Exploring morphological connexions within the mental lexicon: evidence from speakers from diverse educational backgrounds

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1 Introduction

The role of morphology in word perception has been studied through various protocols and settings, among which lexical access protocols, often conducted with the masked priming technique. These studies demonstrate the existence and the role of morphological connections within the mental lexicon (e.g., Feldman, O'Connor & Moscoso del Prado Martin, 2009), while the theoretical specification of what is implied by the term "mental lexicon" is currently the subject of much debate. In what follows, we take the theoretical option of a mental lexicon in which individual words are represented and form connexions with each other based on their systematic common characteristics (form and/or meaning). The experimental evidence accumulated until now clearly shows that morphologically related words tend to facilitate processing of each other, in the same language (e.g., Drews & Zwitserlood, 1995) but also through languages, i.e., in cross-linguistic priming, giving rise to language co-activation effects (e.g., Mulder, Dijkstra, Schreuder & Baayen, 2014). Without going into detail here, we will admit that experimental research, despite some methodological criticisms, has the potential of enriching our understanding of how language in general, and morphology in particular, work (Baayen 2014). This is precisely why the role of some facts about language and its users should make the object of intensive research.

An important issue is about the fact that, contrary to the popular opinion relative to generative linguistics "idealized speaker", all speakers are not equivalent with respect to language use, and possibly to language representation. In the case of masked priming protocols tapping into morphological processes, the variable "speaker" is not often considered, or, to put it in another way, it is a special profile of speaker which is taken into account. The participants tested in most published literature tend to be highly educated students of which the majority is female, very often attending philological curricula. However, it is widely admitted that "differences in individual language users may lead to remarkably different use of the possibilities offered by the grammar of 'the language'" (Baayen 2014: 100). These can be sex differences (Kimura 2000, for a comparison between the verbal skills of men and women), or differences related to speakers' experience with language, leading to the study of variables such as the "vocabulary size" (e.g., Mainz, Shao, Brysbaert & Meyer, 2017) or the exposure to print. Differences between speakers can also be related to exposure to heritage language and its use.

2 Our study

Given the above, we sought to combine the questioning related to morphological processing and representation, to that related to speakers' background, i.e., speakers/readers with diverse educational backgrounds. This questioning arises as a result of previous findings that will be briefly presented below.

2.1 Previous findings on the *-isme/-iste* and *-isme/-ique* connexion

The protocol and results we briefly describe in this section were part of a study (Voga & Anastassiadis-Symeonidis, 2018) designed to compare bilingual and monolingual processing, in which bilingual participants (Exp. 1a) were the "prototypical student group", whereas monolinguals (Exp. 1b) were students in the public technical school of Thessaloniki. The experiment was designed to be "transposable" from a bilingual to a monolingual group. All the experiments presented here (§2.1 and §2.2) used the masked priming technique with a 48ms SOA (Stimulus Onset Asynchrony), which is a prime duration that prevents the participant from consciously processing the prime, and which generally leads to morphological priming effects (and identity ones[1]). The task was lexical decision (LD, YES, it is a word/NO, it is not). The stimuli tested in these experiments were selected to activate the morphological connexion between *-isme* and *-iste* (cf. table 1, a and b), two related morphemes that exist in Greek as well as in French, and to compare it with the *-isme/-ique* connexion (cf. table 1, c).

		Primes			
Targets		Translation/ Identity	Phon ovrl.	Morphological	Unrelated
a) Cognates 0-base *-iste*	*pluraliste* 10.3 lett. 1.81 occ./m.	πλουραλιστής /pluralistís/ 'pluralist'	95%	πλουραλισμός /pluralismós/ (75%)	ξεχείλισμα 'overflowing'
b) Noncognates Greek-base *-iste*	*individualiste* 10.22 lett. 2.06 occ./m.	ατομικιστής /atomikistís/ 'atomist'	–	ατομικισμός /atomikismós/ (–)	αστεροσκοπείο 'observatory'
c) Cognates Greek-base *-ique*	*monarchique* 10.4 lett. 4.5 occ./m.	μοναρχικός /monarhikós/ 'monarchist'	85%	μοναρχισμός /monarhismós/ (55%)	αφαίρεση 'substraction'

Table 1. Stimuli sample (number of letters and lexical frequency) and phonological overlap for the nine experimental conditions (3 priming conditions: translation, morphological, unrelated x three types of target).

