The Morpheme Gender Effect: An Evidence for Decomposition

Fanny Meunier (fanny.meunier@univ-lyon2.fr)
Laboratoire Dynamique du Langage
Institut des Sciences de l'Homme
14 avenue Berthelot, 69 363 Lyon Cedex 07
FRANCE

Alix Seigneuric (alix.seigneuric@u-bourgogne.fr)
Université de Bourgogne, UFR Sciences Humaines
Pôle AAFE Esplanade Erasme, BP 26513, 21065 Dijon Cedex
FRANCE

Elsa Spinelli (elsa.spinelli@upmf-grenoble.fr)
Université Pierre Mendès France
Laboratoire de Psychologie et NeuroCognition
BP 48, 38040 Grenoble Cedex 9
FRANCE

Abstract

In three experiments we tested the decomposition for morphologically complex words in French. Subjects were asked to perform a gender decision task on morphologically complex words that were either of the same gender as their stem or not. We found that the gender of morphologically complex words made from a stem with an opposite gender is more slowly retrieved compared to a condition where the gender of the stem matches that of the derived noun. Similar results are observed for words that are pseudo-morphologically complex while no effect is observed for non morphological embedded words. Such results favour a decompositional hypothesis postulating that recognition of words that are morphologically complex or look like it, is achieved through the activation of the stem.

Keywords: Lexical access; morphology; grammatical gender.

Introduction

The purpose of this study is to provide information about the lexical representation of morphologically complex nouns in French by using a gender decision task. In these experiments, the decompositional hypothesis of morphologically complex nouns is tested by exploring the gender assignment of derivationally suffixed French nouns whose stems have a gender opposite to that of the noun.

The way morphologically complex words are stored and accessed has been widely studied. Many models have been proposed, which make claims about the processing of complex words and the kind of representation that is accessed. To a large extent, such models are located between two extreme positions: the left-to-right processing associated with a global word representation (Butterworth, 1983; Manelis & Tharp, 1977), and the prelexical decomposition associated with a morpheme-decomposed representation (Taft & Forster, 1975). According to the original formulation of this latter hypothesis, stems are extracted from derived words before the words are identified. In this model derived words do not have their own lexical entry. The lexical access of words belonging to the same morphological family is made via the stem. In more recent formulations of the decomposition model (e.g., Taft, 1994), morphemes are represented as units within a hierarchical activation system and are activated whenever congruent orthographic information is contained within the letter-string. Activation within the morpheme units is then passed on to units representing the whole morphological complex word. In this way, a complex word is not actively decomposed prior to lexical access, yet that word is always accessed via activation of its morphemes. There is obligatory decomposition but passively achieved. Many researchers have proposed some compromise between these two extremes views. Some have suggested decomposition processing and/or representation only for particular complex words such as frequent words (Bybee, 1985; Schreuder & Baayen, 1995) or semantically transparent words (Marslen-Wilson, Tyler, Waksler, & Older, 1994). Others have proposed two competing routes with a race between them (Caramazza, Miceli, Silveri, & Laudanna, 1985; Frauenfelder & Schreuder, 1992).

Most studies investigating the lexical representation of morphologically complex words used the priming procedure. In line with the decompositional hypothesis these researches have shown, for example, that the prior presentation of a morphological complex word (e.g., *undo*) facilitates the subsequent processing of its root component (e.g., *do*). This effect is considered as reflecting repeated accesses to the same lexical representation and therefore has been attributed to the implementation of a procedure of decomposition of the derived word into the morphemic constituents of affix and stem (Marslen-Wilson et al., 1994). However, the priming effect is still an indirect evidence of decomposition. It could be argued that to some extent, morphological decomposition occurs because of the priming

paradigm itself, or that priming effect is only reflecting links between morphologically related words but not decomposition *per se*.

