
Formal and Semantic Transparency in L1 and L2 Morphological Processing

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1 Background

While there is a general agreement on the organization of L1 mental lexicon according to morphological parameters (Diependaele et al. 2012 for a review), the debate on the role of morphological factors on L2 lexical representation and processing is still open and lively, as data are still scarce (especially for less commonly learned L2s) and interpretations are controversial. Limiting our attention to derived words (rather than inflected ones), results coming from the masked priming experimental paradigm seem to indicate that proficient L2 speakers adopt processing mechanisms which are (qualitatively) similar to those used by L1 speakers, although L2 processing still remains cognitively more demanding than L1 processing. A growing body of literature indicates that when the prime and the target are morphologically related and when this relationship is both formally and semantically transparent (e.g., *hunter/hunt*), L2 speakers recognize target words significantly faster compared to the condition where the prime is unrelated (e.g., *flower/hunt*). Although different interpretations have been proposed, morphological facilitations have emerged quite consistently across the different L2s and the derivational patterns investigated (Giraud & Dal Maso 2018 for a review).

The results of L2 studies indicate that proficient learners can in fact efficiently rely on words' structure during processing. However, when it comes to formally or semantically opaque complex words, L1 and L2 processing mechanisms seem to diverge. Specifically, orthographic/formal variation, or actual formal disruption affects more deeply L2 than L1 processing. This emerges when allomorphy is considered both in verbal inflectional systems (Basnight-Brown et al. 2007; Feldman et al. 2010 on L2 English; Jacob et al. 2013 on L2 German) and in the case of derivationally related words (Piccinin 2018 on Italian derived words, e.g., *fiore/floreal*). In fact, starting from the acknowledgment of this major reliance on formal aspects, some scholars went so far as to propose that L2 processing relies uniquely on formal features, rather than on truly morphological ones (Heyer & Clahsen 2015).

The effect of semantic transparency in L2 processing is however far less clear as only one experimental study dealt with this issue (Diependaele et al. 2011). Moreover, the picture is complicated by the fact that there is still very much controversy about this issue even in the L1 processing literature. Basically, there is a lack of general consensus on the actual emergence of morphological effects at the very early stages of word processing and recognition. As a matter of fact, Longtin et al. 2003 and Rastle et al. 2004 (among others) found no significant statistical difference between the facilitation yielded in transparent prime-target pairs (*cleaner/clean*) with respect to what they call opaque prime-target pairs (*department/depart* or *corner/corn*), which were both significantly faster than orthographic controls (*brothel/broth*). This kind of result has been taken as evidence of a 'semantically blind' initial processing stage which is characterized by a morpho-orthographic affix-stripping procedure. In this view, all words with apparent morphological structure would be initially parsed into stem and affix, independent of their actual morphological structure (simple words like *corner* or genuinely complex words like *cleaner*). As Baayen (2014) has observed, however, these results raise a

series of concerns with respect to the materials used in the opaque condition, which comprised both pseudo-suffixed (i.e., simple words whose superficial form might be ‘decomposed’ into possible morphological components, but are in fact monomorphemic, like *corner*) and highly lexicalized words which however display a fully functional suffix (such as *fruitless* or *archer*). Moreover, the semantics of some of the stimuli used such as *fruitful* ‘successful’ is made less opaque by the fact that *fruit* has also a related figurative meaning as in ‘the fruits of one’s labors’ besides its literal meaning and cannot therefore be considered opaque to the same extent that *corner* is (Baayen 2014). The emergence of a priming effect in the opaque set, therefore, might have been due to the inclusion of this kind of prime-target pairs, which cannot be equated to pseudo-suffixed words. As a matter of fact, when pseudo-suffixed words and opaque derived words are kept apart, they seem to induce different priming patterns. This is the case in Feldman et al. 2009 who found out that morphological facilitation was significantly greater with semantically transparent morphologically related pairs (*coolant/cool*) than with opaque ones (*rampant/ramp*). Although such findings are not always replicated (for instance Beyersmann et al. 2015.), a growing body of research seems to indicate (Feldman et al. 2015, Basnight-Brown et al. 2007) that semantic properties do affect the early stages of complex words processing.

