more frequently by NEE speakers. Nevertheless, due to the fact that the dataset under investigation is limited and several convergence errors were reported also for models with an extremely reduced random effect structure, we rather opted for a qualitative analysis instead.

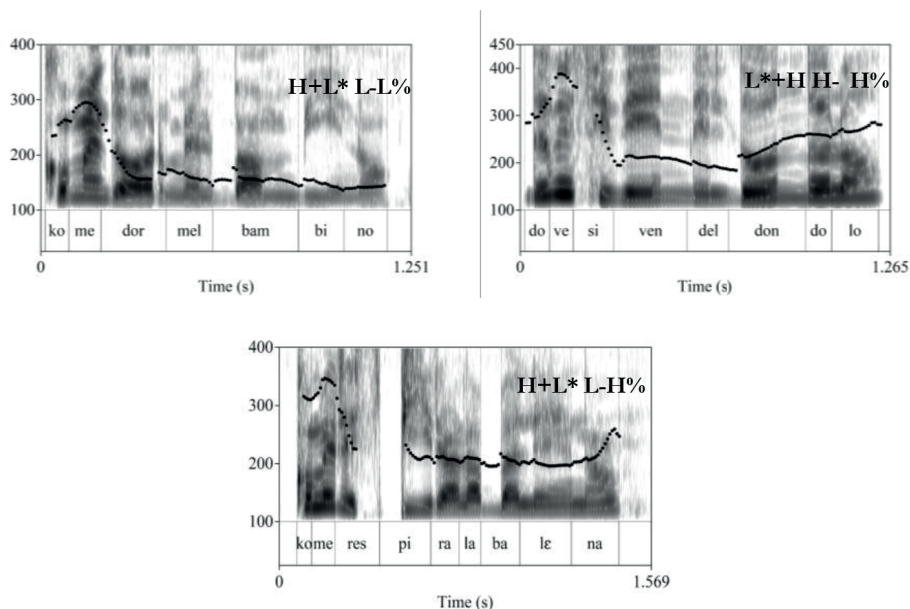
which is more frequently combined with a H% boundary. Her distributions are very similar to the NEE group, and the main difference lies in the use of the L+H* HL-L%, far less frequent in NEE speakers. Finally, the EE speakers with exposure to Neapolitan Italian show a generally variable distribution: as opposed to the NEE speakers, this group shows a sensible reduction of the L+H* HL-H% tune while the two rising-falling tunes are the most frequent ones.

The general picture drawn here mirrors the predictions outlined in 3.3. When we separate the NEE group from the EE one, the distribution of tunes changes. If we take the speakers exposed to the Naples, Venice, and Bari varieties, we see that the use of L% boundary tones becomes more frequent, mirroring the fact that rising-falling tunes are the most attested in the varieties they were exposed to. Also, the higher occurrence of L+H* HL-L% in the Bari Italian EE as opposed to NEE was expected owing to the fact that this tune has been largely attested in that variety. Finally, we do not have specific information about question intonation for Foggia Italian, though the fact that we registered a high percentage of the L+H* HL-L% with respect to NEE speakers might be interpreted as an effect of interference with the variety they were exposed to.

4.2 Wh-questions

Similar to what was found for yes-no questions, different nuclear patterns were also attested for wh-questions and, again, the tunes that were found are consistent with previous investigations. Specifically, three different patterns were attested. As reported in Figure 4 below, we found that wh-questions are most frequently realized with a falling pattern, analyzed as a H+L* nuclear pitch accent and an L-L% edge configuration. Other patterns attested are a fall-rise, analyzed as a H+L* falling accent and a rising edge configuration (L-H%), and a nuclear rise, labeled as L*+H H-H%.

Figure 4 - *Tunes attested for wh-questions: Come dorme il bambino? [How does the kid sleep?] uttered with a H+L* L-L% nuclear tune (top left), Dove si vende il dondolo? [Where do they sell the porch swing?] uttered with a L*+H H-H% nuclear tune (top right), and Come respira la balena? [How does the whale breathe?] uttered with a H+L* L-H% nuclear tune (bottom)*



As for the relative frequencies, shown in the plot below (Figure 5), the most frequent pattern was the H+L* L-L% fall, accounting for 60% of the total realizations, while the fall-rise and the rise were respectively found in the 23.3% and 16.7% of the cases. Hence, different from yes-no questions, here we found that the great majority of wh-question realizations are produced with a falling H+L*. This result is also consistent with previous investigations of intonation in SI. Specifically, Orrico and D'Imperio (2020b) found a clear separation of intonational cues between information-seeking and echo wh-questions, arguing that while pitch accent type in nuclear position determines the pragmatic interpretation of the question, boundary tones, on the other hand, seem to be much more dependent on a speaker-specific choice for which no account can be offered at this point.

