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# Morphological processing in L2 Italian: Evidence from a masked priming study

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## Introduction

The present research aims to investigate the processing of morphologically complex words in L2 Italian with an experimental psycholinguistic technique, i.e. a masked priming experiment associated with a lexical decision task. This work focuses, therefore, on the interface between derivational morphology and the lexicon in the specific setting of Second Language Acquisition. Specifically, we will investigate whether (and possibly to what extent) L2 Italian learners employ morphologically structured representations when processing complex words in real time or whether they have access to whole-word representations and directly retrieve complex words from the lexical storage. Psycholinguistic research on different languages has proved that L1 speakers are sensitive to the morphological structure of complex words during processing and that therefore morphology is a factor of lexical organization (i.e. Stanners, Neiser, Hernon & Hall, 1979; Rastle, Davis, Marslen-Wilson & Tyler, 2000; Clahsen, Sonnenstuhl & Blevins, 2003; Rastle, Davis & New, 2004; Frost, Kugler, Deutsch & Forster, 2005). From a more theoretical viewpoint, Bybee maintains that: “Words entered in the lexicon are related to other words via sets of lexical connections between identical and similar phonological and semantic features. These connections among items have the effect of yielding an internal morphological analysis of complex words” (Bybee, 1995, p. 428). In this perspective, learning a word means to create connections at morpho-lexical level with semantically and phonologically similar words, for example with items of the same morphological family (i.e. words sharing the same root, e.g. *drive/driver*, *kind/kindness* etc.) or with items of the same morphological series (i.e. words sharing the same suffix, e.g. *driver/ painter/ teacher*, *kindness/ darkness/ loneliness*). Following Bybee: “When a new morphologically complex word is learned, it forms connections with existing material on the basis of its meaning and phonological shape. The word is not physically dismembered, but its parts are nonetheless identified” (Bybee, 1988, p. 127). As we see in Bybee’s words, the use of morphologically-based

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representations during processing does not necessarily imply morphological parsing and decomposition but rather morphemic activation: “Even though words entered in the lexicon are not broken up into their constituent morphemes, their morphological structure emerges from connections that make with other words in the lexicon. Parallel sets of phonological and semantic connections, if they are repeated across multiple sets of words, constitute morphological relations” (Bybee, 1995, p. 428). On this particular aspect, but also in a more general way, the view of the lexicon - morphology interface adopted in our study is compatible with the Construction Morphology framework (Booij, 2010) and with its application to language acquisition research (Ellis, 2013). We mainly refer to the conception of the lexicon as a web of words and as a module of grammar containing a network of relationships between individual words and morphological schemas. Moreover, we also explicitly adopt a usage-based approach, in that we maintain that the functioning of language and its acquisition process is strongly based on the speaker’s experience of language usage.

### **1. Lexicon and lexical morphology in SLA: production and processing**

In the last decades, a certain amount of research has been carried out in describing the creation and development of the mental lexicon in the second language (Singleton, 1999; Nation, 2001) and in studying the organization of the bilingual lexicon (de Groot, 1992; Paradis, 2004; Pavlenko, 2009). On the contrary, empirical investigation on lexical morphology has been scarce so far in SLA, mainly because of theoretical and methodological issues. Only few specific aspects about the development of the affix knowledge have been described and discussed in a limited number of L2 languages, i.e. Lowie, 1998, 2000, 2005 (on Dutch learners of L2 English), Lardiere, 2006 (on a speaker of Mandarin Chinese learning L2 English), Petrush, 2008 (on an English learner of L2 French), Mochizuki & Aizawa, 2000 (on Japanese learners of L2 English). These works mostly focus on speech production, using naturalistic or elicited data; consequently they are all based on *off-line* data and do not consider the automatic processes involved in real-time language processing, although it is generally acknowledged that acquiring a L2 presupposes the ability to analyze and process the linguistic input in appropriate ways.

