

On the weakness of syllabic effects in Italian

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ABSTRACT

We report on a number of experiments aimed at verifying the role of the syllable as a representational unit in Italian. In experiments 1A-B [10], we found a syllabic effect within the syllable induction paradigm. However, the effect disappears when Italian subjects name words (exp. 2) or perform a lexical decision (exp. 3A-B). We interpret these findings as evidence that, in Italian, a syllabic representation emerges only (i) at very early processing stages, (ii) when the task strongly encourages the parsing of the speech signal. In addition, we suggest that syllabic representation has a time course, differing from language to language.

1. INTRODUCTION

The proposal that syllabic segmentation plays an important role in lexical access was put forth with special emphasis by Mehler and co-workers in connection with a segment monitoring experiment with French subjects [11]. Later work suggested that this might not be the case in English [5]. However, this discrepancy was shown to be due to an ambisyllabicity effect; when this was taken care of, syllabic segmentation did appear in syllable induction experiments [8]. As for segment monitoring, it yielded syllabic effects in languages as diverse as Spanish, Portuguese, Catalan, Dutch (as for Japanese, a mora rather than syllable effect emerged; cf. references in [17]). However, the same paradigm did not produce the expected result in Italian [15]. Additional data, gathered by means of alternative techniques, might help us shed light on the issue.

2. SYLLABLE INDUCTION

In the version of the induction paradigm adopted here [12], participants monitor for the third phoneme of a given word occurring in the coda of the first syllable (CVC₁CV) or in the onset of the second one (CV₁CCV). The trick consists in manipulating the probability with which each of these two structures appear in each experimental list. In the first list, most of the targets are in the coda position of the first syllable (e.g., *foR-naio* ‘baker’), while in the second list, most of the targets are in the onset position of the second syllable (e.g., *nu-Trice* ‘nurse’). The rationale rests on the assumption that if participants base their responses on a syllabically structured representation, they should be sensitive to the syllabic structure over-

represented in the list they are assigned to. In the two experiments that we ran [10], participants were instructed to decide, by pressing a button, whether a visually presented phoneme was contained in a binaurally presented word or not. The only difference was that 1A was a ‘yes/no task’ whereas 1B was a detection task (so-called ‘go/no-go’), as no response was to be given if the target phoneme was not heard. The latter procedure was expected to speed up participants’ latencies. The ‘go/no-go’ task is indeed assumed to reflect more initial stages of processing [12], [13].

The main finding was a significant interaction of syllabic position and induction condition (see Table 1).

INDUCT.	POSITION	MEAN RTs (s.d.)	
		1A	1B
ONSET	ONSET	467 (±115)	507 (±137)
	CODA	515 (±153)	559 (±176)
CODA	ONSET	588 (±135)	489 (±126)
	CODA	527 (±135)	448 (±146)

Table 1. Mean RTs and s.d. for each experimental condition (1A-B), after subtraction of the latencies found in a baseline list, i.e., without induction [13].

This finding supports the idea that the syllable is an important segmentation unit in the recognition of the speech signal in Italian. Moreover, it appears that participants rely on syllabic representations very early in the recognition process. This is evidenced by the robust syllabic effect emerging with the ‘go/no-go’ task.

These results are perfectly in line with those obtained for French [12], Spanish [12], English [9], and Italian [15] within the same paradigm. Note, however, that the induction paradigm encourages the segmentation of the speech signal in order to inspect for a given target phoneme. For this reason, we devised a new set of experiments based on a different technique.

3. PRIMING EXPERIMENTS (WORD NAMING and LEXICAL DECISION)

Both word naming and lexical decision can be considered more ‘natural’ tasks, in the sense that they can be assumed to be less remote from what people normally do in spontaneous situations. The purpose of the three following

experiments was to verify whether syllabic codes are involved in these tasks and, possibly, to identify the relevant level(s) of processing. To this end, we took advantage of the different levels of processing involved in word naming and lexical decision. First, word naming requires oral output, whereas lexical decision does not. Second, lexical decision can be performed only after accessing the lexical node, whereas word naming does not necessarily require it (i.e., there may be sub-lexical reading). Thus, the presence/absence of the syllabic effect in these tasks, as well as the pattern of effects to be observed, can potentially help us to better understand the magnitude and the locus/loci of the syllabic effect in speech perception and production.

3.1. Experiment 2 - Masked word naming

Method

Participants. Eighteen students at Pisa University took part in the experiment.

Stimuli and design. Eighteen pairs of trisyllabic words, seven letters long, and stressed on the last but one syllable were selected. The words of each pair shared the three initial phonemes (CVC). These phonemes made up the first syllable for one member of the pair (e.g., *lam-ponè* ‘raspberry’), but not for the other (e.g., *la-mento* ‘moan’). The two word sets were balanced for frequency of occurrence (they were all low frequency).

In addition to these word-sets, an additional set of 24 stimuli served as a practice block before the experiment proper.

