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What distinguishes stem allomorphy? A masked priming study with French stimuli.

Since Rumelhart & McClelland (1986) first presented their connectionist model of the English past tense system, the question of the nature of morphological representation has divided psycholinguists. This is a central question in the debates on the nature of cognition, since it concerns the understanding of how the lexicon is organized in terms of structural units, and how these units interact with each other during lexical access. One of the important controversies in this domain is about the description of the core units of the lexicon, namely the *morpheme versus lexeme* problem. Regarding the later, as Aronoff pointed out (1994), it is better to speak of *lexeme-based morphology*, because the term “*word-based*” has led to the misunderstanding that the concrete form of a word might be the basis of morphological operations. However, it is often an abstract stem form of a lexeme, which does never surface as a concrete word form, that constitutes the basis for morphology, and hence, the term “*lexeme-based*” is more appropriate. This lexeme-based view of morphology is shared by many morphologists (Bybee, 1988; Booij, 2002): morphology is not the “*syntax of morphemes*” but the extension of patterns of existing systematic form-meaning correspondences between words.

Aronoff (1994) and Stump (2001) have shown that stems in inflectional morphology are morphomic; a morphomic stem is that part of a word to which inflectional material is added and has no meaning of its own. This view is not easily defensible for allomorphic stems, especially so under the light of psycholinguistic data showing that morphological processing is not an “*all or none*” phenomenon, but that different levels of semantic, orthographic or phonological similarity induce graded effects of morphological facilitation (at least as far as the priming technique is concerned). For example, Rueckl, Mikolinski, Raveh, Miner & Mars, (1997, see also Plaut & Gonnerman, 2000) put forward evidence of graded effects among irregular inflections (e.g., *make-made primes better than take-took*). In the same vein, Pastizzo & Feldman find graded effects within a masked priming procedure where morphological effects are estimated relatively to an orthographic control (ex. *hatch – HATCHED > fall – FELL > teach – TAUGHT*). Graded effects do not necessarily mean that there is no morphology in the lexicon, nevertheless they are often taken as evidence that there is no explicit morphological level: morphology is thus diluted into formal and semantic properties of lexical units.

The experiments we present here aim to show that, in a view where the distinction between regularity and irregularity has no psychological reality (for Greek: Tsapkini, Jarema & Kehayia, 2000; Voga & Grainger, 2004; for English: Pastizzo & Feldman, 2002) the differences in effect amplitude between allomorphic and non allomorphic inflections should be attributed to the circumstances under which these effects are traditionally measured, rather than to the organisation of the inflectional paradigm, the existence or inexistence of several stems within the same lexeme or the morphomic nature of allomorphic stems, at least as far as masked priming is concerned.

One of the difficulties of the study of morphology for alphabetic languages – in which the vast majority of research is conducted – is that not only morphology is correlated with semantic, orthographic and phonological factors, but also that stems and inflected words exist also as free word-forms, entertaining with each other different relations. Giraud & Grainger (2001) proposed a supra-lexical approach of morphological processing, in which abstract morphemic representations (in the sense of Aronoff, 1994) receive activation from whole-word form representations, in such a way that word recognition enables the activation of the morphological level, and not the contrary. The key notion here is lexical competition, central for interactive activation models (e.g. McClelland & Rumelhart, 1981), meaning that the presentation of the stimulus at the entry of the cognitive system (i.e. prime) will produce multiple activations, namely activation of all lexical entries that share formal characteristics with the prime. These multiple representations enter into a competition phase, and identification is achieved when a single word exceeds a given threshold becoming more active than its competitors. The central assumption of this model is that if lexical competition processes affect strongly the identification system, they should also have an impact on morphological effects.

The first experiment replicates the classic regularity effect: regular inflections of French verbs prime their infinitive form targets, whereas allomorphic inflections fail to prime the infinitive forms (ex. *pouvons* primes *pouvoir* whereas *pu* does not). In the second experiment, this classic advantage of non allomorphic over allomorphic inflections is reversed, by modifying the relative frequencies between

primes and targets. In fact, in the first experiment, the target is the infinitive form of the verb, which is the member of the paradigm that has the most elevated residual activation (due to its elevated frequency), and thus, the lowest activation threshold. In the second experiment, targets are no longer the easiest to activate paradigm member, but another inflection, which because of its low frequency, has a higher activation threshold. At the same time, the allomorphic inflections used in the second experiment as primes are rather frequent ones, in any case much more frequent than 2nd plural inflections targets. We obtain thus a reversed “regularity effect” that is a frequent allomorphic prime like *pu* primes its target (*pouvez*) whereas non allomorphic, less frequent inflections do not (*pouvons* fails to prime *pouvez*).

Of course, this kind of results is difficult to insert into a morpheme based approach, even a dual-route one, because there are no reason for the direct (regular) road not to operate when the target is no more the most frequent member. After a quick review of the literature we will show that much of the evidence in favour of the morpheme based account is due to the neglected role of lexical frequency effects in inflectional priming.

Nevertheless, of more interest is what these results imply for a lexeme-based approach. We argue that these results should be viewed as evidence that allomorphic (as well as non allomorphic) inflections are represented within the same lexeme, as word units whose lexical characteristics (like surface frequency) influence processing.

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