Only recently, empirical investigation has looked at the *on-line* processing of morphologically complex words, mainly using the psycholinguistic technique of masked priming (Forster & Davis, 1984). As we also used this paradigm for our study, we will briefly describe its assumptions and procedure, referring specifically to the research on lexical morphology. The priming paradigm consists in an initial presentation on a computer screen of a visual mask (usually a string of hash marks), replaced by a first stimulus (i.e., the ‘prime’) which appears very

briefly<sup>2</sup> and which is immediately replaced by a second visual stimulus (i.e., the ‘target’). The target remains on the screen until the participants decide, by pressing a button, whether the sequence of letters they are exposed to is a word of the L2 or not (i.e., a lexical decision task). Response latencies and errors are recorded for each target. The target word to be recognized is preceded by a prime, which can be related to the target in different ways, determining different priming conditions: (i) identical (i.e. *kind/kind*; *humid/humid*), (ii) morphologically related (i.e., *kindness/kind*; *humidity/humid*), (iii) and orthographically related (i.e., *humanity-humid*). An unrelated priming condition (i.e. *raw/kind*; *loud/humid*) is systematically created to stand as a baseline for estimating the different priming effects. The priming paradigm is based on the assumption that the prior presentation of a related stimulus pre-activates the representation of the target item, whose recognition is thus facilitated. With native speakers, the presentation of a suffixed word before its base yields recognition times which are similar to the identity condition or, in any case, significantly faster than the unrelated condition (for Italian, i.e., Burani & Laudanna, 1988 and Laudanna, Badecker & Caramazza, 1992). Moreover, morphological priming effects have been demonstrated to be significantly different from orthographic priming effects suggesting that this facilitation cannot be explained in terms of a mere formal overlap between the prime and the target (e.g. Grainger, Colé & Segui, 1991).

The first study to investigate the processing of morphologically complex words in L2 learners by means of this experimental design is Silva & Clahsen (2008). Specifically, in experiment 3 and 4, they considered the processing of desadjectival nominalizations with *-ness* (i.e. *kindness*, *bitterness*) and *-ity* (i.e. *hostility*, *humidity*) in two different groups of advanced adult learners of L2 English, Chinese and German speakers, and in a control group of adult native speakers of English (here, we will not consider experiments 1 and 2 on inflectional morphology, which are discussed by Voga, Anastassiadis-Symeonidis & Giraud, this volume). Silva & Clahsen’s results revealed that the derivational word forms, both with *-ity* and with *-ness*, yielded a significant priming effect in L2 learners, although not the full priming effect seen in native speakers. According to the authors, this can be defined as a *partial* priming, i.e. response times values for the test condition are not equivalent to the times obtained in the identity condition, but are nonetheless quicker than the response time recorded in the unrelated condition. Silva & Clahsen conclude that “also L2 learners employ morphologically structured representations for derived word forms during processing, albeit less efficiently than native speakers” (Silva & Clahsen, 2008, p.

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<sup>2</sup> The prime duration is < 60 ms, a duration which makes the prime virtually invisible for the subjects. Consequently, they are not aware of the prime, they cannot make use of any memory strategy or metalinguistic reasoning while processing the target stimulus (see Forster, 1999).

36). The ‘partial’ priming effects for derived words, together with the absence of any priming effects obtained with inflected forms (Exp.1 and 2), have been interpreted by the authors as main clue for existence of a substantial difference between native and non-native processing of morphology. They argued that adult L2 learners are less sensitive to morphological structure than native speakers and rely more on lexical storage than on morphological parsing during processing. These results are compatible with Ullmann’s model: non-native speakers’ problems with morphology are attributed to a reduced access to procedural memory and to a corresponding overreliance on declarative memory. In other terms, instead of computationally process complex words and access them through stems and affixes as native speakers do, L2 learners would rely more on declarative memory and access the whole forms listed in the lexicon. However, the conclusions derived from Silva & Clahsen results need however to be considered with caution. Firstly, the “partial” priming effects they obtained in Exp. 3 and 4 with L2 groups are about 87 ms of facilitation relative to the unrelated baselines (97ms, 52ms, 115ms and 83ms respectively). These facilitation effects are far from being negligible even if they are significantly smaller than the ones observed in the identity conditions. In monolinguals, the morphological effects obtained with suffixed words usually produce facilitation effects around 25-30ms and most of the time they are smaller than the identity effects, as far as derivation is concerned. Consequently, regarding the results of the literature on monolinguals, the effects obtained by Silva & Clahsen 2008 should be considered as strong morphological effects. Secondly, we unexpectedly observe that in all the experiments the identity priming effects are systematically weaker in the L1 group than in the L2 group. Moreover, it is also surprising to see that in Experiments 3 and 4, the morphological effect in L1 is around 50ms (44ms and 55ms, respectively) and therefore far from the 87ms of facilitation seen with L2 groups in the same conditions.

