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OBSERVATION

Discrepancies Between Orthographic and Unrelated Baselines in Masked Priming Undermine a Decompositional Account of Morphological Facilitation

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This study uses the masked priming procedure to compare the decompositionality of regular with irregular English past tense forms relative to both an unrelated baseline and a baseline matched on orthographic similarity to the morphological prime. Morphological facilitation varies with the degree of similarity between related primes and targets. Discrepancies between unrelated and orthographic baselines arise when prime and target match in length and form overlap is high. The outcome demonstrates the key role of baselines in assessments of morphological facilitation and highlights problems of interpretation when evidence of morphological decomposition depends on meeting a statistical criterion for significant morphological facilitation.

A key issue in the study of morphological aspects of word recognition is whether regular and irregular forms are processed by the same mechanism. Recent studies that investigated morphological processing in Hebrew (Deutsch, Frost, & Forster, 1998) reported significant morphological facilitation due to repetition of the verbal pattern for verbs with regular roots but an absence of verbal pattern facilitation for verbs with weak roots (Frost, Deutsch, & Forster, 2000). Weak forms in Hebrew are irregular because they contain a two-consonant root rather than the more typical three-consonant root of complete forms. These findings, interpreted as evidence of decomposition for regular but not for irregular verb forms in Hebrew, are important to a growing literature about the lexical representation of morphologically complex words. Researchers have investigated related questions in other languages with a variety of tasks and presentation conditions. For example, facilitation for regular but not irregular forms arises in German (Sonnenstuhl, Eisenbeiss, & Clahsen, 1999) using cross-modal immediate repetition priming. Similar issues, sometimes with disparate outcomes, have been addressed in English using long-term repetition priming with both auditory (Kempley & Morton, 1982) and visual (Fowler, Napps, & Feldman, 1985; Stanners, Neiser, Hernon, & Hall, 1979) as well as cross-modal presentations (Allen & Badecker, 1999).

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Decompositional accounts assert that a word is represented in the lexicon in terms of its component morphemes (e.g., stem + affix) such that recognizing regularly but not irregularly inflected forms typically entails decomposition of a word into its components (Deutsch et al., 1998). The traditional way to evaluate the decompositional status of inflected forms (e.g., Sonnenstuhl et al., 1999; Stanners et al., 1979; Stolz & Feldman, 1995) is to compare the difference in target decision latencies after related and unrelated primes. If regular and irregular inflections are stored in the lexicon in the same manner, then both should manifest the same pattern. Divergent patterns, on the other hand, have been interpreted to mean that regular but not irregular forms are decomposed in the course of lexical retrieval. By a similar conceptualization of storage and regularity, researchers conducting studies in Hebrew have demonstrated that irregular inflections are stored in memory and are sensitive to similarity effects that reflect orthographic overlap with other entries that are stored in the lexicon, whereas regular forms are not (Berent, Pinker, & Shimron, 1999).

In priming studies, direct comparisons between magnitudes of facilitation after regular and irregular primes for the same target would be most informative (e.g., Frost et al., 2000), but not all designs permit this contrast. Instead, researchers tend to focus on whether morphological facilitation meets the criterion for significance. A more general but related issue is that the construction of control baselines is not standardized over tasks. With some variants of the priming task, researchers (e.g., Forster & Davis, 1984; Frost, Forster, & Deutsch, 1997) introduce an orthographically similar baseline, whereas in others (e.g., Feldman & Soltano, 1999; Marslen-Wilson, Tyler, Waksler, & Older, 1994) they use one that is orthographically as well as morphologically dissimilar. To our knowledge, relatively few studies (viz., Giraudo & Grainger, 2000; Grainger, Colé, & Segui, 1991; Pastizzo & Feldman, in press) have assessed morphological facilitation relative to both types of baselines. An additional complication is that researchers do not always sample regular and irregular forms from the same frequency distribution (Alegre & Gordon, 1999; see also Schreuder & Baayen, 1997; Stemberger & MacWhinney, 1986). If effects of facilitation (or decomposition) depend on frequency, apparent discrepancies between processing of regular and irregular forms may reflect sampling from different frequency distributions.