For each target word, three types of primes were selected: (1) primes that corresponded to the first syllable (e.g., *la&&&&&* - LAMENTO and *lam&&&&&* - LAMPONE), (2) primes that did not correspond to the first syllable (e.g., *lam&&&&&* - LAMENTO and *la&&&&&* - LAMPONE), (3) neutral primes (*&&&&&&&*). Each target word was presented three times to a given participant, each time with a different prime. The order of presentation of a given target with its three corresponding primes was counterbalanced across participants. Word targets (CVC and CV words) represented the factor Type of Target, whereas the three categories of prime stimuli (*CV&&&&&*, *CVC&&&&&*, *&&&&&&&*) represented the factor Type of Prime. The two factors were crossed in a 2x2 repeated measure ANOVA. The Type of Prime was always treated as a within-subject factor, in both F1 and F2; the Type of Target was treated as a within-subject factor in F1, and as a between-subject factor in F2.

Procedure. At the beginning of each trial, a forward mask consisting of seven stars (*****) appeared on the center of the computer screen for 500 ms. This was immediately replaced by presentation of the prime for 29 ms., immediately followed by a backward mask (*****) for 14 ms., which was immediately followed by the target. In order to avoid visual juxtaposition, primes were always presented in lowercase, and targets in uppercase. The target disappeared as soon as participants responded. The inter-trials interval was fixed at 2 seconds.

Results

We removed from the analysis errors, key malfunctionings, RTs shorter than 300 ms. or RTs more than 3 s.d. above the participants’ general mean. Discarded data accounted for 4.4%. The only significant effect was a main effect of Type of Prime: $F(1,16) = 14.7$; $p < .000$; $F(1,34) = 16.8$; $p < .0001$. This finding depends on the fact that it takes longer to name a word target preceded by a neutral prime than the same target preceded by a CV or a CVC prime (see Table 2).

TARGET	PRIME	MEAN RTs (s.d.)
CV	CV	507 (±117)
	CVC	502 (±111)
	NEUTRAL	523 (±109)
CVC	CV	507 (±122)
	CVC	505 (±125)
	NEUTRAL	520 (±110)

Table 2. Mean RTs and s.d. for each prime-target condition (3A).

Planned comparisons showed that the advantage of both CV and CVC priming conditions over the neutral priming condition (respectively of 14 ms. and 18 ms.) is significant (CV vs. neutral: $t = 2.3$; $p = .02$; CVC vs. neutral: $t = 2.8$; $p = .005$). However, the CV priming condition did not significantly differ from the CVC one (CV vs. CVC: $p > .1$). Most importantly, no interaction between Prime and Target Type was observed.

No significant effect emerged from the error analysis.

Discussion

The main finding of this experiment was that Italian participants are insensitive to the syllabic congruency between prime and target when they have to name words. Our finding mirrors what Schiller observed in Dutch [14]. On the other hand, it sharply contrasts with what Ferrand et al. have observed in both French and English [7], [8]. These authors found a robust effect of interaction between Target Type and Prime Type, showing that, at some level of processing, French and English people make use of syllabically structured representations when naming words.

In order to better understand the role of the syllable in Italian, we decided to run two lexical decision experiments. However, as [7] and [8] failed to demonstrate any effect in lexical decision even in languages that do show a syllabic effect in word naming, we adopted some procedural modifications from [4], where a syllabic effect in a lexical decision experiment in Spanish was found.

3.2. Experiment 3 - Lexical decision

Participants. Thirty students at Pisa University were randomly assigned half to experiment 3A, the other half to experiment 3B.

Stimuli and design. The same material as in the previous experiment was used, except for: (i) the lack of the neutral prime condition; (ii) the symbols following the syllabic prime: (*)**** instead of (&)&&&&&; (iii) the symbols in

the mask (##### instead of *****); (iv) the presence of non-word pairs in the same number as word pairs.

Procedure – Experiment 3A. At the beginning of each trial, a mask consisting of seven hash marks (#####) appeared on the center of the computer screen for 500 ms. This was immediately replaced by presentation of the prime, in lowercase, for 166 ms., immediately followed by the target in uppercase (there was no backward mask). The target disappeared as soon as participants decided on its lexical status by pressing one of two buttons. The ‘yes-button’ was assigned to participants’ dominant hand. The inter-trials interval was fixed at 1.5 seconds. A practice block composed of 24 additional items, half of which were non-words, preceded the experiment proper.

Procedure – Experiment 3B. Experiment 3B differed from experiment 3A only in the lack of the mask. This was done in order to enhance prime visibility.

The same statistic analysis as in experiment 2 was used.

Results. RTs shorter than 300 ms., longer than 2000 ms., or more than 3 s.d. above participants’ individual mean were removed from the analysis. In addition, we excluded four items unknown to more than 70% of participants. The percentage of discarded data was 4% (3A) and 3.6% (3B) respectively.