The results obtained by Silva & Clahsen (2008) have been replicated, with some slight modifications, by Rehak & Juffs (2011) with advanced and proficient Spanish and Mandarin Chinese learners of L2 English. Results indicate that the L2 learners do not yield any priming effects with the derivational affixes tested. Specifically, for the derivational suffix *-ness*, the authors obtained no priming effects for either group: “like the Spanish L2 group, the Mandarin Chinese L2 group also showed no priming effect for the derivational affix *-ness*” (Rehak & Juffs, 2011, p. 133). There was no priming effect with *-ity* either. However, Rehak & Juffs observe different mean reaction times for the two groups with the suffix *-ity*, with the native Spanish performing more like the English speakers than the Mandarin Chinese speakers. According to the authors, these data suggest that L1 Spanish learners transfer morphological processing mechanisms from their native

language while processing the English words primed with *-ity* because of its (formal and semantic) similarity with the Spanish suffix *-idad*. This seems an important point because, if confirmed, it would contradict Silva & Clahsen claim that the learners' L1 does not influence L2 word processing.

Rehak & Juffs' results need however to be observed with caution for several reasons. Firstly, in the Experiment 2 on *-ness*, no identity effect was obtained with the Spanish L2 group (699ms for the Identity condition and 687ms in Unrelated condition). This result is quite surprising given the robustness of repetition priming described in the literature, which shows that this effect is obtained even with non-words (see Experiments 2a and 3 in Bodner & Masson, 1997). Results with non-words suggest that these primes can operate at a non-lexical level (i.e. when they are not lexically represented) and therefore that repetition effects do not depend entirely on the lexicality of the primes. Moreover, in Experiment 3 on derivation with *-ity*, English native speakers performed better in the Test condition than in the Identity condition. This is again in contradiction with the literature on morphological priming with natives, which has unequivocally established that both inflected and derived primes produce facilitation on target recognition relative to the unrelated condition. On the other hand, the Mandarin Chinese L2 group, despite their advanced performances in English (their MTELP score was 86.73 in average), presented very long decision latencies and high percentages of errors in all the three priming conditions (around 1000 ms and 16%). These data are unusual, given the fact that the targets were short morphologically simple words having a relatively high surface frequency. Again, these results are difficult to evaluate in the experimental design described.

To sum up, Silva & Clahsen's results indicate a clear priming effect for non-native speakers, but the authors interpreted it as partial priming effect and in the overall discussion they argue for a limited morphological effect on L2 processing. On the other hand, no priming effect has been yielded by Rehak & Juff (2011), however, they found an effect of the L1 on processing, which indeed implies a morphological representation of the word. In the light of the non-univocal results just described and discussed, it is evident that hypotheses on non-native processing need to be verified with different L2 and possibly also with a wider range of suffixes. In this perspective, we carried out a first psycholinguistic experiment on L2 Italian.

## **2. The present study**

Following Silva & Clahsen (2008), in the present research, we investigated the processing of quality nouns, but we focused on L2 Italian. Specifically, we considered desadjectival nominalizations in *-ità* (e.g. *velocità* < *veloce*) and in –

*ezza* (e.g. *bellezza* < *bello*), the two basic suffixes for this kind of nouns, both in terms of numerosity and productivity (Rainer 2004). The two selected suffixes, however, differ as for their quantitative characteristics. More precisely, the numerosity of *-ità* is higher than *-ezza*, both in the lexicography (according to the GRADIT dictionary, De Mauro 2000) and in corpora (according to the COLFIS database, Bertinetto et al., 2005). Moreover, *-ità* is also clearly more frequent than *-ezza*, according to the COLFIS corpus (13278 vs 1916 occ./million). Finally, the suffix *-ità* is the most productive as well (693 vs. 188), if we consider the number of neologisms with the two suffixes (Rainer, 2004).

## 2.1. Method

2.1.1. Participants. Twenty two advanced learners of L2 Italian (from different L1) were recruited for the present experiment. They were all students at the University of Verona or at the Conservatory of Music of Vicenza, their mean age was 27,36. As attending an institutional course at the University or at the Conservatory, the proficiency of the participants had been assessed according to the Common European Framework of Reference and all of the subjects were upper intermediate (B2) or Advanced learner (C2).

A group of twenty two Italian native speakers, with high-school or university education (mean age: 25,39), was recruited as a control group.