An increasingly popular methodology for measuring the impact of morphologically related primes on their targets is Forster and Davis' (1984) masked priming procedure (e.g., Forster & Azuma, 2000; Masson & Isaak, 1999; Tsapkini, Kehayia, & Jarema, 1999). In this technique, primes are presented very briefly (duration ranges from 40 to 60 ms) and are forward masked with a series of hash marks (#####) for 500 ms. Primes appear in lowercase letters. Uppercase targets follow immediately at offset. The change in letter case together with superposition of the target and the prime in the same location serve to backward mask the prime, thereby reducing prime visibility. Phenomenologically, on most trials participants report no awareness of the prime, so priming effects are not likely confounded with conscious processes (Forster, 1999). In the forward masked procedure, morphological facilitation is typically assessed relative to an orthographically similar but morphologically unrelated baseline. Orthographic primes are designed to match morphological primes for degree of letter overlap with the target. By implication, the ideal match of orthographic primes with targets depends on the nature of form overlap among morphologically related primes and targets. The advantage for morphologically related pairs relative to orthographic controls is interpreted as evidence for activations in prime and again in target of a shared morpheme within lexical entries that are decomposed (for a review, see Deutsch et al., 1998).

A potential shortcoming, however, derives from the task's sensitivity to orthographic variables such as target neighborhood density and perhaps target letter length, as well as position of shared letters between prime and target (De Moor & Brysbaert, 2000; Forster, Davis, Schoknecht, & Carter, 1987). Orthographic similarity can be defined to encompass multiple orthographic dimensions, so that an orthographic baseline can differ from a purely unrelated baseline (see for example, Grainger et al., 1991). In one recent study conducted in French (Giraudo & Grainger, 2000), researchers introduced an unrelated as well as an orthographic condition to assess morphological facilitation from repetition of a derivational affix in primes and in targets. Facilitation for affixed targets was assessed relative to pseudoaffixed as well as orthographically unrelated primes. (Pseudoaffixed words were orthographically similar but morphologically unrelated to the target.) Across three (43, 57, and 115 ms) stimulus onset asynchronies, Giraudo and Grainger reported significant facilitation, relative to the unrelated baseline, for primes and targets that shared a prefix (e.g., French analogs of *rename–reborn*) but not for items that shared a suffix (e.g., *taller–warmer*). Facilitation due to repetition of the prefix was also significant relative to the orthographic baseline (e.g., *retail–reborn*), but only at longer prime durations (57 and 115 ms). It is important to note that at a prime exposure duration of 43 ms, target latencies after unrelated primes were 16 ms slower than after pseudoprefixed primes.[1] In essence, in the forward masked procedure at a 43-ms prime duration morphological facilitation assessed relative to orthographic and unrelated baselines differed numerically, and only the latter was significant. The Giraudo and Grainger finding illustrates that in the construction of orthographic controls matching along multiple (orthographic) dimensions may be crucial to assessments of facilitation; in particular, the effect of orthographically similar primes with word initial overlap differed from unrelated primes at very short prime durations, but no analogous effect was evident when overlap was in the final position.

Form overlap among morphological relatives is not restricted to the position of overlapping letters. That is, among morphologically related pairs, regular (e.g., *hatched*) and irregular (e.g., *taught*) past tense forms in English can differ with respect to the amount (number or proportion of shared letters) of orthographic overlap they share with their morphologically simple target (viz., *hatch* and *teach*, respectively). Similarly, in Hebrew, regular and weak root primes can differ with respect to the amount of form overlap they share with a morphologically related target. Note, moreover, that in English as in Hebrew the variability in overlap between morphologically related pairs is not limited to regular versus irregular forms. For example, among irregular inflections, *fell*-type items overlap with their uninflected stem (e.g., *fall*) more than *taught*-type items overlap with theirs (e.g., *teach*). In essence, because regularity and degree of overlap typically are confounded in English (see Table 1) as well as Hebrew, appreciation of the sensitivity of the forward masked lexical decision procedure to orthographic dimensions of similarity suggests that the informativeness of an orthographic baseline also depends on the degree of orthographic overlap between primes and targets. Minimally, orthographically similar primes should match morphological primes so that length and proportion of overlapping letters with the target do not differ.

