The processing of morpheme-like units in monomorphemic words

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Abstract

The word virus is not normally considered polymorphemic, yet it is clearly both semantically and orthographically related to the word viral. Thus, the subunit vir takes on the role of a bound morpheme. In contrast, the words future and futile also share a subunit (fut), but are semantically unrelated. The reported experiment demonstrates facilitation in a masked priming experiment for the semantically related pairs that share an initial orthographic subunit (e.g., virus–viral), but not for the semantically unrelated pairs (e.g., future–futile). Whether the subunit was pronounced the same way in the prime and target was shown to be irrelevant. Furthermore, semantic relatedness was insufficient to produce priming when orthography was not shared. It was concluded that, while the units of processing within the orthographic system may be the same for the two types of item, their representation at a higher level may depend on the correlation between form with meaning. For example, virus and viral might share a higher level representation and thus facilitate each other, whereas future and futile might be represented separately at that higher level and even compete with each other.

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1. Introduction

The concept of a morpheme is acknowledged amongst linguists and psycholinguists to refer to the smallest functional unit within a word (where “function” refers to meaning, syntax, or both). However, while linguistic arguments may be presented to establish the morphological structure of a word, it is not necessarily the case that the average language user shares this understanding. For example, there would be general agreement that softness is built up from soft plus -ness, that actor is built up from act plus -or, and that coastal is built up from coast and -al, but some doubt might be raised when the stem is modified either orthographically (e.g., tidal from tide plus -al) or phonologically (e.g., solidify from solid plus -ify). Indeed, I have informally observed that some people think that tidal incorporates the word tide when it is spoken, but not when it is written, and that solidify incorporates solid when it is written, but not when it is spoken. When this is the case, the language user is clearly demonstrating an insensitivity to functional information when establishing the internal structure of a word.

Even for those who accept the importance of functional information in assessing the internal structure of a word, there are still dubious cases. Take, for example, viral and donor. It is apparent to many people that -al brings an adjectival function to the word viral (just as it does to coastal), while -or conveys agentive information that is found in the meaning of the word donor (just as it is in actor). Yet many, if not most, language users would hesitate to accept these words as polymorphemic (or the equivalent lay concept) because the remaining “stem” is not a free-standing word. This is despite the fact that stems that are not free-standing words (i.e., bound stems) have been shown empirically to have a status in lexical memory that a mere syllable does not have, for example, the cline of decline, the flate of deflate, or the hench of henchman (e.g., Emmorey, 1989; Forster & Azuma, 2000; Taft, 1994, 2003; Taft & Forster, 1975; Taft, Hambly, & Kinoshita, 1986). A subunit is considered to be a bound stem when the rest of the word forms a productive morpheme (e.g., de-, meaning “down,” is consistent with the meaning of decline and deflate, which makes cline and flate bound morphemes;
a *henchman* is a *man*, which makes *hench* a bound morpheme), and more obviously so (see e.g., Taft, 2003) when that subunit is found in other semantically related words (e.g., *cline* is found not only in *decline*, but also in *recline* and *incline*).

It is possible, however, that these other semantically related words are not themselves considered polymorphic, and this raises a paradox. To illustrate, the words *virus* and *donate* are rarely taken to be polymorphemic words because their endings are not considered to make a productive contribution to the word (despite the fact that *-us* usually indicates a noun, and that *-ate* when pronounced */eIIt/* usually indicates a verb). Yet these putatively monomorphemic words are clearly related in meaning to other words that share the same beginning, namely, *viral* and *donor*, respectively. Therefore, a linguistic argument based on distributional factors could be mounted to claim that *virus* and *viral* are related through a bound stem *vir*, and *donate* and *donor* are related through a bound stem *don*. However, to avoid the paradox of having to say that a monomorphemic word can include a morphemic subcomponent, one would then be forced to consider all of these words as polymorphemic. Yet this is not how the typical language user views them.

It is apparent, then, that the concept of “morphe” is not well-developed for the average language user, and even linguists are likely to disagree on what is and what is not a polymorphemic word. In other words, we cannot explicitly define what constitutes a morpheme and this is a problem for any model of lexical processing that includes discrete representations of morphemes (e.g., Burani & Laudanna, 1992; Marslen-Wilson, Tyler, Waksler, & Older, 1994; Schreuder & Baayen, 1995; Taft, 1994; Taft & Forster, 1975). Instead, it appears that there must be some way of capturing the variable relationship that exists between different subunits of form and their associated meaning. That is, there must be some way of determining the degree of correlation between patterns of form activation and patterns of meaning activation is captured at this level.