2.1.2. Stimuli and design. For the critical materials, we selected 80 pairs of morphologically related primes and targets, 40 primes with the suffix *-ità* and 40 primes with the suffix *-ezza*. Because we wanted to have only semantically and phonologically/orthographically transparent pairs, we eliminated from our materials all cases of allomorphy (e.g. it. *giovane* > *giovinezza*, *nuovo* > *novità*, *degnò* > *dignità*) and all cases of phonetic processes due to suffixation (most of all cases of palatalization of the velar consonant before a palatal vowel): i.e. [k] > [tʃ], e.g. *etico* > *eticità*, *cieco* > *cecità*, *unico* > *unicità*. Cases of potential opacity in meaning have also been excluded; consequently, items like it. *fattezza*, *comunità*, *unità*, *pubblicità*, *biodiversità*, although presenting one of the suffix selected, have not been included. Finally, cases where more than one suffix was possible with the same root were also excluded, e.g. *vecchiezza* / *vecchiaia* (< *vecchio*), *allegrezza* / *allegria* (< *allegro*), *gravezza* / *gravità* (< *grave*) which could be a confusing factor for our subjects, although the derivative forms have very different frequencies. Prime words were matched as closely as possible for word length. Specifically the root forms length was of three syllables maximum. As a matter of fact, we did not want to present words with very different size, like *spregiudicatezza* (6 syllables) and *altezza* (3 syllables) or *incostituzionalità* (8 syllables) and *verità* (3 syllables). We also avoided base-derived pairs presenting

graphic variation, i.e. *fresco* > *freschezza*, *franco* > *franchezza*. Moreover, the selection of root forms with a length of no more than three syllables also helps to avoid morphologically complex bases (i.e. bases containing a derivational affix or compound). With respect to Silva & Clahsen 2008, however, we introduced an additional condition relative to the frequency of the primes. In our materials, the 40 suffixed primes in *-ità* were divided in frequency groups, 20 suffixed primes having a high surface frequency (112.5 occ./million in average according to the COLFIS database) and 20 suffixed primes having a low surface frequency (7.7 occ./million in average). This was the same for the other 40 suffixed primes ending in *-ezza* (their respective surface frequencies were 100.4 and 6.35 occ./million in average).

Morphological priming effects (e.g., *velocità-veloce* 'speed'-'fast') were controlled using three comparative conditions: an Identity condition in which the prime corresponded to the target (e.g., *veloce-veloce* 'fast'-'fast'), an Unrelated condition (e.g., *dietro-veloce* 'back'-'fast') standing as the baseline condition in which no priming effect is expected and an Orthographic condition (e.g., *velato-veloce* 'veiled'-'fast') in which the prime is formally, but neither semantically nor morphologically, related to the target<sup>3</sup>. This last condition ensures that the morphological priming effect does not result from purely formal overlaps within prime-target pairs but is due to a genuine morphological relationship between the prime and the target (as recommended by Grainger et al., 1991).

80 non-word targets constructed according the phonotactic rules of Italian, were included in the experiment for the purpose of the lexical decision task. Nonwords were primed at the same experimental conditions, i.e. *dalce-dalce* (Identity), *dalcità - dalce* (Morphological), *delcio - dale* (Orthographic), *bisma - dalce* (Unrelated).

Four experimental lists were constructed each containing 160 word and nonword pairs (in order to present each target only once a Latin square was used). Consequently, in the test condition, all the participants were exposed to the 80 word targets primed by the two types of suffix (*-ità* and *-ezza*) by two types of surface frequency primes (high and low frequency) and controlled by the three comparative conditions (Identity, Orthographic and Unrelated) and to their matched 80 nonword pairs.

2.1.3. Procedure and apparatus. The experiment was conducted on a PC computer using the DMDX software (Forster & Forster, 2003). Each trial consisted of three

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<sup>3</sup> Although for the orthographic control, we selected words which were as similar as possible to the primes, the degree of overlapping may vary in the prime-target pairs in the Orthographic control condition.



visual events. The first was a forward mask consisting of a row of hash marks that appeared for 500ms. The mask was immediately followed by the prime. The prime (presented during 50ms) was in turn immediately followed by the target word which remained on the screen until participants responded. The participants were requested to make lexical decisions (“is it a word ? Yes/No”) on the targets. A lexical test was carried out after the experiment in order to verify the competence of the learners, morphological effects occurring only if the speakers have a certain familiarity with the lexical items investigated. Results for the lexical test show an error rate of 7%.