A recent investigation of morphological facilitation after regular and weak root primes in Hebrew (see Table 2 of Frost et al., 2000) highlights why the construction of orthographic baselines can be critical. If the example in Table 2 of Frost et al. (2000) is representative, in Experiment 1 regular and weak root morphological (viz., word pattern) primes shared their first letter with the target and regular, but not weak, root primes matched targets in letter length. That is, orthographic control primes matched targets and regular primes, but not weak primes, with respect to initial letter and length. In that study, only in Experiments 1 and 5 was initial letter preserved over primes and targets. In the former experiment, word-pattern facilitation was significant after complete (regular) primes (17 ms) but not after weak primes (6 ms). The difference between prime types (11 ms) for the same target was not tested. In Experiment 5, weak root primes that were formed into pseudowords by the addition of a letter (thereby preserving target length) also produced word-pattern facilitation (14 ms) relative to an orthographically similar word prime. In the remaining experiments, orthographic primes shared two or three letters with the five-letter target (proportions of 40–60%) and repeated letters did not necessarily appear in the same positions. Crucially, target decision latencies after orthographic control primes that failed to match both the initial phoneme and the length of the target did not differ from word-pattern primes. Stated generally, variation in the

[1] Forster et al. (1987; Experiment 6) suggested that the direction of orthographic effects (relative to an unrelated control) in forward masked priming depends on the target neighborhood density. Inhibition arises for targets with large orthographic neighborhoods. Facilitation arises for targets with small orthographic neighborhoods.

Table 1
Attributes (and Standard Deviations) of Regular and Irregular Primes and Their Targets

	Prime type			
Morph. type and attribute	Morph.	Ortho.	Unrel.	Target
Regular	hatched	hatchet	phantom	HATCH
Mean frequency	24.0 (27.5)	14.0 (17.9)	12.7 (18.3)	59.7 (72.1)
Total no. of neighbors	3.9 (2.7)	2.6 (1.9)	1.2 (1.9)	10.0 (5.5)
Mean letter length	5.9 (0.9)	5.9 (1.0)	5.9 (1.0)	4.0 (0.6)
Mean repeated letters	4.0 (0.6)	3.6 (0.7)	0.3 (0.6)	—
% repeated letters	68.2 (8.3)	62.1 (12.2)	4.5 (8.6)	—
Mean no. of phones	4.4 (0.8)	4.7 (1.0)	4.7 (0.9)	3.1 (0.6)
Mean repeated phones	3.1 (0.6)	2.7 (0.9)	0.2 (0.5)	
% repeated phones	72.0 (6.5)	57.5 (15.6)	4.0 (9.0)	
Irregular—high overlap	fell	fill	pair	FALL
Mean frequency	82.2 (115.3)	57.9 (105.1)	57.7 (104.1)	85.4 (149.5)
Total no. of neighbors	8.7 (5.2)	7.5 (4.6)	6.3 (4.2)	8.5 (5.1)
Mean letter length	4.4 (0.5)	4.5 (0.6)	4.5 (0.6)	4.4 (0.5)
Mean repeated letters	3.0 (0.8)	3.1 (0.8)	0.4 (0.7)	—
% repeated letters	67.9 (15.9)	68.4 (14.7)	8.4 (15.6)	—
Mean no. of phones	3.7 (0.6)	3.6 (0.6)	3.7 (0.6)	3.6 (0.6)
Mean repeated phones	2.5 (0.6)	2.4 (0.8)	0.2 (0.5)	—
% repeated phones	67.5 (11.1)	66.1 (17.0)	6.7 (14.8)	—
Irregular—low overlap	taught	taunts	slouch	TEACH
Mean frequency	69.0 (72.2)	48.3 (88.7)	48.0 (84.4)	79.0 (85.5)
Total no. of neighbors	5.6 (4.8)	6.4 (5.6)	5.1 (6.1)	7.9 (5.4)
Mean letter length	4.8 (1.1)	4.8 (1.1)	4.8 (1.1)	4.5 (0.9)
Mean repeated letters	2.5 (1.1)	2.1 (0.9)	0.4 (0.6)	—
% repeated letters	56.1 (28.6)	45.6 (21.2)	10.4 (16.8)	—
Mean no. of phones	3.3 (0.5)	3.7 (0.8)	4.0 (0.9)	3.1 (0.6)
Mean repeated phones	2.0 (0.7)	1.5 (0.6)	0.1 (0.4)	—
% repeated phones	57.9 (15.9)	41.8 (16.2)	2.9 (7.5)	—

Note. Morph. = morphological; Ortho. = orthographic; Unrel. = unrelated.

construction of orthographic primes across items and experiments in Hebrew may have contributed to the absence of word-pattern facilitation for weak roots in the forward masked priming studies.

