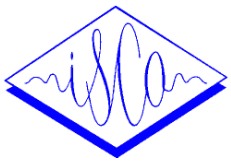

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FOCUS, PHRASING AND BOUNDARY PHENOMENA IN ITALIAN READ SPEECH

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ABSTRACT

One of the phenomena generally used in defining the Phonological Phrase (φ) domain is Raddoppiamento Sintattico (RS), a sandhi rule of Central and Southern varieties of Italian. The application or lack of this rule has also been invoked as evidence for prosodic boundary insertion due to focus restructuring. Our study explores the relationship between phrasing induced by focus and phrasing generated by the Prosodic Phonology component. Though RS is indeed blocked by focus, as predicted by the theory, the prosodic break created is different in strength compared to phonological phrase boundaries that are not produced by focus restructuring. We also show that in another variety of Italian, where RS is not found, it is still possible to observe comparable boundary strength differences.

1. INTRODUCTION

RS is a rule of Central and Southern varieties of Italian that has been extensively studied [3]. This rule lengthens the first consonant of a word immediately following a finally stressed word. In order for the rule to apply, the consonant cannot be in a cluster beginning with [s] and the word sequence has to be within the same phonological phrase [8,6].

Ex. *Il ragno aveva mangiato metá [f:]arfalla*
"The spider had eaten half of the butterfly"

This phenomenon is claimed to be blocked across a Phonological Phrase boundary.

Ex. *Il ragno aveva mangiato metá [d]ella farfalla*
"The spider had eaten half of the butterfly"

Recently [4,5], it has been observed that, among other things, focus can introduce certain boundaries which cannot be accounted for by regular phonological rules alone. In Italian, it appears that a phonological phrase boundary is inserted after a focused word; if this is true, we expect RS not to apply when the first word in the sequence is focused. Moreover, the prosodic break induced by focus has been claimed to have the same status as a regular φ boundary [5]. This predicts that both regular φ boundaries and φ boundaries that are the result of focus restructuring will show analogous phonetic correlates. Moreover, this also predicts that in varieties of Italian that do not have RS we would find comparable acoustic indices at the φ boundary location.

The question of how many levels of phrasing exist in the Prosodic Hierarchy [7,6] is still a very controversial issue. The existence of an intermediate level of phrasing (intermediate phrase) which is the domain of specific intonational phenomena, has been proposed in [2]. On the other hand, it is suggested in [4] that the intermediate phrase is equivalent to the Phonological Phrase of standard Prosodic Phonology [6]. The domain of our investigation is the Phonological Phrase and in particular its boundaries.

The issue addressed here is if the φ boundary [6] can be associated with specific indices that reflect one or more intermediate levels of phrasing. In order to perform the investigation, we collected data from Florentine and Turin Italian. These varieties differ in that RS can occur in the former, but not in the latter. The Florentine corpus was separately transcribed by the two authors, while an acoustic study was later performed on both the Florentine and the Turin Italian data.

2. EXPERIMENT I

2.1. Corpus

The corpus consisted of a set of 5 paragraphs in which various sentence types were embedded. Within each paragraph, focus type and RS context were varied for each of the target sentences. Each paragraph was built in order to set the appropriate context and obtain different focus readings in the target sentences. The focus could be either broad (B or BPP in Table 1) or narrow on the word inducing RS (N or NPP in Table 1).

As we can see in Table 1, the phonological context necessary to induce RS was always present (at least once) in each sentence. However, the φ constituent structure was varied independently by adding a Prepositional Phrase boundary (BPP and NPP), which means adding a φ boundary (for the relation between the syntactic structure and the RS phenomenum see [6]).

B	*Il ragno aveva mangiato metá farfalla*
	"The spider had eaten half of the butterfly"
BPP	*Il ragno aveva mangiato metá della farfalla*
	"The spider had eaten half of the butterfly"
N	*Il ragno aveva mangiato [metá]$_F$ farfalla*
	"The spider had eaten half of the butterfly"
NPP	*Il ragno aveva mangiato [metá]$_F$ della farfalla*
	"The spider had eaten half of the butterfly"

Table 1.Target sentences in one paragraph of the corpus.

The possible target sentence type were: 1) Broad focus and no φ boundary (B); 2) Broad focus and φ boundary (BPP); 3) Narrow focus with no φ boundary (N); 4) narrow focus at the left edge of a φ boundary (NPP), as defined in [6].