So, for example, the recurrence of the subunit *vir* at the beginning of words that refer to the semantic feature of “disease-related” (i.e., *viral* and *virus*) leads to the emergence of a pattern of activation at the intermediate level that represents the fact that this subunit is associated with that specific meaning. If the association is sufficiently strong (i.e., the pattern of activation is sufficiently distinct), the subunit takes on the status of a morpheme, but because the correlation between form and meaning is a continuum, the boundary between what one might consider to be a morpheme and a nonmorpheme is quite arbitrary. The typical language user, however, these emergent patterns simply exist in lexical memory, and it is irrelevant whether they should be labeled morphemic or not.

If this is so, then it should be possible to witness a facilitation in recognition responses to a word that shares both form and meaning with the word that was presented immediately prior to it even if the morphemic status of those words is dubious. This is because the same pattern of activation is required within the intermediate units and is boosted by residual activation therein (e.g., Plaut & Gonnerman, 2000; Rueckl et al., 1997). So, responses to visually presented words like *viral* should be facilitated by the prior presentation of a word that is related in both form and meaning (i.e., *virus*). That is, the classification of *viral* as a word (i.e., the lexical decision response) should be easier to make when it is immediately preceded by *virus* than when preceded by an unrelated word, like *major*. In contrast, two words that are similarly form-related, but not semantically related, should not prime each other (e.g., responses to *futile* should be no different when preceded by *future* than when preceded by *margin*). By forward-masking the prime word, such a pattern of results would be hard to explain purely as a difference in the semantic relatedness of *virus* with *viral* and *futile* with *future*, because it has been shown that semantic priming (e.g., *follow* being faster when primed by *pursue* as opposed to *candle*) is extremely weak in the masked priming paradigm (e.g., Forster & Azuma, 2000; Perea & Gotor, 1997; Rastle, Davis, Marslen-Wilson, & Tyler, 2000). In other words, facilitation of *viral* by the prior masked presentation of *virus* would have to be explained in terms of the

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1 It is quite possible that certain highly productive subunits, notably inflectional affixes, are more discretely represented as “morphemes,” being processed in a rule-like manner outside of the lexical system (see e.g., Pinker & Ullman, 2002; Taft, in press).
conjunction of form and meaning and not in terms of either orthographic relatedness alone or semantic relatedness alone.

Past research suggests that if viral and virus behave like morphologically related words, they should indeed show facilitation. When the prime and target have a clear morphological relationship (e.g., vowed–vow, departure–depart), experiments with briefly presented primes (both masked and unmasked) have consistently revealed facilitatory effects on lexical decision times (e.g., Drews & Zwitserlood, 1995; Feldman, 2000; Rastle et al., 2000). Such priming cannot be ascribed to mere orthographic relatedness because, when the prime and target share the same few initial letters without being semantically related (e.g., vowel-vow, electrode-elect) there is no such facilitation in any of these studies. Indeed, inhibitory effects of orthographic relatedness are observed on both RT and error rates (Drews & Zwitserlood, 1995) or on error rates only (Feldman, 2000; Rastle et al., 2000).

Of course, prime–target pairs like virus–viral are different to pairs like vowed–vow or departure–depart inasmuch as the latter targets are free morphemes that are transparently contained within the prime. If the vir of virus and viral does have a status in lexical memory equivalent to a morpheme, then it will be a bound morpheme. So, it does not necessarily follow that the facilitatory priming that has been observed with free morphemes will be found with words like virus and viral where morphemic status is dubious. However, facilitatory effects have also been reported in the masked priming task when the prime and target share a bound morpheme, namely with prefixed words like deflate and inflate (Forster & Azuma, 2000), thus improving the prospect of finding the same thing for pairs like virus and viral.

The experiment to be reported here, then, examines under masked priming conditions whether facilitatory effects can be obtained when the prime, target, or both are not apparently polymorphemic, but nevertheless share the same initial orthographic form and are semantically related (e.g., virus–viral). This will be contrasted with prime–target pairs that share the same initial orthographic form but are not semantically related (e.g., future–futile).

