Long-lag morphological priming depends on form overlap

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Background and problem statement

Long-lag priming, in which primes and targets are separated by many intervening trials, is a valuable method for investigating lexical activation and representation. Responses to a word are facilitated when a participant has previously seen a morphologically related word (e.g. *hunter*…*hunt*). This long-lag morphological priming is thought to occur even when the form of the morpheme is different between the prime and target (e.g. *give*…*gave*).

In these cases, however, the prime and target share substantial overlap in form. It is less clear **whether long-lag morphological priming can occur with little form overlap (e.g. *teach*…*taught*)**. Few studies have examined morphological priming in such word pairs. Of those that did, the findings have been inconsistent: some observed priming (Marslen-Wilson & Tyler, 1998; Stanners et al., 1979) and some did not (Napps, 1989; Stockall, 2004; Emmorey, 1991).

Experiment design

Here we examine long-lag priming between present- and past-tense forms of English verbs with little form overlap (e.g., ***teach…taught***) compared to those with more form overlap (e.g., ***win…won***) and to regular verbs (e.g., ***kick…kicked***) (Table 1). We used an adaptation of criteria from Stockall and Marantz (2006) to classify irregular verb pairs as having high or low form overlap between past- and present-tense variants. Participants saw each word in isolation and performed a speeded lexical decision to it. Targets occurred 20-58 (mean: 39) trials after their corresponding primes. Because low-overlap irregular verbs tend to be high frequency, we regressed out frequency in our analysis, which used Bayesian mixed-effects regression models (Bürkner, 2017).

Results

In our first experiment (N=65 native speakers of English; Figure 1), irregular verbs with high form overlap showed a robust 15-ms priming (Bayesian 95% credible interval [CrI]: [5, 25]), whereas irregular verbs with low form overlap showed no priming (-2 ms [-22, 16]). However, regular verbs failed to show robust priming (8 ms [-2, 18]), which raises doubt about whether the experiment was able to successfully elicit long-lag morphological priming at all. We thus ran a replication using a new set of regular verbs.

In the replication experiment with new participants (N=68; Figure 2), irregular verbs with high overlap again elicited robust priming (22 ms [11, 35]). Irregular verbs with low overlap failed to elicit robust priming but showed a weak trend (9 ms [-8, 24]), and regular verbs showed essentially no hint of priming (2 ms [-8, 13]).

Across the two experiments, what we find is that **morphological priming only occurred reliably for irregular verbs with a high amount of form overlap**. Neither irregular verbs with low form overlap, nor regular verbs (which inherently have high form overlap) yielded robust priming.

Discussion

The lack of priming for irregular verbs with low overlap suggests that **long-lag morphological priming only occurs when there is sufficient form overlap**. This finding challenges the common assumption that long-lag morphological priming occurs regardless of form; this finding is, however, consistent with Bowers & Kouider's (2003) account of long-lag priming, which explains morphological priming as activation of orthographic/phonological access codes rather than activation of morphemes themselves.

The lack of priming for regular verbs might be explained by the fact that recognizing the past-tense targets in this condition could involve affix stripping (e.g. Stockall & Marantz, 2006), which takes up some processing time and causes the parser to miss the "sweet spot" during which the prime could have facilitated recognition of the target. This explanation is speculative and requires further research to test.

Table 1. Conditions used in the experiment, with example stimuli. Verb targets were paired with a corresponding related or unrelated prime.

	Related	Unrelated
Regular verb (24 targets)	*kick…kicked*	*ride…kicked*
Irregular verb, high overlap (24 targets)	*win…won*	*fail…won*
Irregular verb, low overlap (12 targets)	*teach…taught*	*quit…taught*
Noun fillers (120; not paired into primes/targets)	*carrot*	
Pseudoword foils (240; not paired into primes/targets)	*glod*	

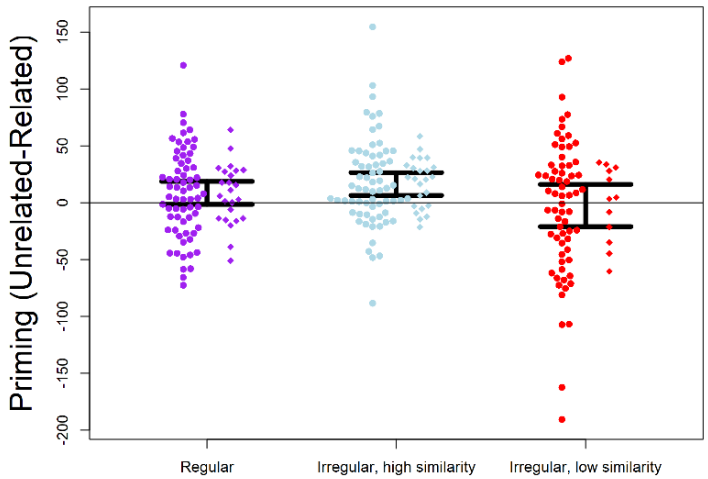

Figure 1. Priming effects for each condition. Dots are participants, diamonds are items. Error bars represent 95% credible interval of the priming effect.

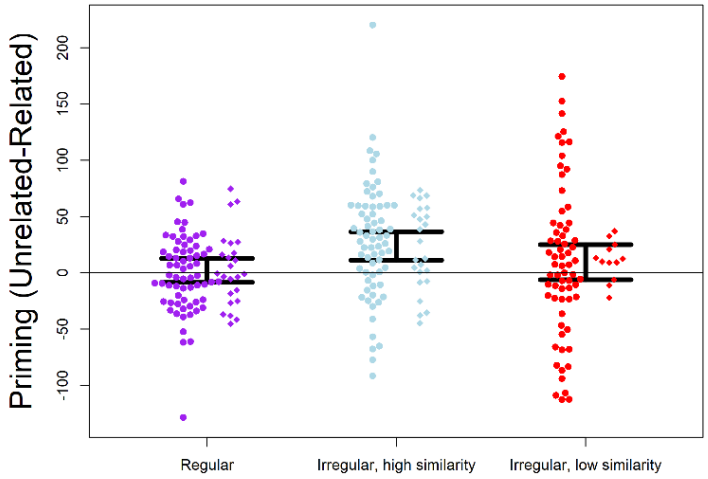

Figure 2. Priming effects for each condition. Dots are participants, diamonds are items. Error bars represent 95% credible interval of the priming effect.

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