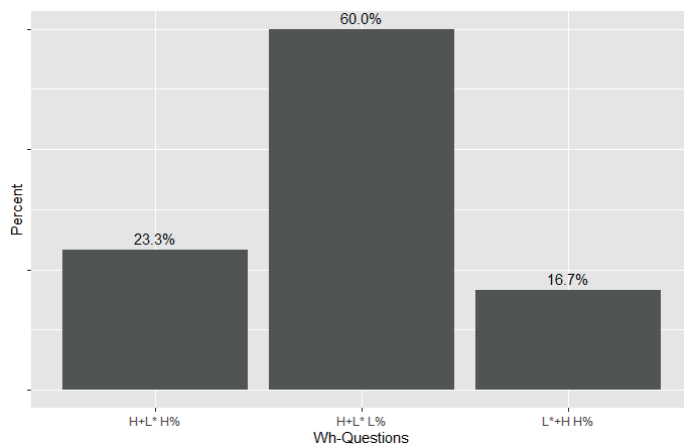
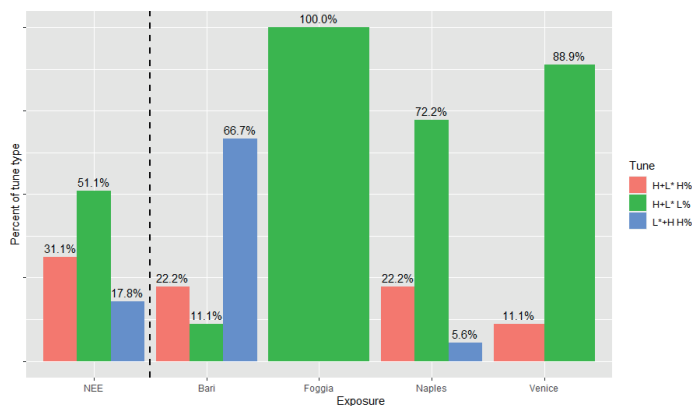
Figure 5 - Percentage of occurrence of *wh*-question tunes⁸

Figure 6 below shows the relative frequencies of tunes according to the EE variable, with productions divided according to the variety speakers were exposed to.

Figure 6 - Distribution of *wh* question tunes as a function of Exposure

The distribution for the NEE group does not change much with respect of the general distribution shown in Figure 5 above. The most frequent contour is the falling H+L* L-L% tune, followed by the falling-rise tune. The low frequency of L*+H H-H% was expected since it has been shown to be linked to specific pragmatic meanings in SI that were not elicited here (Orrico, D'Imperio, 2020b, but see also section 2.1 above). Similar distributions were found for speakers exposed to Venice and Neapolitan Italian, while the speaker exposed to Bari Italian showed high frequency for the rising tune. Finally, the speaker exposed to Foggia Italian

⁸ Here, too, phrase accents have been omitted for convenience. Falling accents are always followed by L-, while rising accents by H-.

only produced *wh*-questions with a falling tune. While data from EE to Neapolitan Italian was expected since the falling tune was the only attested tune in the variety the speakers were exposed to, results for the EE to Bari are a bit surprising: the rising tune in *wh*-questions has been attested for Salerno and Pescara Italian in Gili Fivela et al. (2015), therefore the behavior of this speaker is not easily accounted for by hypothesizing an effect of exposure.

5. Discussion

Our aim in this study was to report variability in the use of intonation to encode a question (both *yes/no* and *wh*-questions) in Salerno Italian. We build on previous research suggesting that the high degree of variation found in the use of intonation, especially in Italian varieties, might be due to varietal contact. Specifically, we tested the hypothesis that early exposure to different Italian varieties might induce such variation. We hence asked 10 Salerno Italian female speakers to perform a production task (read speech) created with the aim of eliciting both information-seeking *yes-no* and *wh*-questions. The 10 speakers were divided into two groups on the basis of having experienced early exposure to another variety of Italian, besides the one spoken in Salerno. More specifically, while all the speakers were born and brought up in Salerno, without ever living in other cities for prolonged periods of time, a group of them (5 speakers) had one non-SI parent. Results show that while high levels of variability were found in the data analyzed, this variation can be partly explained as an effect of experiencing early-exposure to a different phonological system. In particular, NEE speakers show a preference for specific tunes ($L+H^*$ HL-H% for *yes-no* and $H+L^*$ L-L% for *wh*-questions), while productions by the exposed speakers can be partially explained by looking at the tunes attested for the varieties they were exposed to.