A further factor will also be included, namely, phonological compatibility between prime and target. The subunit vir is pronounced identically in virus and viral, with the same syllable boundary, and so is the fut of future and futile. An examination can therefore be made of whether phonology is crucial in orthographic word recognition, as many have claimed (see e.g., Frost, 1998), by determining whether the same pattern of priming is maintained when the prime and target overlap orthographically, but are phonologically different (e.g., fem is pronounced differently in the semantically related words female and feminine, as is sal in the semantically unrelated words saliva and salad).

Finally, in order to determine whether semantic relatedness alone can potentially explain any priming effects that are obtained, semantically related word pairs that do not share orthographic form will also be examined (e.g., pursue–follow).

2. Method

2.1. Participants

Thirty first-year psychology students at the University of New South Wales participated in the study for course credit. All were native speakers of English.

2.2. Materials

Twenty orthographically related prime–target pairs were selected in each of four conditions, manipulating semantic and phonological relatedness. No pairs were related by the simple addition of an affix (e.g., legality):

+O + P + S: Orthographically, phonologically, and semantically related, e.g., virus–viral, donate–donor, capture–captive;

+O – P + S: Orthographically and semantically, but not phonologically related, e.g., female–feminine, chorus–choral, final–finish;

+O + P – S: Orthographically and phonologically, but not semantically related, e.g., future–futile, labor–label, satellite–satisfy;

+O – P – S: Orthographically, but not phonologically or semantically related, e.g., saliva–salad, solid–solar, capital–capable

In addition, there were 20 semantically related prime–target pairs that were not orthographically (or phonologically) related: –O – P + S, e.g., pursue–follow, rascal–villain, compost–manure.

Semantic relatedness was established by means of a pre-test. Ten first-year university students who did not take part in the experiment were asked to rate on a scale of 1 (“unrelated in meaning”) to 7 (“related in meaning”) their response to the question “To what extent do you believe that each of the following word pairs are related in meaning?” They were then presented with 142 written word pairs that potentially could be used in the experiment. The experimental items were then selected so that the +O + P + S, +O – P + S, and –O – P + S conditions were matched on semantic relatedness (with mean ratings of 5.02, 4.82, and 5.30, respectively), $F(2, 57) = 1.21, p > .1$, as were the +O + P – S and +O – P – S conditions (1.70 and 1.71, respectively, $F < 1$). The +S items differed significantly from the –S items, $F(1, 98) = 419.61, p < .001$. 

Orthographic relatedness was based on the matching of the initial consonant/s-vowel-consonant/s (CVC) subunit of the prime and target, although sometimes letters beyond this subunit were also the same. The number of letters overlapping between prime and target was matched between the +S and −S conditions (3.80 vs 3.58, respectively), \( F(1, 76) = 1.62, p > .1 \). However, the +P pairs had significantly more overlapping letters than did the −P pairs (3.93 vs 3.45, respectively), \( F(1, 76) = 7.20, p < .01 \), with no interaction between semantic and phonological relatedness, \( F < 1 \). For some words, the letters following the orthographically matched subunit formed a potential affix (e.g., the -al of viral or the -ar of solar), but this was not typically so.

Phonological relatedness was primarily determined on the basis of syllabification, that is, on whether the initial subunit was syllabified in the same way in the prime and target. For the vast majority of cases, this meant that the +P items were also matched on the quality of the initial vowel (e.g., viral–virus, as opposed to society–social where the placement of the syllable boundary is nevertheless matched).

In order to determine the degree of priming, each target in the five experimental conditions required a control comparison where the prime was unrelated in either form or meaning to the target (i.e., −O−P−S). To this end, control primes for each of the 100 target words were created by replacing each prime with a word that bore no obvious semantic, orthographic, or phonological relationship to the target (e.g., major–viral, margin–futile, drama–finish). The items were divided into two lists so that a target appeared in one list with its control prime and in the other with its control prime. A Latin-squares design ensured that each list contained 10 items in each of the five experimental and five control conditions.

Nonword distractors were designed to mimic the structure of the word conditions, and were at least two letters different from an existing word. The prime for 40 of these nonwords targets was a letter-string that shared its initial orthographic subunit with the target, and was a word for half of the pairs (e.g., family–famure, nation–natour, quality–qualomer) and a nonword for the other half (e.g., tazob–tazin, cover–futil, voix–vomany, hierus–hi-nism). The remaining 60 nonword targets were not related in form to their primes. Half of these primes were again real words (e.g., cover–folt, guitar–deabim, marathon–danilist) and half nonwords (e.g., migob–lafig, bofemy–dezont, bivar–sonten). The same nonword items were used in each list.