2 Our study

Given these premises, our research aims at verifying whether semantic transparency (vs. opacity) affects L2 processing of complex words or whether, given the major role played by formal aspects on L2 processing, semantics’ influence is reduced with respect to native speakers.

Looking at L2 speakers’ performance seems particularly interesting since the impact of morphological parameters on lexical organization and processing (with respect to purely formal ones) has been found out to be significantly related to vocabulary size even in the case of native speakers. Interestingly, Andrews & Lo 2013, investigating 92 university students, native speakers of English, found that morphological facilitation was significantly modulated by individual differences. Specifically, speakers with higher vocabulary knowledge obtained robust priming for transparent pairs (*worker/work*) but, crucially little priming for opaque or form pairs (*corn/corner* and *turnip/turn*). In contrast, individuals with lower vocabulary skills showed sustained priming for opaque pairs that was at least as strong as for transparently related pairs. In the same vein, Quémart et al. 2018 investigated the strength of morphological representations in French young readers (third, fifth, and seventh graders) and adults by using a lexical decision task associated with the masked priming paradigm in which targets were preceded by morphological (e.g., *tablette/table*, ‘little table/table’), pseudoderived (e.g., *baguette/bague*, ‘little stick/ring’), orthographic control (e.g., *abricot/abri*, ‘apricot/shelter’), and semantic control (e.g., *tulipe/fleur*, ‘tulip/flower’) primes. Different patterns of priming were observed across the groups: in developing readers, the processing of written morphology was triggered by the formal properties, while semantic properties were activated later in the time course of word recognition. In adults, patterns of priming were similar, except that the activation of the formal properties decreased earlier in the time course of word recognition. Therefore, French developing readers seem to process both formal and semantic properties of words when reading but show a progressive quantitative change in the development of morphological processing over the course of reading development.

In the light of these results, our study will allow to verify whether and to what extent the reliance on morphological properties during L2 processing is modulated by semantics or whether their reduced and less automatized lexical competence results in a priority for formal

aspects (as observed in the case of developing L1 readers). If the first case is verified, we expect opaque primes to induce weaker morphological facilitation with respect to transparent ones; in the second case, in contrast, we should observe the same amount of facilitation for opaque and transparent prime-target pairs.

2.1 Materials and Procedure

A masked priming experiment associated with a lexical decision task was performed with two groups of subjects: L1 adult native speakers of Italian and L2 upper intermediate and advanced learners of Italian L2. Three priming conditions were included: identity, morphological, and unrelated. 30 Italian transparent and 30 opaque evaluative derived words were selected as primes to be used in the morphological condition. For the transparent set, we selected words derived by means of evaluative suffixes having an augmentative, diminutive, or pejorative semantics. For the opaque set, we selected highly lexicalized derived words (matching the same range of suffixes used in the opaque condition) which display semantic shift or semantic bleaching (e.g. *fumo/fumetto*, ‘smoke/comics, comic strip’). Materials were matched for frequency and for length.

Conditions	Transparent set		Opaque set	
	prime	target	prime	target
Identity	Borsa ‘bag’	Borsa ‘bag’	Fumo ‘smoke’	Fumo ‘smoke’
Morphological	Borsetta ‘handbag’	Borsa ‘bag’	Fumetto ‘comics’	Fumo ‘smoke’
Unrelated	Suocera ‘mother in law’	Borsa ‘bag’	Verdura ‘vegetables’	Fumo ‘smoke’

Table 1: Experimental design

3 Preliminary Results

Preliminary results for the L1 group reveal a robust priming effect in the morphological condition for the transparent set: RTs yielded after the presentation of a morphologically related prime (*borsetta/borsa*) are significantly faster than those obtained in the Unrelated condition (*suocera/borsa*) and statistically equivalent to those obtained in the Identity condition (*borsa/borsa*). On the contrary, for the opaque set, the morphological facilitation was still significant with respect to the Unrelated condition, but interestingly, in this case, RTs in the morphological condition were significantly different also from those observed in the Identity condition. Therefore, while in the transparent set we observed, as expected according to the literature, a full priming effect, in the opaque set, only a partial priming effect emerged.