In contrast to the voluminous literature reporting experiments using the priming paradigm, the literature reporting simple presentation of items is sparse. An approach used by Taft and colleagues consists of using pseudowords and manipulating the status of the units used to create these pseudowords. For example Taft, Hambly, and Kinoshita (1986) carried out a lexical decision experiment using four types of pseudowords. Each type resulted from the concatenation of a real or false prefix (*de* or *te*) with a real or false stem (*joice* or *jouse*). Following the decomposition hypothesis, response times (RTs) for pseudowords should be longer for pseudowords made of real morphemes such as *dejoice* (real prefix + real stem) as this type of item should be decomposed and the lexical entry corresponding to the stem activated. This should not be the case for pseudowords starting with a false prefix such as *tejoice* (false prefix + real stem) or *tejouse* (false prefix + false stem) as decomposition would not be engaged and the status of the second unit of the pseudoword would not matter in this case. Indeed Taft et al. observed that lexical decision times were faster for items starting with a false prefix than for those starting with a real one. Moreover the status of the second unit of the pseudoword was taken into account only when decomposition was engaged. However, as mentioned by Henderson (1985), processes observed with pseudowords may not reflect those applying to words. It could be that decomposition processes arise after the failure of the item identification as a word. Reaction times observed in lexical decision are indeed much longer for pseudowords than for real words, suggesting the presence of post checking stages that are not involved in the processing of real words. These additional stages could interfere with critical effects and lead to erroneous conclusions about word processing and representation.

Another way of testing the decompositional hypothesis is to examine the role of specific parameters related to the morphemic components or to the whole word form. Some researchers used frequency cues. For a complex word two types of frequency estimates are relevant, surface frequency and cumulative frequency. The former refers to the word's frequency of occurrence in language as a free lexical item (e.g., the word *fleuriste* 'florist'). The latter refers to the sum of the frequency of the root plus all its affixed forms (*fleuriste* 'florist' + *fleur* 'flower' + *fleurir* 'to flower' + *floral* 'floral' + *déflorer* 'to deflower' + *refleurir* 'to flower again'...). Several authors have shown that the recognition time for polymorphemic words is generally sensitive to both surface frequency and cumulative frequency (e.g., Colé, Beauvillain & Segui, 1989; Meunier & Segui, 1999). The presence of a cumulative frequency for derived suffixed words has been taken as an evidence of decomposition, showing that access to their lexical representations takes place via the representation of the root which is sensitive to frequency of use. However an unresolved issue about frequency effects is how and when exactly these effects occur. In the experiments presented in this paper we used another property of morpheme: morpheme gender.

French is a language in which nouns are classified into two genders: each noun is either feminine (such as *lune*– 'moon') or masculine (such as *soleil*-'sun'). Gender systems are language-specific. For example in English it is restrained to animate nouns as revealed in phenomena such as anaphoric pronouns. Gender has never been used to look for morphological decomposition and in fact is not widely explored. However in languages where a gender grammatical system exits, such as French, it could provide a fruitful paradigm to explore morphological decomposition.

Two general questions can be addressed regarding gender processing: A first issue is how it is lexically represented and accessed during word recognition. Using gender decision tasks or grammaticality judgments, several studies have stressed the role of sublexical cues (based on word endings) and lexical cues (based on the association between nouns and articles) to retrieve grammatical gender (Holmes & Segui, 2004; Taft & Meunier, 1998). Globally the results show that classification of nouns leads to longer times when both sublexical and lexical cues are uninformative than when one or both cues are gender informative. The second interest of gender in comprehension refers to the syntactic function of gender and explores the gender processing involved in gender agreement. In languages that have grammatical gender, words related to nouns, such as articles or adjectives are marked depending on the gender of the noun. Most studies have explored this last point using primarily priming paradigm to test effects of grammatical congruency or incongruency (e.g. between a noun and an adjective or article). For example, Bates, Devescovi, Hernandez, and Pizzamiglio (1996) in Italian, using word-repetition, gender-monitoring, and grammaticality judgment tasks showed that the presence of a gender-marked article can facilitate the recognition of a noun. Performances in all three tasks were slower when the target noun was preceded by a gender-incongruent adjective and faster when preceded by a gender-congruent adjective (see also Colé and Segui, 1994, for results on French). Overall most studies provide evidence for an influence of a gender-marked context on the activation of lexical candidates. They also reveal that grammatical gender access is automatically triggered by a grammatical prime marked for gender whereas the task itself does not require such processing, such as in a primed lexical decision task (see for example Grosjean, Dommergues, Cornu, Guillelmon, & Besson, 1994).

