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On the weakness of syllabic effects in Italian (Extended version)

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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 (Finocchiaro & Bertinetto 2000), 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 (Mehler et al. 1981). Later work suggested that this might not be the case in English (Cutler et al. 1986). 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 (Ferrand et al. 1997). 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 Bertinetto 2001). However, the same paradigm did not produce the expected result in Italian (Tabossi et al. 2000).

2. Syllable induction

In the version of the induction paradigm adopted here (Pallier et al. 1993), participants monitor for the third phoneme of a given word occurring in the coda of the first syllable (CV<u>C</u>.CV) or in the onset of the second one (CV. <u>C</u>CV). 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 (Finocchiaro & Bertinetto 2000), 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 (cf. Pallier et al. 1993; Pitt et al. 1998).

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 (Pitt et al. 1998).

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 (Pallier et al. 1993), Spanish (Pallier et al. 1993), English (Finney et al. 1996), and Italian (Tabossi et al. 2000) 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-pone* '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: (i) primes that corresponded to the first syllable (e.g., la&&&&& - LAMENTO and lam&&&& - LAMPONE), (ii) primes that did not correspond to the first syllable (e.g., lam&&&& - LAMENTO and la&&&&& - LAMPONE), (iii) 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: F1 (2,16) = 14.7; $p < .000$; F2 (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 (2).

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 (Schiller 1998). On the other hand, it sharply contrasts with what Ferrand et al. have observed in both French (Ferrand et al. 1996) and English (Ferrand et al. 1997). 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. Note, however, that Schiller (1999, 2000) and Brand et al. (2003) failed to replicate the syllable priming effect in word reading in English and French respectively. Thus, the syllable priming effect does not seem to be very reliable either in French or English. These findings indicate that the results reported by Ferrand and colleagues has to be interpreted with caution.

In order to better understand the role of the syllable in Italian, we decided to run two lexical decision experiments. However, as Ferrand and colleagues 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 Carreiras & Perea (2002), 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 (see Appendix 1), 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: $F1\ (1,14) = 10$, $p = .007$ (3A); $F1\ (1,14) = 7.3$, $p = .002$ (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 ($F1\ (1,14) = 5$, $p = .04$), showing that people make more errors on CV targets (5%) than on CVC targets (2.3%).

4. General 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 (Carreiras & Perea 2002). 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.

In our discussion we shall disentangle the factors that might turn out to be most relevant. Let us begin with the following two factors: input vs. output level and sub- vs. post-lexical stage. Note that output-level does not imply postlexical-level and vice versa. In fact, word naming (cf. experiment 2) may be performed sublexically, while lexical decision (cf. experiment 3A-B) necessarily occurs at the postlexical-level even though the articulation is not activated.

The results of the syllable induction experiments 1A-B are relatively straightforward. Italian participants present a clear syllabic effect in this task, which involves input-level (for the production mechanism is not activated) and sublexical-level (for the monitoring of a consonant in the initial part of the item 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 (Ferrand et al. 1996) and English (Ferrand et al. 1997).

The results of the priming experiments 2 and 3A-B, on the other hand, did not elicit the expected syllabically-driven response. As noted above, this result – which is in agreement with the one obtained for Dutch (Schiller 1998) – is not necessarily alternative to that obtained for French (Ferrand et al. 1996) and English (Ferrand et al. 1997), considering the conflicting outcome described in Schiller (1999, 2000) and Brand et al. (2003). Note that the above tasks differ among each other in a number of relevant respects. Experiment 2 involves production, hence output-level, although it possibly does not involve the postlexical-level, as already noted. Experiments 3A-B, by contrast, do not involve the output-level (hence only input-level), but clearly presuppose attainment of postlexical-level as the appropriate stage for lexical decision. Interestingly, although experiments 2 and 3A-B differ, they all necessarily involve, for one reason or another, a relatively late stage of processing.