As for the L2 group, preliminary results indicate that a similar morphological effect emerges in the two sets, independently of the degree of semantic transparency of the prime-target relationship. If these results were confirmed, they would on the one hand confirm the efficacy of morphological parameters in L2 processing when transparent prime-target pairs are used. However, these findings would, on the other hand, indicate that L2 processing mechanisms, similarly to what observed with developing readers, are firstly driven by formal properties and that major reliance on formal properties reduces the effect of semantic opacity.

References

Andrews, Sally, & Steson Lo. S. 2013. Is morphological priming stronger for transparent than opaque words? It depends on individual differences in spelling and vocabulary. *Journal of Memory and Language* 68(3). 279–296.

- Baayen, Harald R. 2014. Experimental and psycholinguistic approaches to studying derivation. *Handbook of Derivational Morphology*, 95–117.
- Basnight-Brown, Dana M., Lang Chen, Shu Hua, Aleksandar Kostić & Larie Beth Feldman. 2007. Monolingual and bilingual recognition of regular and irregular English verbs: Sensitivity to form similarity varies with first language experience. *Journal of Memory and Language* 57(1). 65–80.
- Beyersmann, Elisabeth, Grainger Jonathan, Séverine Casalis, Johannes C. Ziegler. 2015. Effects of reading proficiency on embedded stem priming in primary school children. *Journal of Experimental Child Psychology* 139. 115–126.
- Diependaele, Kevin, Jonathan Grainger & Dominiek Sandra. 2012. Derivational morphology and skilled reading: An empirical overview. In M. Spivey, K. McRae & M. Joanisse (Eds.), *The Cambridge Handbook of Psycholinguistics* (pp. 311–332). Cambridge: Cambridge University Press.
- Diependaele, Kevin, Jon Adoni Duñabeitia, Joanna Morris & Emmanuel Keuleers. 2011. Fast morphological effects in first and second language word recognition. *Journal of Memory and Language* 64(4). 344–358.
- Feldman, Laurie Beth, Patrick A. O'Connor & Fermín Moscoso del Prado Martín. 2009. Early morphological processing is morphosemantic and not simply morpho-orthographic: A violation of form-then-meaning accounts of word recognition. *Psychonomic Bulletin & Review* 16(4). 684–691.
- Feldman, Laurie Beth, Petar Milin, Kit W. Cho, Fermín Moscoso del Prado Martín & Patrick O'Connor. 2015. Must analysis of meaning follow analysis of form? A time course analysis. *Frontiers in Human Neuroscience* 9, 1–19.
- Feldman, Laurie Beth, Aleksandar Kostić, Dana M. Basnight-Brown, Dusica F. Durđević & Matthew J. Pastizzo. 2010. Morphological facilitation for regular and irregular verb formations in native and non-native speakers: Little evidence for two distinct mechanisms. *Bilingualism: Language and Cognition*, 13(02), 119–135.
- Giraud, Hélène & Serena Dal Maso. 2018. Towards a constructional approach of L2 processing. In Geert E. Booij (ed.), *The Construction of Words. Advances in Construction Morphology*, 603–622. Dordrecht: Springer.
- Heyer, Vera & Harald Clahsen. 2015. Late bilinguals see a scan in scanner AND in scandal: dissecting formal overlap from morphological priming in the processing of derived words. *Bilingualism: Language and Cognition* 18(03). 543–550.
- Jacob, Gunnar, Elisabeth Fleischhauer & Harald Clahsen. 2013. Allomorphy and affixation in morphological processing: a cross-modal priming study with late bilinguals. *Bilingualism: Language and Cognition* 16(4). 924–933.
- Longtin, Catherine-Mary, Juan Segui & Pierre A. Hallé. 2003. Morphological priming without morphological relationship. *Language and Cognitive Processes* 18(3). 313–334.
- Piccinin, Sabrina. 2018. *Native and non-native processing of morphologically complex words in Italian*. PhD dissertation, University of Verona, University of Toulouse.
- Quémart, Pauline, Gonnerman Laura, Jennifer Dowling & Hélène S. Deacon. 2018. The development of morphological representations in young readers: a cross-modal priming study. *Developmental science* 18. 1–10.
- Rastle, Kathleen, Matthew H. Davis & Boris New. 2004. The broth in my brother's brothel: Morpho-orthographic segmentation in visual word recognition. *Psychonomic Bulletin & Review* 11(6). 1090–1098.