In our experiment we tested whether the gender of morphologically complex words derived from a stem with an opposite gender is more slowly retrieved compared to a condition where the gender of the stem matches that of the derived noun. Such results would favour a decompositional hypothesis postulating that recognition of the derived word is achieved through the activation of the stem.

In the first experiment we compared pairs of derived words matched on suffix, frequency and length. For one

member of the pair the stem had the same gender as the derived word while for the other, genders were opposite. In the second experiment we compared pairs of derived words sharing the same stem but having two different genders. The third experiment was designed to assess whether the effects were due to decomposition per se or if orthographic overlap could explain these effects.

Experiment 1

In the first experiment, we investigated whether morphologically complex words are decomposed during identification. In order to assess decomposition in word access, we used a visual gender decision task. Participants were presented to nouns and they had to decide whether they were feminine or masculine. The main factor manipulated was the congruence between the gender of the stem from which the complex word was derived and the gender of the morphologically complex word itself. If gender decision is affected by the gender of the stem-morpheme this would imply that morphologically complex words are decomposed.

Method

Participants Twenty-one students of the University Pierre Mendes France, Grenoble, participated in the experiment for course credit. All participants were native speakers of French and had normal or corrected vision.

Stimuli Thirty pairs of morphological complex suffixed words were selected such that both members of the pairs were of the same gender (*maisonette* $_{\text{feminine}}$ 'small house'-*camionette* $_{\text{feminine}}$ 'small truck') but one member of the pair was derived from a masculine word : e.g. *camion* $_{\text{masculine}}$ in *camionette* and the other member of the pair was derived from a feminine word : e.g. *maison* $_{\text{feminine}}$ 'house' in *maisonette*. There were 16 feminine word pairs (e.g. *maisonette* $_{\text{feminine}}$ -*camionette* $_{\text{feminine}}$), and 14 masculine word pairs (e.g. *poivrier* $_{\text{masculine}}$ 'pepper mill' -*cendrier* $_{\text{masculine}}$ 'ash tray') individually matched in type of suffix, frequency (1.3 vs 2.5 occurrences per million), number of syllables (2.5 vs 2.6) and number of letters (8.3 vs 8.2). Half of the suffixed words were gender congruent with their stem (gender congruent condition) and the other half were gender incongruent with their stem (gender incongruent condition). A lexical decision pre-test conducted with 12 participants revealed no difference in reaction times between the gender congruent and the gender incongruent set of stimuli [gender congruent condition = 627 ms, gender incongruent condition =634 ms; $t1(11)<1$, $t2(29)<1$]. Sixty filler words (28 feminine and 32 masculine words) were also included in the experimental list. Hence, there were equal numbers of feminine and masculine words in the experiment.

Procedure Participants were tested individually in a quiet room. Stimuli were displayed at the centre of a computer screen and participants were required to perform a gender decision task on the visual targets by pressing as accurately and as quickly as possible one of two response buttons. Half of the subjects were required to press the « feminine » button with their left forefinger and the « masculine » button with their right forefinger. It was the reverse for the other half of the subjects. The experiment was controlled by E-prime Software (E-prime Psychology Software Tools Inc.; Pittsburgh, USA). The computer clock was triggered by the presentation of the target on the screen and stopped by the subjects' response. Response latencies and errors were collected. The session began by 10 practice trials and lasted approximately ten minutes.

Results & Discussion

Incorrect responses (3 % of responses), and RTs longer than 1500 ms (0.4 %) were removed. *T* tests were performed by subjects ($t1$) and by items ($t2$). RTs data showed faster response times in the gender congruent condition (655 ms) than the gender incongruent condition (692 ms) significant both by subjects and by items ($t1(20)=4.81$, $p>.001$, $t2(29)=4.04$; $p<.001$). Analyses conducted on errors showed an effect of gender congruency significant by subjects ($t1(20)=2.35$, $p>.05$) and marginally significant by items ($t2(29)=1.98$; $p<.057$) with fewer errors in the gender congruent condition (2.2 %) than in the gender incongruent condition (3.8 %).