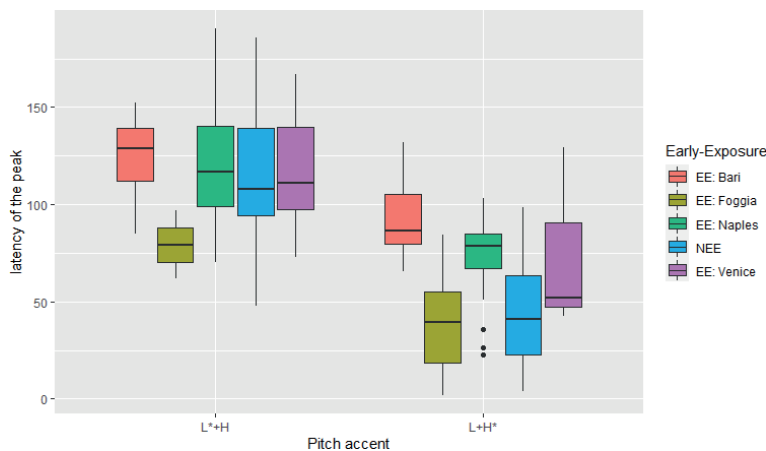
This is particularly visible in *yes-no* questions. While the four patterns found in the present study were also attested in other studies focusing on the variety spoken in Salerno, we found that their distribution changes when we consider early exposure as a possible factor of variation. The distributional differences might therefore be attributed to the different frequency of distribution of these tunes in the input the speakers received their whole life, which, as mentioned in the introduction above, is a key factor in shaping the phonological system of an individual. Therefore, if we suppose a different input as a function of having a non-SI parent, this might explain why in *yes-no* questions we registered a higher percentage of L^*+H HL-L% in Venice- and Neapolitan-EE and of $L+H^*$ HL-L% in Bari-EE as opposed to the percentages registered for the NEE, and why, in the case of *wh*-questions, Neapolitan-EE speakers show a higher percentage of falling tunes as opposed to NEE.

One problem that would arise if we follow this path is represented by how the different phonological categories are shaped within an individual being exposed to different phonological systems. This might be extremely problematic in the case of pitch accents, since the same phonological category might be realized differently

(in terms of peak alignment, shape of the f0 curve, and so on) in different regional varieties. For example, what has been labelled as L+H* in Neapolitan or Salerno Italian, two varieties that have in their phonological inventories two different accentual rises, is different from the L+H* attested in Bari, having a peak aligned later than SI and the Neapolitan L+H*. What is more, the same Bari Italian accent appears to be aligned earlier with respect to an L*+H in the Salerno and Neapolitan varieties. Therefore, if we posit that the higher frequency of the L+H* in Bari-EE yes-no questions derives from the high presence of this accent in the input, we also have to suppose that that accent is realized differently in terms of peak alignment in that speaker.

Figure 7 shows the distribution of peak alignment (distance of the peak from the onset of the stressed vowel) in the different groups.

Figure 7 - *Distribution of peak alignment in information-seeking yes-no questions according to early exposure and pitch accent type*



We are aware of the fact that the data shown in the plot hardly allow for any generalization: firstly because they consider only one of the possible dimensions that characterize category membership of tonal events and, more importantly, these refer to a very small dataset (we had only one speaker by exposure to either Venice, Bari, or Foggia). Nevertheless, the plot allows us to focus our attention on an interesting trend. While all speakers appear to keep the two categories apart by means of (at least) the timing of the accentual peak, differences can still be noticed. Specifically, if we look at data of EE to Bari, as opposed to NEE, it is possible to see that both L+H* and L*+H are aligned later.

We can speculate that the Bari-EE speaker has learned, at an early stage of life, the later-peaked version of L+H*, typical of Bari Italian; then, the earlier-peaked SI version, present in the SI input she was later exposed to, has been assimilated to that category. This process is accounted by Flege's (1995) SLM, in which it is reported that the formation of a new category is prevented in case the sounds of two

competing phonological systems are perceived as similar. The same model can also explain why the L*+H within the same speaker is also aligned later, as an effect of category dissimilation: in that case, the phonetic distance between two categories might be exaggerated in order to keep the two categories apart. In other words, since the L+H* is realized with a later-than-expected peak, the speaker does the same for the L*+H, to make sure to maintain the phonological contrast between the two pitch accents; see also D'Imperio et al. (2014) for similar results concerning the adjustment of peak alignment within categories in imitation.

A similar behavior is observed for the realization of L+H* by Neapolitan-EE, which is realized with a later peak than NEE speakers. This might be explained in a similar fashion as we did with the Bari Italian case: the speakers exposed to Neapolitan Italian might have learned both categories, though they might avoid realizing it with an extremely early peak to keep the interrogative early peak accent apart from the L+H* used for narrow focus statement. These arguments are only speculative for now and future research should be carried out with an appropriate number of speakers to test the validity of this theory.