2.2. Method

A recording of 4 Florentine speakers reading the corpus was performed. These data were separately transcribed by the authors to check for: 1) presence or absence of RS and 2) presence or absence of a clearly audible pause in the relevant contexts. The results of the transcription were analyzed with the standard Intertranscriber Agreement (IA) procedure [9]. The percentage of agreement was calculated by dividing the number of tokens identically labeled by both transcribers by the total number of tokens. The result was multiplied by one hundred in order to obtain the percentage.

The same corpus used for the auditory transcription was later acoustically analyzed. The target utterances were digitized at 16 kHz on a SUN Sparc Station using ESPS Waves+ at the Phonetics Lab of the Department of Linguistics, OSU. Measurements of the consonant duration, of the immediately preceding stressed vowel and the potential pause at the RS site were performed.

2.3. Results

2.3.1. Auditory Transcription

Table 2 shows the percentage of cases in which RS and Pauses (PAU) have been transcribed for each sentence type. The values in columns RSa/PAUa correspond to the percentages of RS/PAU cases which have been transcribed by both transcribers, while the values in column RSb/PAUb are the percentages of RS/PAU transcribed by at least one of the transcribers. As expected, RS was transcribed at least in 60% of the cases where no phonological phrase boundary was present. Also, when narrow focus occurred, only in 10% of the cases RS was transcribed by both transcribers, suggesting that restructuring has taken place in the majority of the cases, even though not always. RS was independently reported for BPP sentences in 33% of the cases (RSb), but these cases were never the same for both transcribers (RSa). The highest percentage of PAU was found when both narrow focus and syntactic condition for a prosodic break were present (NPP).

	RS a	RS b	PAU a	PAU b
B	60%	75%	5%	15%
BPP	0%	33.33%	41.66%	66.66%
N	10%	15%	70%	80%
NPP	0%	8.33%	75%	75%

Table 2. Percentage of transcribed RS and pauses (PAU) for each sentence type.

The absolute IA, calculated over the entire corpus, was 87.5%. Agreement for both transcribed presence or absence of RS and PAU was also calculated for each sentence type, and is shown in Table 3. As we can see, IA is higher for PAU transcription than for RS transcription. The lowest agreement is for RS in the BPP construction, but for all other cases IA is always above 80%.

	RS	PAU
B	85%	90%
BPP	66.66%	75%
N	95%	90%
NPP	91%	100%

Table 3. Intertranscriber agreement for transcribed RS and pauses (PAU) for each sentence type.

2.3.2. Acoustic Analysis

In Figure 1, consonant duration (represented by bar height) is given across all four sentence types.

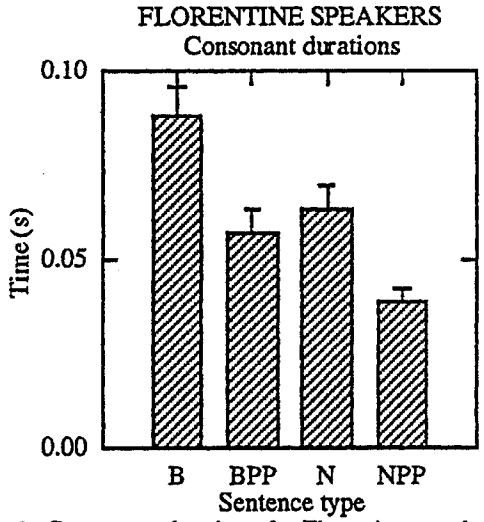

Figure 1. Consonant durations for Florentine speakers (SE bars).

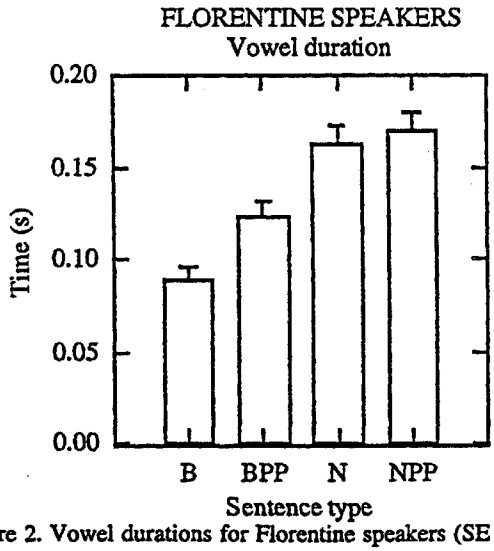

Figure 2. Vowel durations for Florentine speakers (SE bars).