This result suggests that morphologically complex words are decomposed in their constituent morphemes during identification. However as mentioned in the introduction for morphologically complex words two types of frequency estimates are relevant, surface frequency and cumulative frequency. In our experiment words in each pair were matched on surface frequency but cumulative frequency was not controlled. In order to control for a potential effect due to this confound factor we ran another experiment using pairs of words sharing the same stem, where one is masculine and the other feminine, e.g. *chemisier* 'long-sleeved shirt'/*chemisette* 'short-sleeved shirt'.

Experiment 2

Method

Participants Twenty-three students of the University Pierre Mendes France, Grenoble, participated in the experiment for course credit. All participants were native speakers of French and had normal or corrected vision. None of them had participated in experiment one.

Stimuli Nineteen pairs of morphological complex suffixed words were selected such that both members of the pairs were derived from the same base stem (e.g. *chemisette* $_{\text{feminine}}$ -*chemisier* $_{\text{masculine}}$ both derived from *chemise* $_{\text{feminine}}$ 'shirt') but one member of the pair was masculine and the other member was feminine. There were 10 word pairs derived from a feminine base stem (e.g. (*chemisette* $_{\text{feminine}}$ - *chemisier* $_{\text{masculine}}$), and 9 word pairs derived from a masculine base stem (e.g. *citronnade* $_{\text{feminine}}$ 'lemonade'-

citronnier masculine 'lemon tree' both derived from *citron* masculine 'lemon'). The pairs were individually matched in stem, frequency (3.4 vs 1.7 occurrences per million), number of letters (7.9 vs 8.5) and number of syllables (2.3 vs 2.4). As in experiment 1, half of the suffixed words were gender congruent with their stem (gender congruent condition) and the other half were gender incongruent with their stem (gender incongruent condition). Thirty eight filler words (19 feminine and 19 masculine words) were also included in the experimental list. Hence, there were equal numbers of feminine and masculine words in the experiment.

Procedure The procedure was the same than the one used in experiment 1. However as words in each pair shared the same stem, in order to avoid short lag priming between the two members of the pairs, the stimuli were divided into two blocks so that the two members of one pair did not appear in the same block. Participants were presented to both blocks and the order of block presentation was counterbalanced.

Results & Discussion

Incorrect responses (4.8 % of responses), and RTs longer than 1500 ms (0.6 %) were removed. *T* tests were performed by subjects (*t*1) and by items (*t*2). RTs data showed descriptively faster response times in the gender congruent condition (684ms) than the gender incongruent condition (692 ms) but this difference was not significant (both ts<1). In a subsequent analysis, subjects were divided into two groups according to their mean RTs. We performed T tests on the two subgroups of subjects (11 rapid subjects and 12 slow subjects). The analyses yielded a significant effect of gender congruency [$t(10)=2.63$, $p<.05$] with faster responses in the gender congruent condition (618ms) than the gender incongruent condition (649 ms) for the subgroups of rapid subjects and no effect of congruency for the subgroups of slow subjects [gender congruent condition, 745 ms vs gender incongruent condition, 732 ms; $t(11)=1.22$, *ns*].

Analyses conducted on errors data showed a significant effect of gender congruency [$t1(22)=3.64$, $p<.005$; $t2(18)=2.16$, $p<.05$] with less errors in the gender congruent condition (2.3 %) than in the gender incongruent condition (7.3 %).

This result corroborates those found in experiment 1 and suggests that morphologically complex words are decomposed into their constituent morphemes during identification. The gender morpheme effect is only observed for fast subjects suggesting that it is short living effect. When morphemes are extracted and activated, their gender must also be activated and compete with the full-form word gender, however as soon as the word is recognized this competition must fade out. It remains to be seen whether the gender effect observed is indeed morphemic and not only orthographic, i.e. due to the presence of a noun embedded within another noun irrespective of the morphemic status of the units in the target noun. The third experiment was designed to test the morphemic nature of the effect observed in the two previous experiments.