Delaying for the time being the discussion concerning French and English (but see below), we are thus invited to speculate that Italian might be a language in which the syllable is only activated, for the sake of on-line psycholinguistic experimentation, at very early stages, and presents a rapid decay. This view is encouraged by an important observation stemming from word transformation experiments with oral output, where participants are asked to substitute one or more segments of an auditorily presented input stimulus according to a pre-defined pattern (the dependent measure being the comparable ease with which the various types of substitution are performed, relative to syllable-internal structure). Now, in these tasks Italian participants did not show any syllabic effect (Bertinetto 1999), as opposed to English ones (cf., for instance, Treiman 1983; Derwing et al. 1988). However, when time-compression was introduced, and no oral output was requested, even Italian participants exhibited the effect of syllable structure in a blending-preference task, in which they were asked to choose (by pressing one of two buttons) between two visually presented blending strategies relating to two orally presented /CVC CVC/ sequences (Bertinetto 1999). In this case, the overwhelmingly preferred blend was such that the onset of the first stimulus combined with the rhyme of the second. Note that this task (due to the crucial condition of time compression) seems to involve a relatively early stage of processing, whereby the decision is taken without activating the articulatory level. Admittedly, one might object that it is not easy to exactly determine how early is the processing stage tapped on by this task, since (despite time-compression) the decision has to be taken after listening to the two monosyllables to be blended. Although the choice

among the two visually presented alternatives is simply performed by selecting the appropriate button, at the moment they make their decision participants have already been presented with the full phonetic form of the two monosyllables to be blended. On the other hand, in this task Italian speakers yield a dramatically different result as compared with blend learning tasks with oral output. We thus cannot exclude an interpretation that involves a somewhat early, post-perceptual stage of processing.

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

Condition (a) might suggest that the syllable has no pervasive import in the linguistic ecology of Italian participants, presumably as a consequence of the relatively simple syllable structure of their language. The fact that the situation looks different in English and French – as suggested by a number of experiments, although not all results converge – 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 (cf. Carreiras & Perea 2002) 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. For instance, Spanish allows word-internal stop sequences (e.g. *victoria*) and various sorts of obstruents in coda (e.g. *ciudad*). It is important to observe, however, that the above observation only refers to psycholinguistic experimentation, for in spontaneous behavior, e.g. in speech errors, Italian speakers do show a striking effect of syllable internal structure. In fact, as shown in Bertinetto (2001b), the largely prevailing recombination point in blending and exchange errors is at onset/rhyme juncture: cf. *aggiati* (< *aggiunti* + *sommati*) and *la perta aporta* (< *la porta aperta*), respectively (the first "i" in *aggiati* and *aggiunti* is a sheer marker of palatalization and affrication of the preceding consonant). Depending on how these data are calculated, the percentage of onset/rhyme recombinations lies between 71% and 75% with the former type of errors, and between 90,5% and 93,1% with the latter one.

Condition (b) is inspired by an enlightening suggestion by Berg & Abd-el-Jawad (1996), where it is proposed that languages may differ in terms of the speed with which syllable structure is erected. Arabic, as claimed by these scholars, presents a slow build-up as compared with Germanic languages. We adopt this view, but would like to suggest, in

addition, that languages might also differ in terms of the rate of decay of syllabic representation in on-line processing. Italian, among the languages here considered, seems to present the fastest decay rate. Other languages seem to have a considerably slower rate. Consider English, where syllabic effects are to be observed not only in induction tasks (cf. experiments 1A-B), but also in word transformation ones (as to primed masked naming, as in experiment 2, see below). Spanish, on the other hand, seems to present a slower decay rate as compared with Italian – cf. the experiment by Carreiras & Perea (2002), which inspired our experiments 3A-B, where a relatively long mask exposure is adopted – but faster than English, for with Spanish speakers word transformation tasks produce as little evidence of a syllabically-driven behavior as with Italian speakers (Bertinetto et al. 1999). Thus, if the proposal put forth by Berg & Abd-el-Jawad (1996) – namely, that Arabic languages present a slow build-up of syllabic structure – is correct, one may hypothesize that the growth and decay of the on-line representation of this prosodic component in psycholinguistic on-line experimentation may be differently phased in different languages. Possibly, Germanic and Romance languages share a rapid build-up but differ in terms of their decay rate (with English having the slowest one, Italian the fastest, and Spanish falling in between), while Semitic languages present a slow build-up (as to its decay rate, nothing can be said at the moment). Note that this view improves on the one proposed by Berg & Abd-el-Jawad (1996), and departs from the one suggested in Bertinetto (2001a).