## 2.2. Results

Correct response times (RTs) were averaged across participants after excluding outliers (RTs >1300ms, 1.77% of the data). ANOVA analyses were performed on RTs and percentage of errors according to three main factors: prime type (Identical, Test, Orthographic, Unrelated), suffix type (*-ità* and *-ezza*) and prime frequency (High Surface Frequency vs. Low Surface Frequency targets). Results for learners and native speakers of Italian are presented in Table 1 and 2. Three L2 participants were excluded from the analysis because of their high percentage of errors (i.e., >30%). List was included as a between-participant factor in order to extract any variance associated with this variable. As a Latin Square design was used in the present experiment, we did not performed separate subject and item analyses but only a *F1* statistic test (see Raaijmakers et al., 1999).

**Table 1: Mean RTs and percentage of errors in parentheses for learners of Italian L2**

		High SF primes		Low SF primes	
		<i>-ità</i>	<i>-ezza</i>	<i>-ità</i>	<i>-ezza</i>
	Identity	723 (3.1)	706 (0.0)	773 (3.2)	768 (7.3)
	Morphologic	746 (1.0)	741 (1.0)	830 (1.0)	836 (4.2)
	Orthographic	808 (1.0)	750 (1.0)	842 (3.2)	852 (8.4)
	Unrelated	785 (1.0)	759 (2.1)	859 (5.2)	834 (8.1)
Net priming effects	U-I	+62*	+53*	+86*	+66*
	U-M	+39*	+18	+29(t)	+2
	O-M	+54*	+9	+12	+16

\*:  $p < .05$ ; t:  $.05 < p < .10$

For learners of L2 Italian the two main factors, prime type and prime frequency, were significant ( $F(1,18) = 33.67$ ,  $p < .0001$  and  $F(3,54) = 13.36$ ,  $p < .0001$ , respectively). The suffix type factor did not reach significance ( $F(1,18) = 1.92$ ,  $p > .10$ ) but interacts with prime frequency ( $F(1,18) = 4.69$ ,  $p < .05$ ).

Planned comparisons revealed indeed a morphological priming effect restricted to high frequency primes ending in *-ità*. In fact, only this effect differed significantly from both the Orthographic and Unrelated control condition. Moreover, our results reveal that this morphological condition did not differ significantly from the Identity condition. Low surface frequency primes ending in *-ità* also produced facilitation (+29 ms), but this effect only reaches a tendency relative to the Unrelated condition and does not differ from the Orthographic condition.

**Table 2: Mean RTs and percentage of errors in parentheses for Italian native speakers**

		High SF primes		Low SF primes	
		<i>-ità</i>	<i>-ezza</i>	<i>-ità</i>	<i>-ezza</i>
	Identity	611 (0.0)	583 (0.0)	619 (2.1)	625 (0.0)
	Morphologic	625 (1.0)	627 (1.0)	652 (1.0)	651 (1.0)
	Orthographic	654 (1.0)	655 (1.0)	697 (1.0)	674 (1.0)
	Unrelated	686 (0.0)	664 (1.0)	702 (0.0)	701 (2.1)
Net priming effects	U-I	+75*	+81*	+83*	+76*
	U-M	+61*	+37*	+50*	+50*
	O-M	+29*	+28*	+45*	+23*

\*:  $p < .05$

For Italian native speakers, the effect of the three main factors was significant (type of suffix:  $F(1,18) = 5.91$ ,  $p < .025$ ; prime frequency:  $F(1,18) = 20.59$ ,  $p < .001$ ; type of prime:  $F(3,54) = 9.45$ ,  $p < .0001$ ). As it is usually found through the literature, morphologically related primes facilitated target processing and these effects all differ from orthographic controls (all  $p_s < .05$ ), suggesting that they did not result from the orthographic overlap between the morphologically related prime-target pairs only.

In the RT analysis for non-word targets there was no main effect of prime type or interaction (all  $F1 < 1$ ). There were no significant effects in the error analysis neither for word nor for non-word targets.

### 3. Discussion of results

The present study aimed to determine whether L2 learners access morphologically complex items through computation and consequently through morphemic activation, as L1 subjects, or whether they rather rely on a full-form storage and retrieval. Our results reveal morphological priming effects emerging for words ending with the productive suffix *-ità* and having a high surface frequency in Italian. Therefore, our data seem to indicate that morphology does indeed play a

role in processing L2 Italian, at least for very frequent words. For less frequent words ending in *-ità*, we obtained a tendency to facilitation that reduced the recognition latencies of the targets (-29 ms relative to the unrelated primes). As a tendency to signification can be explained in terms of a too large inter-individual variability, which is not surprising in learners even if they are correctly matched in terms of language proficiency, this result could suggest that these suffixed words are connected with their base within the lexicon for some of the learners among our participants.