Experiment 3

The goal of the third experiment was to assess whether the effect obtained with morphologically complex words was due to orthographic overlap between two words, rather than to morphological decomposition per se. In this experiment, we used non-morphological words that included an initial segment that look like a stem plus a non-morphemic ending of French. For example, we compared the effect of gender congruency for non-morphological words like *seringue* 'syringe'. The ending *-gue* is not a suffix in French, but appears at the end of existing words like *bague* 'ring', *dingue* 'fool', etc. If the effect previously observed is not morphological but orthographic, then we should obtain a gender effect for these words as well (as *serin* 'serin' is masculine and *seringue* feminine in French). If the effects obtained in experiments 1 and 2 are morphological in nature and are due to decomposition then we should not obtain any effect with these non-morphological words.

We also tested another type of words: pseudo-derived words like *baguette* 'French bread, chopsticks', which can be parsed into the base morpheme *bague* 'ring' and the suffix *–ette*, but is neither etymologically nor semantically related to *bague*. This type of word have the same morphological surface structure (a noun and the suffix *–ette*) as truly morphologically complex words such as the ones used in experiments 1 and 2 but are not morphologically complex nouns. We used this type of words in order to see if decomposition occurs when words look like morphologically complex but are not, i.e. do not have any semantic or historical links with their pseudo-stem.

Method

Participants Twenty-one students of the Institut des Sciences Politiques and of the Lumière-Lyon2 University, Lyon, were paid to participate in the experiment. All participants were native speakers of French and had normal or corrected vision. None had participated in any of the previous experiments.

Stimuli Twenty pairs of pseudo-morphological complex suffixed words were selected such that both members of the pairs were of the same gender (*vignette* feminine 'label'-*chouette* feminine 'owl') but one member of the pair contained as a pseudo-stem a masculine word, e.g. *chou* masculine 'colly' in *chouette* and the other member of the pair contained as pseudo-stem a feminine word, e.g. *vigne* feminine 'vine' in *vignette*. There were 8 feminine word pairs (e.g. *vignette* feminine-*chouette* feminine), and 12 masculine word pairs (e.g. *peuplier* masculine 'poplar'-*sanglier* masculine 'wild boar') individually matched in type of suffix, frequency (4.7 vs 16.6 occurrences per million), number of syllables (7 vs 6.9) and number of letters (2.1 vs 2.1). Half of the pseudosuffixed words were gender congruent with their pseudo-stem (gender congruent condition) and the other half

were gender incongruent with their stem (gender incongruent condition). Twenty pairs of orthographically related words were also selected such as both members of the pairs were of the same gender (*seringue* feminine -*auberge* feminine 'inn') but one member of the pair contained an embedded masculine word : e.g. *serin* masculine in *seringue* and the other member of the pair contained an embedded feminine word : e.g. *aube* feminine 'paddle' in *auberge*. There were 9 feminine word pairs (e.g. *seringue* feminine-*auberge* feminine), and 11 masculine word pairs (e.g. *amiral* masculine 'admiral' -*bulletin* masculine 'bulletin') individually matched in frequency (22.9 vs 18.4 occurrences per million), number of syllables (6.5 vs 6.1) and number of letters (2.1 vs 1.8). Half of the orthographic words were gender congruent with their embedded word (gender congruent condition) and the other half were gender incongruent with their embedded word (gender incongruent condition). Twelve feminine filler words were also included in the experimental list. Hence, there were equal numbers of feminine and masculine words in the experiment.

Procedure The procedure was the same than the one used in experiment 1. The only difference was that the third experiment was controlled by DMDX software (J. Forster).

Results & Discussion

Incorrect responses (4.1% of responses) and RTs longer than 1500ms and lower than 300ms (2.6%) were removed. Anova analyses were performed by subjects ($F1$) and by items ($F2$).

Overall we observed a significant effect of word type by subjects and items ($F1(1,20)=12.77$, $p<.002$; $F2(1,38)=4.58$, $p<.05$). The congruence factor is significant by subjects ($F1(1,20)=4.40$, $p<.05$; $F2(1,38)=1.56$, n.s.), as is the interaction between this two factors ($F1(1,20)=4.51$, $p<.05$; $F2<1$). For pseudo-morphological complex suffixed words, planned comparisons showed faster response times in the gender congruent condition (677 ms) than the gender incongruent condition (706 ms) significant by subjects ($F1(1,20)=12.77$, $p<.002$, $F2(1,19)=1.77$, n.s.). For the orthographic controls no significant difference was observed (716 ms for congruent condition vs 721 for incongruent one; $Fs<1$).