As expected from the transcription data, consonant duration was longer for type B, where the presence of RS was agreed on in 60% of the cases, while it was shortest in type NPP, where there was never consensus between the transcribers for the presence of RS.

Intermediate consonant durations are found for N, where the presence of RS was agreed upon in 10% of the cases, and in BPP, where, as for NPP, the presence of RS was never agreed upon. However, we can notice that while in NPP sentences RS was independently transcribed in only 8% of the cases, in BPP sentences it was independently transcribed in 33% of the cases.

The data for vowel duration are given in Figure 2. There is an ordered hierarchy of final lengthening in the various contexts. Lengthening was greatest for NPP sentences, where PAU was transcribed in the majority of cases and where RS was never unanimously present. N sentences had values which were very close to NPP, even though slightly shorter. B sentences had the shortest vowels, as expected. Here, in fact, RS was reported in the majority of cases, while the presence of PAU was agreed upon only in 5% of the cases. Intermediate values were found for BPP, where pauses were transcribed unanimously in 42% of the cases.

3. EXPERIMENT II

3.1. Method

The same corpus described in 2.1. was used for this study.
Three speakers of Turin Italian read each target utterance 5 times. The recordings were digitized and measured according to the same procedure described in 2.2., without performing any previous auditory transcription.

3.2. Results

The data for consonant duration are shown in Figure 3.

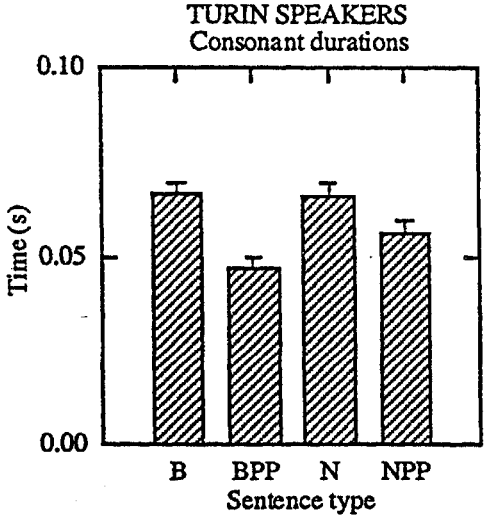

Figure 3. Consonant durations for Turin speakers.

As expected, since there is no RS in the Turin variety of Italian, no difference was found between B and N contexts. However, as for the Florentine speakers, there is a shorter consonant duration for BPP and NPP sentence types, even though the relationship is inverted here.

Vowel duration data appear to reflect the relationship between sentence types found for the Florentine data. As can be seen in Figure 4, vowel duration is highest in NPP and N sentences. Also, vowels in BPP sentences are again longer than vowels in B sentences.

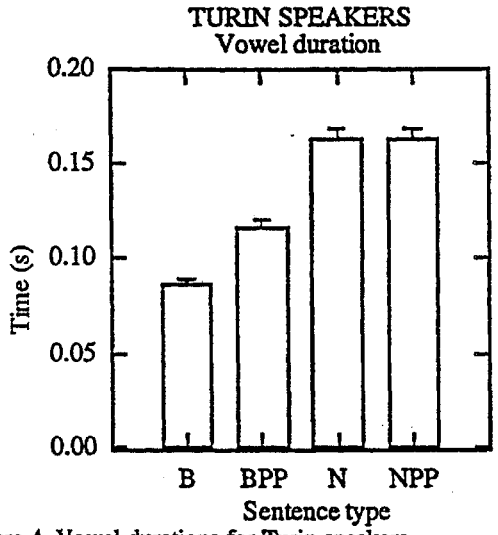

Figure 4. Vowel durations for Turin speakers.

A two-way ANOVA was performed on the data, with Sentence Type and the paragraph (Paragraph) as independent variables. The data were manipulated within speakers. For consonant duration, Sentence Type was not significant [$F(3,176) = 4.215$; $p>.001$], while Paragraph was significant [$F(4, 176) = 5.827$; $p<.001$]. The interaction was not significant [$F(8, 176) = 1.703$; $p>.001$]. The Tukey-Kramer Post-hoc test revealed a significant difference between BPP and B, and BPP and N levels.
For vowel duration, Sentence Type was highly significant [$F(3,176) = 78.683$; $p<.001$], while neither Paragraph was [$F(4,176) = 4.763$; $p>.001$], nor the interaction [$F(8,176) = 1.684$; $p>.001$] were significant. The Tukey-Kramer Post-hoc test revealed a significant difference between all the levels of Sentence Type, except between N and NAP.