2.3. Procedure

Participants were allocated randomly to one of the two lists, such that there were 15 participants in each group and nobody saw the same target word twice. Trials were presented in a different random order for each participant preceded by the same eight practice items. A trial consisted of a 500 ms forward mask consisting of a row of hash-marks (#######) followed immediately by the prime presented in lower case letters for 50 ms, and then the target presented in upper case letters for 500 ms. After 4 s the next trial began. If there was no response made within this time limit, an error was assigned to that trial.

Participants were instructed to respond via a “yes” or “no” button whether each letter-string was a word or not, and to do this as quickly, but as accurately as they could. Because the identity of the prime was masked from conscientious under the conditions used (see Forster & Davis, 1984), the response was always made to the upper-case target.

3. Results

The data from one participant were eliminated owing to an error rate exceeding 25%. In addition, four items were removed from the item analysis because of error rates exceeding 50%. These consisted of two +O+P−S targets (totem and basil) and two +O−P−S targets (tonal and ravioli). For each participant, any response times that exceeded the value of two standard deviations away from the mean for the word conditions were replaced by that cut-off value.

The +O conditions were analyzed as three within-group factors in the analysis of participant means (\( F_1 \)): Priming (primed vs control), semantic relatedness (+S vs −S), and phonological relatedness (+P vs −P), with the two lists being treated as a between-groups factor. In the item analysis (\( F_2 \), priming was the only within-group factor, with semantic and phonological relatedness being between-groups factors. The mean RTs and error rates for the +O conditions are presented in Table 1.

There was an overall priming effect on RTs, \( F_1(1, 27) = 11.72, p < .01; F_2(1, 72) = 9.99, p < .01 \), but not on error rates, both \( F_1's < 1 \). Phonological relatedness did not interact with priming, \( F_1's < 1.88 \), and neither was there a three-way interaction between phonological relatedness, semantic relatedness, and priming, \( F_1's < 1 \). Where there was an interaction, however, was between priming and semantic relatedness both on error rates, \( F_1(1, 27) = 11.81, p < .01; F_2(1, 72) = 4.68, p < .05 \), and on response times, at least in the more powerful item analysis, \( F_1(1, 27) = 2.05, p > .1; F_2(1, 72) = 4.01, p < .05 \). This interaction arose from the fact that priming was observed for the +S conditions both on response times, \( F_1(1, 27) = 11.76, p < .01; F_2(1, 72) = 10.49, p < .01 \), and on error rates, \( F_1(1, 27) = 5.06, p < .05; F_2(1, 72) = 5.08, p < .05 \), whereas there was no priming for the −S conditions either on RTs, \( F_1(1, 27) = 1.70, p > .1; F_2 < 1 \), or on error
Table 1
Mean lexical decision times (RT in ms) and error rates (ER) for the orthographically related pairs (+O) and their controls

<table>
<thead>
<tr>
<th></th>
<th>Semantically related (+S)</th>
<th></th>
<th>Semantically unrelated (−S)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>−P</td>
<td>Control</td>
<td>Priming</td>
<td>+P</td>
</tr>
<tr>
<td>virus</td>
<td>female–feminine</td>
<td></td>
<td>−25</td>
<td>virus</td>
</tr>
<tr>
<td>major</td>
<td></td>
<td></td>
<td>565 (61.15)</td>
<td>future</td>
</tr>
<tr>
<td>virus</td>
<td></td>
<td>10.05% (12.82)</td>
<td>+2.55%</td>
<td>margin</td>
</tr>
<tr>
<td>RT</td>
<td>535 (45.69)</td>
<td>560 (50.85)</td>
<td></td>
<td>566 (57.76)</td>
</tr>
<tr>
<td>ER</td>
<td>7.45% (10.81)</td>
<td>10.05% (12.82)</td>
<td></td>
<td>12.67% (12.89)</td>
</tr>
<tr>
<td>+P</td>
<td></td>
<td></td>
<td></td>
<td>−P</td>
</tr>
<tr>
<td>future</td>
<td></td>
<td></td>
<td></td>
<td>future</td>
</tr>
<tr>
<td>futile</td>
<td></td>
<td></td>
<td></td>
<td>margin</td>
</tr>
<tr>
<td>Priming</td>
<td></td>
<td></td>
<td></td>
<td>548 (32.10)</td>
</tr>
<tr>
<td>RT</td>
<td>566 (57.76)</td>
<td>569 (39.84)</td>
<td>+3</td>
<td>12.67% (12.89)</td>
</tr>
<tr>
<td>ER</td>
<td>12.67% (12.89)</td>
<td>7.94% (9.69)</td>
<td>−4.73%</td>
<td>6.00% (6.61)</td>
</tr>
</tbody>
</table>

Item standard deviations are in parentheses.

rates, where the trend was actually inhibitory, $F_1(1, 27) = 2.43, p > .1; F_2 < 1$.