In our study, we used the masked priming procedure to investigate morphological processing of regular and irregular inflections in English. Generally, we examined morphological facilitation as a function of form overlap among morphologically related prime–target pairs. Because morphological facilitation in masked priming may depend on the degree of orthographic similarity between primes and targets, and consistent with the refinement of Grainger et al. (1991) and Giraudo and Grainger (2000), we included both an orthographic and an unrelated baseline condition. Our goals for this study were threefold: (a) to probe for evidence of decompositionality on the basis of morphological facilitation after regular but not irregular past tense formations in English, (b) to compare morphological facilitation assessed relative to orthographic and unrelated baselines, and (c) to examine whether degree of form overlap influences facilitation among irregular inflectionally related forms.

Method

Participants

Fifty-three students recruited from the University at Albany, State University of New York participated in the experiment. Fifty participated in partial fulfillment of introductory psychology course requirements, and the remaining 3 received $5 for their participation. All participants were native English speakers with normal or corrected-to-normal vision and no known reading disorders.

Materials

Sixty-three simplex, present tense English verbs served as target words. Each target was paired with three prime words: (a) a morphological relative, (b) an orthographically similar form, and (c) a morphologically and orthographically unrelated control. Morphological primes were either regular or irregular past tense forms. Twenty-one targets had regular morphological primes, and 42 had irregular primes. The overlap of the past tense forms varied. Half of the irregular pairs had morphological primes that shared with their targets an average of 67.9% of their letters in the same position (e.g., *fell–FALL*), and half shared an average of 56.1% of their letters in the same position (e.g., *taught–TEACH*). Regular past tense morphological primes shared 68.2% of their letters with their respective targets (e.g., *hatched–HATCH*).

Orthographic primes were constructed to be as similar to targets as were morphological primes. As such, orthographic primes and morphological primes (e.g. *hatchet–hatched; fill–fell; taunts–taught*) were selected for maximum similarity in letter length, orthographic overlap (number and proportion of letters, and phones, repeated in the same position in prime and target), and total number of neighbors that differed from the prime by one letter (see Table 1). Orthographically similar primes as well as morphologically related primes always retained the initial letter and phoneme of the target. Both the orthographic and unrelated control primes were designed to serve as baselines for the morphological condition. Accordingly, orthographic and unrelated control primes were matched to each other for written frequency (Kučera & Francis, 1967), letter length, and number of neighbors, and these constraints took priority over perfect matching of morphological and orthographic conditions on number of overlapping letters (and phones). Finally, the three types of targets (e.g., regular, irregular—high overlap, irregular—low overlap) were matched for written frequency,[2] letter length, and number of neighbors (see Table 1).

Sixty-three word–nonword pairs were constructed to mimic the conditions in word–word pairs. Accordingly, 42 pairs (e.g., *glimmer–GLIM; bloom–BLOME; wonder–WEND*) shared orthography (to varying degrees), and 21 pairs were unrelated (e.g., *pollen–RANCE*).

Design

We created three counterbalanced lists, and each contained 126 trials (63 word targets, 63 nonword targets). Targets (e.g., *HATCH*) appeared only once per list and all three prime types (morphological, e.g., *hatched*; orthographic, e.g., *hatchet*; and unrelated, e.g., *phantom*) were equally represented within each list. Each prime appeared in only one list, such that across lists each target was preceded by a different prime. Nonword pairs were not counterbalanced across lists. Morphological type (e.g., *hatched–HATCH, fell–FALL, taught–TEACH*) was a repeated factor in the analysis by participants and a between-items factor in the analysis by items. Relatedness (i.e., morphological, orthographic, unrelated) was a repeated factor in the analyses by participants and by items.