4. DISCUSSION

The transcription data for the Florentine speakers show that the highest value of IA is found for N and NPP sentence types. The lowest IA, instead, was found for the BPP sentence type. This uncertainty in the BPP sentences appears to be important in the light of the acoustic measurements that we will discuss below. As expected, the highest percentage of transcribed RS was found in B sentences, where phonological phrase structure predicts the rule to apply. A very low

percentage of RS was reported for N sentences, where we expected focus restructuring to apply. Evidently, the restructuring has applied most of the times, but not always. It is interesting to notice that RS occurrence is never agreed upon in BPP and NPP. This suggests that the syntactic construction creates a boundary in BPP sentences, and focus can reinforce that boundary as in NPP sentences. We also found the highest percentage of transcribed pauses in NPP constructions, where, apparently, both focus and the syntax are at work in creating the boundary.

When looking at the acoustic data for Florentine speakers, we notice that longest consonant duration is found where RS was transcribed most of the times, i.e. in B sentences. On the contrary, lowest consonants were found in NPP constructions, where the RS was never unanimously transcribed by both transcribers. As expected, the consonant is shorter when focus restructuring takes place, as in most of the N sentences, but is even shorter when the stronger NPP boundary occurs. Consonant duration in BPP sentences are very similar to those in N sentences but are slightly lower. This suggests that the syntactic contribution to boundary strength is stronger than that of focus. Even though the difference between BPP and N is apparently small, we must consider that the mean for BPP sentences included a quite high percentage of cases where RS was independently transcribed (33%). However, agreement was low, indeed the lowest, on the overall transcription of this sentence type (66%).

The consonant data for the Turin variety show equal values for B and N sentence types. This is expected since no RS is found here. Differently from the Florentine speakers, consonant durations in NPP sentences are higher than in BPP sentences. However, we can hypothesize that the relationship between these sentence types is the same as for Florentine speakers, but it is obscured by some occurrences of RS in BPP sentences that increase mean consonant duration.

The vowel duration data for Florentine speakers also suggest a hierarchical relationship between the factors manipulated in the study. The highest degree of vowel lengthening was found in N and NPP sentence types. It is interesting to notice that these are the cases where the highest IA is reported, as well as the highest percentage of pause occurrences. BPP sentences are instead characterized by a vowel duration which is intermediate between N and NPP sentences on the one side and B sentences on the other. The same relationship was found for the Turin data. This might suggest that the syntax and focus contribution to vowel lengthening is different, and, in particular, the syntactic break produces less lengthening than focus.

The different strength of the boundary appears to be mirrored in the acoustic data. In particular, the duration of the vowel increases if a phonological phrase boundary follows it (as in BPP), but it is lengthened even more when focus applies.

This hierarchical relationship is not quite the same in the case of the consonants. In fact, while at the two extremes (B and NPP sentences) of our data it is still possible to observe a clear direction in the contribution of syntax and focus, the values for BPP and N sentences are not related to each other in the same way as in the consonant data. We can just speculate at this point that in these sentence types there is more variability among varieties of Italian. In addition, we can hypothesize that Florentine and Turin speakers might differ in the way they exploit consonant duration for the purpose of contrast, since one variety has RS and the other does not.

6. CONCLUSIONS

Different types of Phonological Phrase boundaries have been analyzed in Florentine and Turin Italian. The speakers seem to differ in the way they exploit the consonant duration as predicted by the fact that one variety has RS the other does not. A uniform strategy was found in the way the speakers from both varieties exploit vowel duration. The presence of a phonological phrase boundary has an effect on the realization of the preceding stressed vowel, but this effect is not as strong as the one induced by the presence of narrow focus. This is similar to phenomena occurring in other languages. For example, it has been observed that in English [1], that different degrees of lengthening occur before different types of boundaries. Further research is needed in order to understand how many levels of phrasing exist and what the phonetic correlates of these levels may be.

5. REFERENCES

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