The situation may be summarised as in the following table, where the presence of a syllabic effect with respect to a number of (mostly experimental) conditions, together with their characterizing features, is listed in relation to four languages (English, French, Spanish and Italian).

	Factors					*Languages*			
Type of condition	cross-modal	metalin-guistic	early tapping	output-level	Postlex-level	Eng.	Fr.	Sp.	It.
Blending and exchange errors	-	-	-	+	+	+	+		+
Syllable induction monitoring	+	+	+	-	-	+	+	+	+
Syllable monitoring	+	+	+	-	-	+	+	+	-
Time-compressed blending preference	+	+	?	-	+ ?			+	+
Primed masked naming	-	-	-	+	-	±	±		-
Primed masked lexical decision	-	+	-	-	+	(-)	(-)	+	-
Word transformation	+	+	-	+	+	+		-	-

Table 4. Syllabic effect with respect to language and experimental condition.

Some preliminary comments are in order. First, with the exception of blending and exchange errors, all the conditions listed above refer to experimental tasks. Second, as already observed, the evidence concerning the primed masked naming task is somewhat ambiguous in the case of English and French (as shown by the "±" sign), for the literature offers conflicting results. Third, a question mark has been inserted in two instances to mark our uncertainty as to the actual characterization of the time-compressed blending preference task (as to the minus signs between parenthesis, see below). Finally, for some of the conditions listed there are no available data for each of the languages considered, as shown by the empty cases in the right hand-side of the table. As a consequence, it is impossible to arrive at a fine discrimination between English and French on the basis of these data. On the other hand, English differs from Spanish in at least two experimental conditions: word transformation and primed masked lexical decision. Let us consider this datum.

As a first step, we have to rule out all factors which do not influence the manifestation of syllabic effects in these languages. As may be seen, cross-modality, metalinguistic character, activation of the output-level and attainment of the post-lexical level do not matter, for the presence vs. absence of syllabic effects in English, French and Spanish is not directly conditioned by these factors. We are therefore left with early tapping. However, this factor cannot be fully exploited with respect to the primed masked lexical decision

task, since a different mask exposure time was used in the experiments performed with Spanish vs. English and French participants. Note that Carreiras & Perea (2002) explicitly mention the fact that they had to increase the exposure time after obtaining a null result with shorter durations. Thus, one likely explanation of this apparent mismatch might be that with this particular technique a sufficiently long exposure time should be used. If this is the case, the negative result obtained with English and French participants would have no bearing on the assessment of experimentally induced syllabic effects. This is why the minus sign appears between parenthesis in the cells relating to English and French. By contrast, the negative result obtained with Italian participants is a truly negative one, for the mask exposure was the same as that adopted in the Spanish experiment.

Thus, limiting ourselves to experimental tasks (as opposed to spontaneous behavior), we may claim that the diverging results of English, French, Spanish and Italian are compatible with the hypothesis that (provided the appropriate experimental techniques are used) these languages converge in presenting a fast build-up of syllable representation, but diverge in terms of its decay rate. The decay is fastest in Italian, slowest in English (and possibly French, to the extent that future data concerning the empty cases in table 4 will confirm its convergence with English), and intermediate in Spanish, for this language diverges from English in word transformation tasks but it also diverges from Italian in the primed masked lexical decision task.

Let us now consider the case of Italian in more detail. As noted above, the metalinguistic nature of the task performed seems to be a relevant factor. However, the behavior exhibited by Italian speakers in spontaneous blending and exchange errors – ostensibly on-line and ecologically salient processes – suggests that this cannot be the whole story. In the latter case, the syllable-driven behavior emerges at relatively late stages, for (especially in exchange errors) both interacting words must be available in relevant aspects of their phonetic form. Thus, one might be led to the paradoxical conclusion that, as far as Italian speakers are concerned, the on-line representation of the syllable seems to be differently phased in spontaneous and ecologically natural behavior, as opposed to artificial, experimentally elicited behavior.