The effect of word type is the only effect significant in the analyses conducted on errors ($F1(1,20)=15.55$, $p<.001$; $F2(1,38)=6.77$, $p<.02$) with fewer errors in the pseudo-morphological word condition (1.8%) than in the orthographic condition (6.3%).

Overall RTs of this experiment showed an effect of gender congruency only for pseudo-derived words like *baguette*. No effect was observed for non-morphological carrier words.

General Discussion

We ran three experiments to test decomposition of morphological complex words by testing whether gender categorisation of morphologically complex noun is affected by the gender of the morphemes included in them. By varying the gender congruency and incongruency of short words included in longer words, we observed a gender congruency effect for morphologically complex words and for pseudo-morphological words. Gender decision was faster when the stem or the pseudo-stem had the same gender as the derived or pseudo-derived noun. By contrast no gender congruency effect was observed when the target nouns were not made of morpheme-like parts. For words were orthographic overlap is partial, i.e. a short word is included in the longer word but the rest of the longer word is not a morpheme, no effect was observed. For true or pseudo morphologically complex words, an incongruency between the gender of the stem or pseudo-stem and the gender of the target noun delayed gender access. Altogether these results are compatible with a decompositional hypothesis of the morphologically complex nouns.

The result suggesting that morphological decomposition occurs even when the target noun is pseudo-morphologically complex is very interesting. Recent masked priming studies have suggested the existence of an early blind decomposition process that starts as soon as the target looks morphologically complex, irrespective of whether its morphological structure is real or only superficial. They also reported a lack of priming effects for orthographically related words such as *abricot* 'apricot' which contains *abri* 'shelter' but where *–cot* is not a morpheme suggesting that this decomposition is not a left to right process but rather a parallel mapping of the input to the available morphemic units, both stems and affixes (Feldman & Soltano, 1999; Longtin, Halle & Segui, 2003; Rastle, Davis, Marslen-Wilson and Tyler, 2000). Unmasked priming experiments showed that the realness of morphological structures is taken into account later on during word identification. Indeed, when an auditory or unmasked visual prime is used, a priming effect is observed only for real morphologically related words: Word like *clochette* 'small bell' primes *cloche* 'bell', but word like *vignette* does not prime *vigne* (Feldman & Soltano, 1999; Longtin et al., 2003; Marslen-Wilson et al., 1994; Rastle et al., 2000). The morpheme gender effect we observed in our experiments could reflect this very early on decomposition process. Moreover this interpretation is compatible with our result showing that the effect is mainly observed on fast subjects. However the gender categorization task that we used is usually not considered as tapping on very early stages of word processing.

Another domain could be relevant to understand our morphological gender effect: studies showing the role of sublexical gender information carried by noun ending in gender access. In French there are morpho-phonological regularities that occur on noun-endings. For example the ending *–ette* like in *fourchette* 'fork' or *cigarette* 'cigarette' is predominantly feminine at 98%. Corpus analyses done by Tucker, Lambert and Rigault (1977) showed that using ending predictability would ensure correct gender categorization at 85%. Empirical evidence have been

reported by these same authors but also by others (Taft and Meunier, 1998): Experimental studies show that nouns with predictive gender endings are categorized faster than nouns with unpredictive gender endings. What has to be noticed is that in fact predictive gender endings often correspond to suffix morpheme like *–ette*. Indeed when a suffix is add to a stem, its effect is always the same: for example adding *–ette* to a noun will modify the meaning of that noun by the idea of smallness and the resulting derived noun will always be feminine whatever the gender of the base noun. Exception nouns, i.e. nouns that end with *–ette* but which are masculine as *squelette*, are words where the ending *–ette* is not the suffix-morpheme and where in our example *squel-* is not a stem. In our experiments it could be that the gender morpheme effect does reflect the conflict between the activation of the stem-morpheme gender and the effect of gender predictive noun endings. This explanation would also explain the lack of effect observed for orthographical (non morphological) pairs. Indeed in this case, endings are not predictive suffixes. So it may that these items are not decomposed as 1) there are not morphologically complex even superficially and 2) endings are not gender informative so do not produce a gender ending effect.