As expected, for native speakers significant morphologically priming effects were obtained for high and low surface frequency words, ending in both *-ità* and *-ezza*. Moreover, the use of an orthographic control condition ensures that these priming effects cannot be attributed to the formal similarity of prime-target pairs. The introduction in our experimental design of quantitative variables (i.e. frequency and productivity) sheds light on Silva & Clahsen's data. We found that learners are indeed sensitive to morphology when processing complex words, but this is restricted to words having a high surface frequency and presenting a very productive suffix. This suggests, in our opinion, that the difference between native and non-native processing could be interpreted more as a matter of different degrees of language proficiency, rather than as a matter of 'substantial differences' in processing mechanisms, as Silva & Clahsen (2008) proposed. Moreover, the introduction of the orthographic control condition allows us to claim that when facilitation emerges, this cannot be attributed to the formal similarity of prime-target pairs, but genuinely to their morphological relationships. Consequently, morphological priming effects have to be examined relative to an Orthographic condition rather than to an Unrelated condition.

#### **4. A general discussion on L2 processing of derived words**

As far as derivational morphology is concerned, our results are globally in line with the previous ones described by Silva & Clahsen (2008) who systematically observed morphological priming effects in L2 English groups with heterogeneous L1 backgrounds (Chinese and German). These masked priming effects have been replicated also by Diependaele, Duñabeitia, Morris and Keuleers (2011) in L2 English; on the contrary Clahsen & Neubauer (2010) did not observe any morphological priming in L2 German with Polish L1 learners. Recently, Kirkici & Clahsen (2013) compared the early automatic processes involved in the recognition of inflected and derived words in L1 and L2 Turkish. They found significant priming effects for both inflected and derived primes in L1, but for L2 a significant priming effect was observed only for derived primes (while no priming was found for inflected forms). Taken together, these findings encouraged the authors to conclude "that L1 and L2 processing of morphologically complex words differ in subtle rather than in superficial or obvious ways. It is not the case that L1 and L2 processing are alike except for L2 processing being slower and

affected by L1 transfer, or that morphology is generally difficult for L2 learners” (Kirkici & Clahsen, 2013, p. 787). Kirkici & Clahsen argue that the full decompositional hypothesis formulated by many authors for native speakers (see Rastle & Davis, 2008 for a review), stating that an early automatic morphological parsing mechanism operates on decomposable words, would predict equivalent priming effects for both inflected and derived primes. As the results they obtained visibly contradict this prediction, Kirkici & Clahsen (2013) proposed to interpret the differences between the processing of inflected and derived forms in the L2 in terms of “different underlying mechanisms”. Clearly, at present it is not possible to wholly clarify the role of morphological information in L2, as we cannot determine where the *locus* of morphology is within the L2 lexicon: does it play a role within the access ways to the lexicon or rather within the organization of the lexicon, structuring word representations in terms of morphological families and series?

Certainly, our data clarify two aspects on morphological processing of derived words in L2, i.e., morphological processing: (1) strongly depends on the surface frequency of the manipulated words and (2) seems to be restricted to productive suffixes. These two claims lead us to hypothesize that, apart from the level of language proficiency, morphological processing is also influenced by language use in terms of statistical occurrence. Consequently, we propose that, similarly to L1 processing, morphological information is progressively coded in long-term memory by virtue of the meaning and formal overlaps between morphologically related words. However, this does not necessarily mean that forms are accessed through decomposition. Numerous studies have indeed demonstrated that even when a decomposition process cannot be applied, strong morphological priming effects are obtained (for example in the case of irregular inflection i.e., *bought* cannot not be split into *b-* and *-ought* to access its base *buy*). Since we observed a significant effect of surface frequency determining morphological priming effects relative to both Orthographic and Unrelated controls (significant only when primes had a high surface frequency), we suggest that no pre-lexical decomposition mechanism operated in L2 processing confirming in a way what Kirkici & Clahsen (2013) claimed: “advanced L2 learners’ lexical representations of morphologically complex words are identical to those of L1 speakers, but that (unlike in the L1) L2 processing does not make use of morphological decomposition” (p.787). This claim is of course based on the assumption that L1 mental lexicon actually integrates an obligatory pre-lexical phase of morphological decomposition. This view is not shared by all the psycholinguists, some of them postulate, on the contrary, that lexical access operates on whole word activation and that morphology organizes the lexicon in terms of morphological families (e.g., Feldman, Kostic, Gvozdenovic, O’Connor and Moscoso del Prado Martin, 2012; Feldman, O’Connor and Moscoso del Prado Martin, 2009; Pastizzo & Feldman, 2002). It is true that for some authors