In addition to a perspective which takes into account a condition of language contact at the individual level, some effects of exposure can also be highlighted looking at language contact among the phonological systems of such varieties. Clearly, unlike Gili Fivela and Nicora (2018), the present study does not strictly deal with geographical adjacency among the varieties. Nevertheless, being Neapolitan Italian one of the non-SI varieties under investigation, some observations about the relation between these two geographically neighboring varieties need to be made. Salerno and Naples share the same regional area and are traditionally classified as belonging to the same dialectal area. In the light of this, we looked at the distribution of the patterns attested for information-seeking yes-no questions⁹ in both varieties.

As far as Neapolitan Italian is concerned, for polar questions, the rise-fall tune – L*+H HL-L% – is largely attested (*inter alia* D'Imperio, 2002). Similarly, in our data, this tune is the most frequent one in the productions of speakers who had been early exposed to Neapolitan Italian. Conversely, in previous investigations on SI this tune is attested with a lower frequency of occurrence (about 20% of cases; Orrico, 2020); our data confirm such frequency (22.7% in the NEE group). As for SI, both in this study (63.6%) and in previous ones (more than 50% of cases; Orrico, 2020), the most frequent attested pattern is the rise-fall-rise – L+H* HL-H% – tune. Note that, for Neapolitan Italian, rising terminals have only been attested in Canepari (1986) and Cangemi and Grice (2016), but information on their frequency of occurrence is not available. Our EE speakers to Neapolitan Italian do make use of this tune, even though in less than 20% of productions. In short, the most frequent attested tunes in the two varieties of Neapolitan and Salerno Italian, i.e. the rise-fall

⁹ We focus on information-seeking yes-no questions because in this condition the highest levels of intra and inter-variety variability have been found both in the literature (Gili Fivela, Nicora, 2018) and in our data.

and the rise-fall-rise respectively, are possible tunes in both varieties; crucially, the main difference lies in their distribution.

A close look at the Neapolitan-Salerno pair of varieties suggests on the one hand that both NEE and Neapolitan-EE speakers' productions mirror the distribution of patterns attested for the two varieties: both tunes are present in their native phonological systems, though the frequency of occurrence is reversed, at least as far as yes-no questions are concerned. On the other hand, in line with Gili Fivela and Nicora's (2018) investigation, a certain degree of continuity in terms of possible tunes can be ascribed to vicinity at the diatopic level. Indeed, such a geographical proximity between Naples and Salerno implicates that Neapolitan and Salerno Italian speakers are subject to continuous exposure to each other. Nevertheless, in order to assess such a contact between the varieties, further analyses appear to be necessary.

The results reported here have strong implications for linguistic theories of intonation, spanning from improving our knowledge of the phonological organization of a language and its varieties to the criteria used to select speakers and listeners. To the best of our knowledge, only few studies have investigated language contact in case of geographically close varieties. Indeed, several studies are, to date, still building on the assumption that individuals sharing the same geographical space are, in all respects, homogeneous from a phonological point of view. What is important, however, is to point out that lack of speech variability within the same linguistic community should not necessarily be expected. Chang (2019) indeed advises caution when considering a speaker as monolingual (e.g., in our case, the non-exposed ones), since a linguistic system keeps evolving during the entire life span as an effect of all kinds of linguistic input a speaker is exposed to during her life (e.g., learning an L2). Several factors, either linked to linguistic input or other aspects, such as cognitive differences (e.g., musical abilities or empathy skills), play a strong role in the definition of an individual's phonological system (see Cason, Marmursztejn, D'Imperio & Schön, 2019; Esteve-Gibert et al., 2020, Orrico, D'Imperio, 2020a).

Our study underlines the extreme importance of taking into account speaker-specific factors in the study of intonation, in order to reach a fairly good understanding of the way this system contributes to the communicative process.

6. *Conclusion*

A production study was designed to investigate intonation variation in Salerno Italian yes-no and wh-questions as a consequence of the presence vs absence of early exposure to a non-native variety. Results point to differences in the use of intonational contours, both in terms of pitch accent and boundary tone specification, across the different exposed speakers. Moreover, the patterns shown by the exposed speakers were similar to those typical of the variety they were exposed to. The study adds to the literature by showing that the type of phonological input an individual is exposed to is an important predictor of the way she uses intonation to encode specific pragmatic meanings. Furthermore, our study emphasizes the importance of

taking into account several potential sources of speech variability, in order to reach a good understanding of the intonation-meaning mapping.

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