The pattern of results found for the bilingual group (i.e., university students having Greek as L1 and having spent some years in France) and for the technical school group were quite different. The bilingual group (N = 29) exhibited translation and morphological priming effects (83ms and 49ms respectively) which occurred simultaneously for cognates Greek-base. This result extends the cognate effect to complex primes and targets and demonstrates that there is a cross-language connexion between *-isme* and *-ique*. Our bilingual speakers showed no effect for non-cognates, which is not surprising, given that in most cases the morphological effect is concomitant to the cognate (translation) effect. As for condition a), i.e., the 0-base cognates (in the L1 of our subjects, since *plural-* is not a stem in Greek), it induces morphological priming (85ms) but no translation priming. This result highlights two facts: i) that the contact with a whole word (lexical) entry is necessary to trigger translation effects: morphological segments such as πλουραλ- /plural-/ do not constitute entry units for the L1 lexicon of our subjects, and as such they cannot contact the corresponding lexical entry (Corbin, 1987: 457-459, 'ils ne sont les produits d'aucune Règle de Construction de Mot'). Psycho-linguistically speaking, 0-base cognates should have an intermediate status

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[1] Please note that the identity effect under monolingual conditions corresponds to a translation effect under bilingual conditions, given that it is the same word which is tested; in Exp. 1a the priming direction is from L1 to L2 (cross-language cross-script priming, given that Greek and French have different alphabets), and in Exp. 1b the priming direction is from L1 to L1.

between the constructed and the non-constructed word; ii) that overlapping (phonological) form between prime and target does not suffice to induce cross-language effects, confirming that masked priming cross-language effects are not simply form priming effects.

The (unpublished) results of Exp. 1b (27 participants studying in the public technical school, age: 18-23) did not show any significant morphological priming, which is surprising, given that both primes and targets were in their L1. Only one condition, the identity condition of Cognates Greek-base *-ique* (Table 1, c) managed to yield a 52ms significant effect. Many questions arise from this finding: is it because our monolingual participants do not know these words, for instance the Cognates 0-base *-iste* words, which are not very frequent and cannot be connected to any morphological family of Greek words? Or would it be because they simply did not have the time to read the prime words, which were all quite lengthy (appr. 10 letters long)? If this were the case, how can we explain the fact that no priming effect is found for the morphological condition of Cognates Greek-base, despite the robust identity effect found for this type of word? In sum, while L2 speakers exhibit priming effects in most of cross-language conditions (Exp. 1a), monolingual speakers do not perceive morphological relations in their own L1, a fact that could imply qualitative differences within the processing system, depending on the type of speaker. Such an account recalls that claiming the inability of L2 learners to rely on the computational component (e.g., Clahsen, Felser, Neubauer, Sato & Silva, 2010) and their inclination to list forms in the lexicon rather than creating them with stems and affixes, as native speakers do.

2.2 Evidence from groups of speakers from diverse educational backgrounds

Given the above, it seemed crucial to us to repeat the experiment 1a with speakers of another language, we therefore ran the experiment with participants who are students in a "Second chance school" (age: 17-24) and have French as their "school and everyday language". To do so, we had to make the necessary adjustments, mainly the suppression of condition b (Table 1), given that these words (generally) do not exist in French. Another difference was that the morphological prime for the c) condition was the base, ex. *monarchie* for the target *monarchique*. Excepted these two differences, exp.2 was identical to Exp. 1a (§2.1), in its monolingual French version, i.e., both primes and targets were in French. Most of our participants in this experiment had French as their 'school language', but in most cases, French was not the "home language". We do not have the space here to provide a detailed description of this population, we wish however to underline that most participants had a "terminale" class level (i.e., the high school degree/ A level year), with some of them declaring a level equivalent to that of "seconde" (i.e., 11/10th grade, before integrating the school). Two groups were created, based on a double assessment of participants linguistic competence: her/his score in a French vocabulary test and the proportion of errors in the lexical decision protocol. Table 2 summarizes the results of the group that performed better (less than 22% error rate in the LD task). What our results show is that these participants do not process the *-ique* and the *-iste* derivations (targets) in the same way.

Words	Primes							
Targets	Identity (Id.)		Morph. (M)		Unrel. (U)		Net prim. effect	
	RT	Err.	RT	Err.	RT	Err.	U- Id.	U - M
-iste, ex. pluraliste	1060	14,7	1060	13,1	1056	14,4	0	-4
-ique, ex. monarchique	993	6,9	1023	9,7	1059	6,6	66*	36*

Table 2. Reaction times (in milliseconds) and percentages of errors for the lexical decisions to the two types of targets in the three priming conditions (identity, morphological and unrelated). Net priming

effects are given relative to the unrelated condition and statistically significant priming effects (identity and morphological) are marked with an asterisk.

In Exp. 2, the *-isme/-iste* induces no priming, whereas for *-ique* conditions, robust identity and morphological (base) priming are found, showing the strength of the connexion between the base and its derivation. In the discussion, these results will be compared to those of Exp. 1a and 1b, underlining the influence of the variable "type of speaker", as well as its effect in terms of strength of the connexions between words (and their parts). Our results will be interpreted with respect to what Mulder et al. (2014) call the "larger chain of morphological relations", including series effects (Dal Maso & Giraudo, 2019). With respect to the discussion related to multilingualism, they fit well the view of the mental lexicon as a unified lexico-semantic architecture (Schoonbaert, Duyck, Brysbaert & Hartsuiker, 2009; Voga, 2020).

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