Procedure

Materials were presented in a different random order for each participant on a Power Macintosh 6100/60AV computer. Each trial began with a 450-ms "+" fixation followed by a 50-ms blank. A masking pattern (######), matched in length to each prime word, appeared for 500 ms. Prime words appeared for 48 ms, and superimposed targets immediately followed until participants responded or 3,000 ms had elapsed. All stimuli were left justified at the same central location on the screen. Stimuli were presented in a black, 18 point Courier font on a white screen. Primes were lowercase and targets were uppercase. Participants made lexical decision responses to each target by pressing the left key (colored red) for nonwords and the right key (colored green) for words. The intertrial interval was 1,000 ms. There was no reaction time or accuracy feedback.

Results

Data from 6 participants, 2 per experimental list, were deleted from the analyses because their response accuracy fell below 60% in at least one condition. One target, *OPT*, was removed from the analyses because across participants its response accuracy was below 60% in all conditions. Additionally, reaction times that were more extreme than three standard deviations from each participant's mean reaction time were deleted and treated as errors (2.8% of all reaction times). Inspection of mean response latencies revealed shorter reaction times for targets preceded by morphologically related primes (see Table 2). It is important to note that difference scores indicate that choice of baseline (orthographic vs. unrelated) influenced the magnitude of morphological facilitation (see Figure 1).

Latency and accuracy data from 47 participants were entered into separate 3 (morphological type: *hatched–HATCH, fell–FALL, taught–TEACH*) × 3 (relatedness: morphological, orthographic, unrelated) analyses of variance with participants (F_1) and items (F_2) as random variables. The effect of morphological type was significant with the reaction time measure, $F_1(2, 46) = 5.645$, $MSE = 5{,}399$, $p < .01$; $F_2(2, 59) = 4.234$, $MSE = 9{,}957$, $p < .02$, and nearly significant with the accuracy measure, $F_1(2, 46) = 27.859$, $MSE = 0.004$, $p < .01$; $F_2(2, 59) = 2.630$, $MSE = 0.007$, $p = .08$. That is, responses were slower and less accurate for *HATCH*-type items compared with both types of irregular past tense formations. There was also an effect of relatedness that was significant only with the reaction time measure, $F_1(2, 92) = 11.069$, $MSE = 3{,}324$, $p < .01$; $F_2(2, 118) = 6.948$, $MSE = 3{,}121$, $p < .01$. Response latencies for targets varied depending on whether primes were morphologically related, orthographically related, or unrelated to targets. Finally, the Morphological Type × Relatedness interaction was not significant, $F_1 < 1$; $F_2(4, 118) = 1.720$, $MSE = 3{,}121$, $p = .15$.

Planned comparisons revealed that target latencies after an orthographically similar prime did not differ significantly from those that followed an unrelated prime, and this was true for all types of targets ($Fs < 1.15$). When assessed relative to the unrelated baseline, morphologically related primes significantly reduced response latencies (38 ms) for *hatched–HATCH*-type items, $F_1(1, 184) = 8.468$, $MSE = 4{,}012$, $p < .01$; $F_2(1, 38) = 3.057$, $MSE = 5{,}787$, $p < .09$. Morphological facilitation for *hatched–HATCH*-type items was stronger (44 ms) when assessed relative to the orthographic baseline, $F_1(1, 184) = 11.125$, $MSE = 4{,}012$, $p < .01$; $F_2(1, 38) = 8.191$, $MSE = 5{,}787$, $p < .01$. Choice of baseline did not alter the assessment of morphological facilitation for *taught–TEACH*-type items. Neither measurement was significant. Crucially, morphological facilitation (33 ms) was significant for *fell–FALL*-type items when assessed relative to the orthographic (*fill–FALL*) baseline, $F_1(1, 184) = 6.348$, $MSE = 4{,}012$, $p = .01$;

Table 2
Mean Decision Latencies (and % Accuracies)

Morph. type	Prime type: Unrel.	Ortho.	Morph.	Morph. vs. ortho.
Regular				
Prime	phantom	hatchet	hatched	
Target	HATCH	HATCH	HATCH	
	670 (94)	676 (91)	632 (93)	
Facilitation		−6 (−3)	38 (−1)	44 (2)
Irregular—high overlap				
Prime	pair	fill	fell	
Target	FALL	FALL	FALL	
	632 (98)	646 (97)	613 (97)	
Facilitation		−14 (−1)	19 (−1)	33 (0)
Irregular—low overlap				
Prime	slouch	taunts	taught	
Target	TEACH	TEACH	TEACH	
	648 (98)	646 (97)	631 (98)	
Facilitation		2 (−1)	17 (0)	15 (1)

Note. Unrel. = unrelated; Ortho. = orthographic; Morph. = morphological.