In both experiments, the only significant effect was the main effect of Type of Target in the analysis by participants: $F(1,14) = 10, p = .007$ (3A); $F(1,14) = 7.3, p = .002$ (3B), showing that CVC targets are responded to faster than CV targets (see Table 3 for mean RTs).

TARGET	PRIME	MEAN RTs (s.d.)	
		3A	3B
CV	CV	632 (±138)	618 (±131)
	CVC	635 (±142)	633 (±138)
CVC	CV	608 (±137)	610 (±136)
	CVC	612 (±142)	609 (±123)

Table 3. Mean RTs and s.d. for each prime-target condition (3A-B).

Limited to experiment 3B, the effect of Target Type was mirrored in the analysis of errors in the by-participants analysis ($F(1,14) = 5, p = .04$), showing that people make more errors on CV targets (5%) than on CVC targets (2.3%).

Discussion

From experiments 3A-B we can conclude that Italian people do not rely on syllabically structured representations when they have to decide on the lexical status of a given target. The absence of a syllabic effect is somewhat surprising, given that the prime exposure was sufficiently long (166 ms.) as to give rise to a syllabic effect in Spanish [4]. Moreover, our findings held true even when prime visibility was enhanced by the lack of any mask (3B).

We have no principled explanation for the main effect of Type of Target in the by-participants analysis of RTs (3A,

3B) and errors (3B). It could be a spurious effect, possibly due to the fact that our targets, although supposedly balanced for frequency, may conceal subtle differences underrepresented in frequency dictionaries.

4. CONCLUSIONS

In our discussion we shall disentangle the factors that might turn out to be most relevant. In particular: input vs. output level (IL / OL) and sub- vs. post-lexical stage (S-L / P-L). Note that OL does not imply P-L, for word naming may be performed sub-lexically.

The results of the syllable induction experiments 1A-B are relatively straightforward. Italian subjects present a clear syllabic effect in this task, which involves IL (for the production mechanism is not activated) and S-L (for the monitoring of a consonant may be activated before accessing the whole word). It should be noted that this task involves a metalinguistic strategy, since: (i) it triggers a phoneme scanning procedure, (ii) it is cross-modal. Our results replicate similar ones obtained for French [7] and English [8].

The results of the priming experiments 2 and 3A-B, on the other hand, did not elicit the expected syllabically-driven response, as opposed to French [7] and English [8], but in agreement with Dutch [14]. The above tasks differ among each other in a number of relevant respects. Experiment 2 involves production, hence OL, although it possibly does not involve P-L, as noted above. Experiments 3A-B, by contrast, do not involve OL, but clearly presuppose attainment of P-L as the appropriate stage for lexical decision. Thus, although experiments 2 and 3A-B differ, they all necessarily involve, for one reason or another, a relatively late stage of processing.

We are thus invited to speculate that Italian, as opposed to French and English, might be a language in which the syllable is only activated, for the sake of psycholinguistic processing, at very early stages, and presents a rapid decay. This view is encouraged by the important observation that in word manipulation experiments, where subjects are asked to modify an input stimulus according to a pre-defined pattern, Italian subjects do not show any syllabic effect [2], as opposed to English ones (cf., for instance, [16] and [6]). However, when time-compression is introduced, and no oral output is requested, even Italian subjects exhibited an effect of syllable structure in a blending-preference task, in which they were asked to choose between two visually presented blending strategies relating to two orally presented /CVC/ sequences [2].

Note that this task shares an important feature with the induction paradigm. In both cases, subjects are asked to perform a fairly unnatural task, quite remote from normal linguistic situations (monitoring for a consonant, blending two pseudo-words). One is thus invited to suppose that the activation of the syllabic component for Italian speakers is only relevant: (a) when a metalinguistic task is forced upon them; (b) at very early stages of processing.

The first condition suggests that the syllable has no real import in the linguistic ecology of Italian speakers, presumably as a consequence of the relatively simple syllable structure of their language. The fact that the situation looks different in English and French is no surprise, considering the more complex syllable structure exhibited by these languages. Even the fact that Spanish differs from Italian relative to the results of experiment 3A [4] is consistent with our view, for the syllable structure of Spanish, although simpler than that of English and French, is more complex than that of Italian.

The second condition is inspired by the enlightening suggestion to be found in [1], where it is proposed that languages may differ in terms of the speed with which the syllable structure is erected. We would like to suggest, however, that languages might also differ in terms of the rate of decay of syllabic representation. Note that this decay seems to occur earlier in Spanish than in English or French, for with Spanish speakers syllable manipulation tasks produce as little evidence of a syllabically-driven behavior as with Italian speakers [3]. The difference with respect to Italian seems to be that in the latter language the rate of decay is even sharper. On the other hand, the proposal put forth in [1] that Arabic languages present a slow erection of the syllabic structure suggests that the growth and decay of this prosodic component may be differently phased in different languages. Possibly, Germanic and Romance languages share a rapid growth and differ in terms of their rate of decay, while Semitic languages present a slow growth.

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