Conclusion

Results observed in the experiments presented in this paper indicate clearly that morphologically and pseudo-morphologically complex words are decomposed and that the gender of the stem-unit is activated. Also our experiments suggest that the noun ending predictability effect observed in previous experiments could in fact reflect morphological decomposition.

Acknowledgments

This research was supported in part by EMERGENCE grant from the Région Rhône-Alpes and an ACI from the French Research Ministry.

References

Bates, E., Devescovi, A., Hernandez, A. & Pizzamiglio, L. (1996). Gender priming in Italian. *Perception & Psychophysics, 58,* 992-1004.

Buttherworth, B. (1983). Lexical representation. In B. Butterworth (Ed.), *Language production*. London: Academic Press.

Bybee, J. L. (1985). *Morphology: A study of the relation between meaning and form*. Amsterdam: Benjamins.

Caramazza, A., Miceli, G., Silvieri, M.C., & Laudanna, A. (1985). Reading mechanisms and the organization of the lexicon: Evidence from acquired dyslexia. *Cognitive Neuropsychology, 2,* 81-114.

Colé, P., Beauvillain, C., & Segui, J. (1989). On the representation and processing of prefixed and suffixed derived words: A differential frequency effect. *Journal of Memory and Language, 28,* 1-13.

Colé, P. & Segui J. (1994). Grammatical incongruency and vocabulary types. *Memory & Cognition, 22,* 387-394.

Feldman, L.B., & Soltano, E.G. (1999). Morphological priming: The role of prime duration, semantic transparency, and affix position. *Brain and Language, 68,* 33-39.

Frauenfelder, U. H., & Schreuder, R. (1992). Constraining psycholinguistics models of morphological processing and representation: the role of productivity. In G. Booij & J. van Marle (Eds.), *Yearbook of morphology 1991*. Netherlands: Kluwer Academic Publishers.

Grosjean, F., Dommergues, J-Y., Cornu, E., Guillelmon D. & Besson, C. (1994). The gendermarking effect in spoken word recogntion. *Perception & Psychophysics, 56*, 590-598.

Henderson, L. (1985). Toward a psychology of morphemes. In A.W. Wallis (Ed.), *Progress in the Psychology of Language*, Vol. 1. London: Lawrence Erlbaum Associates Limited.

Holmes, V. & Segui, J. (2004). sublexical and lexical influences on gender assignment in French. *Journal of Psycholinguistic Reasearch, 33,* 425-457.

Longtin, C.-M., Segui, J., & Hallé, P.A. (2003). Morphological priming without morphological relationship. *Language and Cognitive Processes, 18,* 313-334.

Manelis, L., & Tharp, D. (1977). The processing of affixed words. *Memory & Cognition, 5,* 690-695.

Marslen-Wilson, W.D., Tyler, L. K., Waksler, R., & Older, L. (1994). Morphology and meaning in the English mental lexicon. *Psychological Review, 101*, 3-33.

Meunier, F., & Segui, J. (1999). Morphological priming effect: The role of surface frequency. *Brain and Language, 68*, 54-60.

Rastle, K., Davis, M.H., Marslen-Wilson, W.D., & Tyler, L.K. (2000). Morphological and semantic effects in visual word recognition: A time-course study. *Language and Cognitive Processes, 15,* 507-537.

Schreuder, R., & Baayen, R.H. (1995). Modeling morphological processing. In L.B. Feldman (Ed.), *Morphological aspects of language processing*. Hillsdale, NJ: Lawrence Erlbaum.

Taft, M. (1994). Interactive-activation as a framework for understanding morphological processing. *Language and Cognitive Processes, 9,* 271-294.

Taft, M., & Forster, K.I. (1975). Lexical storage and retrieval of prefixed words. *Journal of Verbal Learning and Verbal Behavior, 15,* 638-647.

Taft, M., Hambly, G., & Kinoshita, S. (1986). Visual and auditory recognition of prefixed words. *Quarterly Journal of Experimental Psychology, 38A,* 351-366.

Taft & Meunier, (1998). Lexical representation of gender : A quasiregular domain. *Journal of Psycholinguistic Research*, *27,* 23-45.