[2] Target word frequencies were entered into a one-way analysis of variance. The dependent measure was frequency and the nonrepeated factor was morphological type (regular, irregular—high overlap, irregular—low overlap). There was no main effect of morphological type ($Fs < 1$). Additionally, planned comparisons revealed no significant difference between any pair of morphological types ($Fs < 1$).

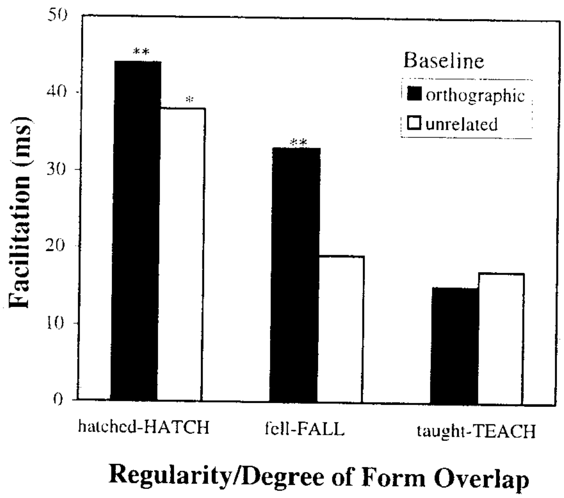

Figure 1. Morphological and orthographic effects as a function of regularity. *significant ($p < .05$) in analysis by participants; ($p < .09$) by items. **significant ($p < .05$) in analyses by participants and by items.

$F_2(1, 40) = 6.485$, $MSE = 1{,}912$, $p = .01$, but not (19 ms) relative to the unrelated (*pair–FALL*) baseline, $F_1(1, 184) = 2.107$, $MSE = 4{,}012$, $p = .15$; $F_2(1, 40) = 1.207$, $MSE = 1{,}912$, $p = .28$.

Discussion

The results of this masked priming study demonstrate that regular (*hatched–HATCH*) as well as *fell–FALL*-type irregular relatives facilitate response latencies to their present tense targets. This was not the case, however, for irregular prime–target pairs such as *taught–TEACH*. It is important to note that facilitation is not limited to regular past tense formations, therefore it need not reflect decomposition and repeated access to a shared base morpheme. We emphasize that the differential magnitudes of morphological facilitation for regular and irregular targets cannot be attributed to characteristics of the targets. *HATCH*-, *FALL*-, and *TEACH*-type targets were matched for printed frequency, length, and number of neighbors. Additionally, because targets were always present tense verb forms and primes were always the past tense form of the target, shared semantics between morphologically related primes and targets was tightly controlled. There are, however, dimensions of form similarity between the primes and targets that may contribute to the presence of morphological facilitation for *hatched–HATCH*- and *fell–FALL*- but not for *taught–TEACH*-type items. *Hatched–HATCH* prime–target pairs, for example, exhibit similarity because the base morpheme of the prime always recurs in the target. Another aspect of similarity, high degree of positional letter overlap, was evident for *fell–FALL* as well as *hatched–HATCH* pairs, and both types produced morphological facilitation. In contrast, *taught–TEACH*-type items had a reduced degree of orthographic overlap and morphological facilitation was absent. In terms of letters (and phones) that recur in the same position in morphological prime and target, overlap was 68% (and 72%) for *HATCH*, 68% (and 68%) for *FALL*, but only 56% (and 58%) for *TEACH*-type items. To summarize, although both are irregular, *fell–FALL*-type items share greater form overlap (in fact, 15 of 21 pairs are orthographic neighbors) than do *taught–TEACH*-type items and only the former manifested morphological facilitation.