Pure semantic priming was examined through a comparison of the −O−P+S condition with its −O−P−S control and no effect was observed either on the RT measure, 558 ms ($SD = 57.71$) vs 559 ms ($SD = 61.99$), respectively, or on the accuracy measure, 11.35% ($SD = 12.57$) vs 9.10% ($SD = 8.71$), respectively, all $F$'s < 1.28.

4. Discussion

It is clear from these data that words sharing an initial orthographic subunit will prime each other, but only when there is a semantic relationship between those words. So, responses to viral are facilitated by the prior (masked) presentation of virus, while responses to futile are not facilitated by prior presentation of future. Given that semantic relatedness alone did not produce priming (e.g., pursue–follow), it seems that priming arises only when there is a conjunction of form and meaning. Furthermore, the strong priming effect for the +O+S pairs does not appear to arise merely from the additive effects of weak semantic priming plus weak orthographic priming. This can be concluded from the fact that priming for the +O+S pairs on error rates was facilitatory in contrast to the inhibitory trend for both the +O−S pairs and −O+S pairs. Thus, the mere addition of the latter two trends could not lead to a facilitatory effect.

The explicit impact of the convergence of form and meaning is compatible with connectionist models of lexical processing whereby there are intermediate units between the representations of form and meaning that capture the correlation between them. However, an explanation of greater detail is required. In particular, the present results contrast with an important result obtained by Rastle et al. (2000), namely, that masked priming is not observed for word pairs like screech–scream or fondle–handle, which are related in both form and meaning while being clearly monomorphemic. Such a result suggests that not all correlations of form and meaning are represented in lexical memory. So, what might be the important difference between the words used by Rastle et al. (2000) and those used in the present study?

One obvious difference is that the overlapping letters of the virus–viral pairs consistently included a CVC subunit. In contrast, the screech–scream pairs were quite variable in their relationship, sometimes being matched on their consonantal onset plus zero or more of their subsequent letters (e.g., frost–freeze, screech–scream, shovel–shelf), and sometimes being matched on their final letters, either rhyming (e.g., hotel–motel, branch–lunch) or not (e.g., fondle–handle). So, it may well be that the overlapping letters between semantically related words need to fall within a systematic structure for the form-meaning correlation to emerge. In fact, more recent connectionist simulations have required a systematic structure to be imposed on the orthographic input units in order for a subset of the input to be successfully mapped onto the output units. For example, in modeling the conversion from orthography to phonology of monosyllabic words, Plaut, McClelland, Seidenberg, and Patterson (1996) structured their input units in terms of a consonantal onset, a vowel, and a consonantal coda (e.g., ground being structured as gr, ou, and nd; stir being structured as st, i, and r). Thus, the correlation between orthography and phonology was captured in terms of these structural units. In relation to the “morphological” simulation reported by Plaut and Gonneman (2000), the artificially constructed orthographic input was always composed of two syllables with the associations with meaning being made at the level of the syllable. Such sublexical structuring was entirely systematic, though quite arbitrary.

The idea that form-meaning correlations are represented only when there is systematic sublexical structuring is consistent with the failure of Rastle et al. (2000) to find facilitation with primes and targets whose orthographic overlap was haphazard. The present
experiment helps to establish what systematic sublexical structuring might be most relevant, suggesting that it involves the initial CVC unit. That is, representation of the correlation between meaning and a subset of the orthographic input might only emerge when that subset is the initial CVC unit, and this is consistent with the proposal of Taft (1979, 1987, 2001, 2002) that the initial CVC unit of a polysyllabic word is important in the recognition of that word.