In fact, there is even more than that. At the production level, the spontaneous behavior of Italian speakers demonstrates that syllable-driven phonological processes are deeply rooted in articulation. For instance, it is well-known that Italian presents a sort of isochronic regularity, to the effect that stressed vowels are long in open syllables and short in closed ones. Actually, and contrary to a wide-spread misconception, this regularity is not always enforced, but only under sentence stress, hence also in the pronunciation of isolated words

(Bertinetto 1981). However, to the extent that it emerges, it is an undeniable proof of the existence of syllable-driven phenomena in the phonology of Italian. Obviously, this poses a challenge to the view suggested above with respect to the time-course of syllabic representations. In fact, this problem concerns Spanish as well as Italian. Although the decay rate of the syllable representation in experimentally elicited behaviors is somewhat slower than in Italian, it is nevertheless faster than in English or (supposedly) French. Yet syllable-driven phonological processes clearly exist in Spanish (e.g., post-lexical velarization of nasals in specific contexts).

The paradox may be phrased in the following way. In some languages (Italian, at the very least) we apparently observe the on-line effect of syllable structure at two distinct phases: (i) at an early stage in the case of experimentally elicited behaviors, (ii) at a considerably later stage in the case of phonological regularities and spontaneous errors, as manifested in the articulatory output. Needless to say, this looks like a fairly uncomfortable situation. However, we believe that a careful examination of the data reveals a different picture. Let us consider the following three solutions.

(A) Paradoxical. The on-line elicited representation of the syllable and its on-line spontaneous representation are totally independent of each other. Although this solution is logically consistent with the data, it is not at all attractive, for it would force us to assume that two behaviors that are strictly connected with the internal structuring of syllabic components have nothing in common, except for the fact that they both deal with the same phonological units.

(B) Undetected bias. All sorts of on-line representations of the syllable coincide; hence, the mismatch to be obseved in Italian is merely due to some yet undiscovered experimental bias which oscures the correct interpretation of the facts. Note, however, that the data concerning syllable induction monitoring and primed masked lexical decision have both been replicated with Italian subjects (the former result is described both in experiments 1A-B here and in Tabossi et al. (2000); the latter result in experiment 3A-B above). Thus, it is unlikely that it is purely accidental.

(C) Unitary. The on-line elicited representation of the syllable and its on-line spontaneous representation ultimately coincide, although their effect is to be observed at different time lags. A possible explanation is the following. On-line syllabic representations in Germanic and Romance languages are uniformly created at a very early stage of processing, when output routines, strictly dependent on the phonology of the given language, are stored. Thus, although the effect of syllable-driven phonological regularities manifests itself at a much later stage – i.e. at output level – it is essentially of the same

nature as the effect to be observed at much earlier stages in experimentally elicited behaviors. The same holds true with respect to spontaneous blending and exchange errors. Supposedly, their origin is to be found at the time of articulatory programming, although their effect manifests itself in the actual output.

We claim that solution (C) is the correct one, although admittedly further research should be pursued in order to provide a conclusive demonstration. Note however that, whatever is the case with respect to the two facets of on-line syllabic representations, these must in any case be kept apart from off-line syllabic representations. This claim is suggested by the fact that in possibly all languages (including languages like Italian and Spanish, where experimentally elicited syllabic representations present a more or less fast decay), the syllable as an off-line linguistic component persists at fairly late stages of processing, presumably much beyond the point of decay of its on-line cognitive representation. This explains results obtained in tasks of "sound similarity judgements" performed with various languages (Derwing & Nearey 1994; Yoon & Derwing 1995), or in tasks of short-term recalling of word lists, as performed by English participants (Treiman et al. 1994). However, and fortunately, this fact is easy to reconcile with experimental data such as the ones described in this paper, for there are good reasons to believe that on-line and off-line representations of the syllable are relatively independent of each other, although non-arbitrarily connected.

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