Distinct from the orthographic similarity among morphological relatives, the form similarity of targets to orthographic controls may influence outcomes in the forward masked priming task. As noted above, the results of Giraudo and Grainger (2000) intimate a special contribution for initial, relative to final, form overlap among prime–target pairs that were orthographically but not morphologically related. Preliminary data collected in our lab indicate that when overall similarity and length were matched, and prime–target pairs were not morphologically related, mismatch in the first position (e.g., *ring–SING*) produced nonsignificant facilitation (7 ms), whereas mismatch in the final position (e.g., *sink–SING*) produced marginally significant inhibition (−25 ms). This pattern was only evident for low-frequency targets ($M = 19.4$, $SD = 11.7$) from large ($M = 14.3$, $SD = 3.2$) orthographic neighborhoods, however. In the present study, we emphasize, the first letter of the target was always retained in the orthographic as well as the morphological prime and all targets came from high-density neighborhoods.

In the present study, morphological and orthographic primes differed in orthographic overlap with targets by (68 − 62) 6% for *HATCH*-type items, by (68 − 68) 0% for *FALL*-type items, and by (56 − 46) 10% for *TEACH*-type items. Analogous differences for phonological overlap patterned similarly and were 14%, 2%, and 16%, respectively (see Table 1). Evidently, when proportion of overlap approached 70% and matching was most rigorous there was evidence of orthographic inhibition for targets that resided in large neighborhoods in the forward masked priming task (see also Forster et al., 1987, Experiment 6). Accordingly, when morphological relatives are similar in form and morphological and orthographic primes are tightly matched for similarity with the target, morphological facilitation depends on the baseline. When assessed relative to an orthographic baseline, *fell–FALL*-type items—like *hatched–HATCH* but unlike *taught–TEACH*-type items—revealed significant morphological facilitation. Assessed relative to an unrelated baseline, however, both the *fell–FALL* and *taught–TEACH* irregular items failed to reveal morphological facilitation. Apparently, choice of baseline did not alter facilitation for *HATCH*-type targets or the absence of facilitation for *TEACH*-type targets. By contrast, facilitation for *FALL*-type items depended on baseline (see Figure 1).

The issue of baseline in assessments of morphological facilitation for *fell–FALL*-type pairs in English also may be relevant to our understanding of word pattern facilitation in Hebrew (Frost et al., 2000). Prime–target pairs with shared word patterns produced morphological facilitation when prime roots were regular, but irregular primes with two- (instead of three-) letter roots and a shared word pattern failed to produce significant morphological facilitation (Frost et al., 2000, Experiment 1). However, with the same materials, facilitation was significant when a random consonant was inserted into the letter string of the irregular prime (Frost et al., 2000, Experiment 5) to restore the length of the root. Frost et al. claimed that when facilitation was assessed relative to an orthographic baseline, it was essential to preserve root length to be able to decompose word pattern from root so as to obtain word-pattern facilitation. Note, however, that the construction of orthographic control primes varied across experiments and had consequences for the target error rate. Admittedly, the appropriateness of comparing Hebrew weak roots and English irregular past tense inflection is subject to discussion. Nevertheless, we have demonstrated that degree of form similarity among relatives influences the magnitude of morphological facilitation and that matching form similarity of orthographic primes with morphological primes can be crucial. Therefore, without more precise knowledge about the orthographic and phonological structure of the Hebrew orthographic controls, it is misleading to claim that in masked priming regular roots produce word-pattern facilitation whereas irregular roots do not.

In summary, comparisons between regular and irregular forms in variants of the lexical decision task are central to our understanding of morphological processing and to debates about whether different mechanisms underlie recognition of regular and irregular forms. Comparisons are problematic unless regular and irregular targets can be equated on dimensions such as frequency and number of neighbors. In addition, because the degree of overlap among related primes and targets generally varies with regularity, the contribution of orthographic overlap is better assessed by including both an orthographic and an unrelated baseline even though the identification and weighting of critical dimensions (viz., initial letter, word length, percentage and position of repeated letters and phones) of similarity remains underspecified. In our study, with controls for orthographic overlap, the magnitude of morphological facilitation was significant for regular as well as high-overlap irregular morphological relatives. In conclusion, claims of morphological facilitation for regular but not for irregular verb formations in English appear to reflect a confound with degree of form overlap rather than compelling evidence of selective decomposition.

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