Taft (1979, 1987, 2001, 2002) has called this unit the Basic Orthographic Syllabic Structure (BOSS) and it essentially optimizes the informativeness of the initial subunit (ignoring any prefixes) by maximizing the coda of that first subunit. So, the BOSS of virus and viral is *vir* because the *r* is incorporated into the first subunit as the coda. Similarly, the BOSS of female and feminine is *fem*, the BOSS of captive and capture is *capt*, and the BOSS of future and futile is *fut*. The suggestion, then, is that the orthographic input units are structured in a way that is consistent with the BOSS and that the association between form and meaning is captured in terms of this structure. Fig. 1 models such a situation using a localist description. That is, rather than there being a distributed set of units mediating between form and function, this level is depicted by single units, referred to as “lemmas” (see Taft, 2003).

A lemma develops when a particular form combination is associated with a constancy of function in the face of varying contexts. So, a free-standing word (like virus or futile) maintains a specific meaning whatever context it is embedded in and, therefore, is associated with a lemma that mediates between the levels of form and meaning is captured in terms of this structure. Fig. 1 models such a situation using a localist description. That is, rather than there being a distributed set of units mediating between form and function, this level is depicted by single units, referred to as “lemmas” (see Taft, 2003).

An interesting feature of the results is that priming effects were not modulated by phonological relatedness, and this was true despite the fact that the phonologically matched pairs had more overlapping letters than the phonologically dissimilar pairs. If the correlation between form and meaning were based on both orthography and phonology, one might expect that the lemma for a phonologically matched pair would be more strongly developed than would be the case when the word pair conflicts in terms of phonology. This is because the correlation between form and meaning would
be weaker in the latter case owing to the greater variability in form relatedness. Thus, one might have expected weaker priming for the +O+S items when they were –P than +P. How is the lack of such a finding to be explained?

One possibility is that the lemma system mediating between orthography and meaning is different to the lemma system mediating between phonology and meaning, and that only the orthographic system is engaged in a visual lexical decision task. Such a conclusion would oppose the idea that phonology is activated in silent reading for the purposes of getting from form to meaning (e.g., Frost, 1998; Lukatela, Lukatela, & Turvey, 1993; Van Orden, 1987). Phonological mediation between orthography and semantics would require the activation of phonological form units via direct links with the orthographic form units, thus leading to activation of meaning via the phonologically based lemmas. If the use of the orthographically based lemmas is secondary, a reduced priming effect should have been observed for the phonologically dissimilar items in the present experiment.

Another possibility is that there is only one set of lemmas intervening between form and meaning, but that the strength of a lemma associated with orthographic subunits and phonological subunits that are identical in two semantically related words is no greater than that based on orthographic subunits that are identical and phonological subunits that are merely similar. That is, the latter relationship is sufficient for the maximal development of a representation corresponding to that subunit at the lemma level, thus producing maximal priming effects. This essentially says that the difference between +P and –P was simply not sensitive enough to capture any processing differences. However, it would be impossible to increase this sensitivity, since orthographic identity in any alphabetically scripted language necessarily corresponds to a high degree of phonological similarity.

Finally, it is conceivable that orthography dominates phonology in determining the development of sublexical lemmas, such that acquisition of literacy leads to a more sophisticated representation of lexical information rather than merely appending an orthographic component to an extant phonological–semantic processing system. It is far more often the case that morphemically related words have greater orthographic similarity than phonological similarity than the reverse. As a typical example, the words action, actor, and acting all overlap orthographically with their stem act, but do not overlap phonologically with it (given the palatalization of the t and/or the syllable boundary after the c). On the other hand, there are very few cases where phonology overlaps, but not orthography (an example being height and high). In other words, knowledge of orthography greatly increases the correlation between form and meaning and may, therefore, be primary in determining the development of the sublexical lemma representations.

5. Conclusions

When a target word overlaps orthographically with a masked prime, it is apparent that recognition is facilitated, but only when they are related in meaning. It is concluded from this, and from the concomitant lack of pure semantic priming effects, that a correspondence between sublexical structure and meaning is explicitly captured within the lexical processing system. There will be variation in the degree of such correspondence and this may be captured within the system as well. Whether the representation arising from this correspondence should be labeled a “morpheme” is an arbitrary judgment and fundamentally irrelevant to the actual processing of the word. Processing will be influenced by the mere existence of such a sublexical representation and not whether it needs to be categorized as a morpheme or not. However, it is further proposed that the correlation between form and meaning is based on a systematically structured orthographic form. In particular, it is suggested that the BOSS, which is the initial CVC unit of a word (excluding prefixes), provides the relevant structure with which meaning might be associated. Finally, the lack of any impact of phonological variability between prime and target suggests that orthography may have a greater impact than pronunciation in determining the sublexical representations involved in silent reading.

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