orthographic priming effects are comparable to morphological ones (e.g., *corner* would prime *corn* as much as *darkness* primes *dark*) and that orthographic and morphological processing ultimately coincide (see Rastle & Davis, 2008). However, this assumption completely empties the morphology of its linguistic function and consequently one might wonder if it is worth to include morphology in the mental lexicon.

On the contrary, if one assumes that morphology is present within the lexicon, one has to acknowledge a more central role of organization among morphologically related words. Our data on derivation suggest that similarly to native speakers, L2 learners are sensitive to morphological information, but they integrate it progressively through L2 learning. Consequently, in our view, L1 and L2 processing do not differ in terms underlying processes and more specifically not as far as morphological decomposition is concerned. They would rather differ on the degree to which lexical representations are organized morphologically at a given point of the learning process of the L2 and at a given level of language proficiency. However, in order to further clarify the role of frequency and productivity in L2 processing, other aspects need to be taken into consideration in future research. Firstly, the base / derived word frequency ratio and their relative degree of entrenchment (as discussed in Giraud & Dal Maso, 2014) as it is acknowledged the probability for a morphologically complex word to be accessed by whole-word retrieval, or by the processing of its morphological components strongly depends on their relative frequencies (Beauvillain, 1996; Burani & Caramazza, 1987; Colé, Beauvillain & Segui, 1989; Burani & Thornton, 2003). Secondly, the degree of morphotactic transparency of the suffixes can provide interesting hints about the probability of morphological processing. In the case examined here (*-ità* and *-ezza*), for instance, the fact that *-ità* frequently combines with other productive suffixes (like *-ale* or *-bile*), can make it more transparent than *-ezza*. More generally, a count of the relative number of transparent vs. non transparent words which are constructed with a certain suffix should be verified. Finally, the group of subjects on which our experiment has been carried out is quite heterogeneous, as for their L1 are concerned and no hypothesis on language transfer has been examined here. Undoubtedly, different groups of participants, with homogenous L1, would provide more information on how it is that their L1 influence morphological competence and processing mechanisms in the L2.

### **Conclusion**

The present study aimed to examine L2 morphological processing for derivations while manipulating the surface frequency of the primes and the productivity of the derived suffixes. The results showed that as far as L2 learners were concerned morphological priming effects depends on these two factors. We interpreted these data as evidence for a morphological sensitivity in L2 processing suggesting that

both L1 and L2 are organized according to morphological principles. In line with other authors who explored morphological processing in L1 and assigned a central rather than a pre-lexical role to morphology, we believe that the observed differences between L1 and L2 processing do not come from different underlying processes or from different patterns of representations. The present results, showing that in L2 morphological processing is restricted to frequent words and to the most productive suffixes (e.g., *-ità* in Italian), lead us to consider the L2 lexicon as a dynamic system coding morphological information through language learning. Like in L1, central morphological representations emerge and strengthen according to language use. In order to shed light on this hypothesis, more investigations on the effect of the (perceptive) saliency on word processing and representation needs to be carried out.

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### **Abstract**

The present paper explores the processing of morphologically complex words in L2 Italian by means of an experimental psycholinguistic technique, i.e. a masked priming experiment associated with a lexical decision task. More specifically, we manipulated desadjectival nominalizations in *-ità* (e.g. *velocità* < *veloce*) and in *-ezza* (e.g. *bellezza* < *bello*), that differ in terms of numerosity, productivity (Rainer 2004) and on surface frequency (according to the COLFIS database). Morphological priming effects were evaluated relative to both orthographic and identity conditions and the data revealed significant morphological priming effects emerging for words ending with the most productive suffix (*-ità*) and having a high surface frequency in Italian. Our data on derivation suggest that similarly to native speakers, L2 learners are sensitive to morphological information, but they integrate it progressively through L2 learning process.

**Keywords:** second language acquisition, morphological processing, masked priming, word recognition.

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