Learning to love the null

Adrian Staub

Examining the Replication Crisis

ISSR Panel

April 8, 2016

"The null hypothesis is often the theoretically most elegant and interesting hypothesis, as witness the invariance laws in physics. It is almost always the more precise hypothesis. We should proudly champion it when the data support it." (Gallistel, 2009)

Phonological typicality influences on-line sentence comprehension

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Since Saussure, the relationship between the sound and the meaning of words has been regarded as largely arbitrary. Here, however, we show that a probabilistic relationship exists between

guide their interpretation of novel words (14). Moreover, phonological cues have also been shown to improve the learning of artificial languages by both children (15) and adults (11). Together

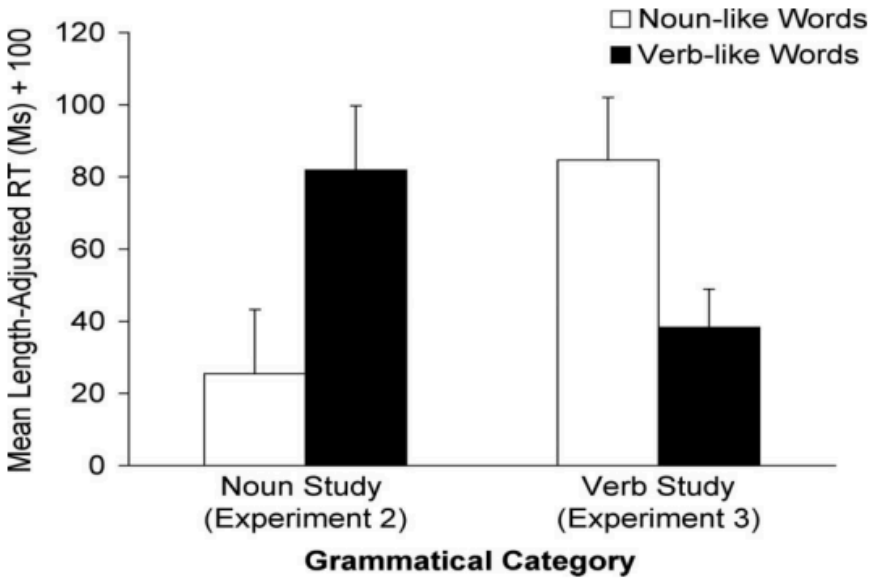

Fig. 2. Mean RTs (and standard errors) for the phonologically typical and atypical conditions in experiments 2 and 3. After length-adjustment, a constant of 100 was added to make the figure easier to interpret.

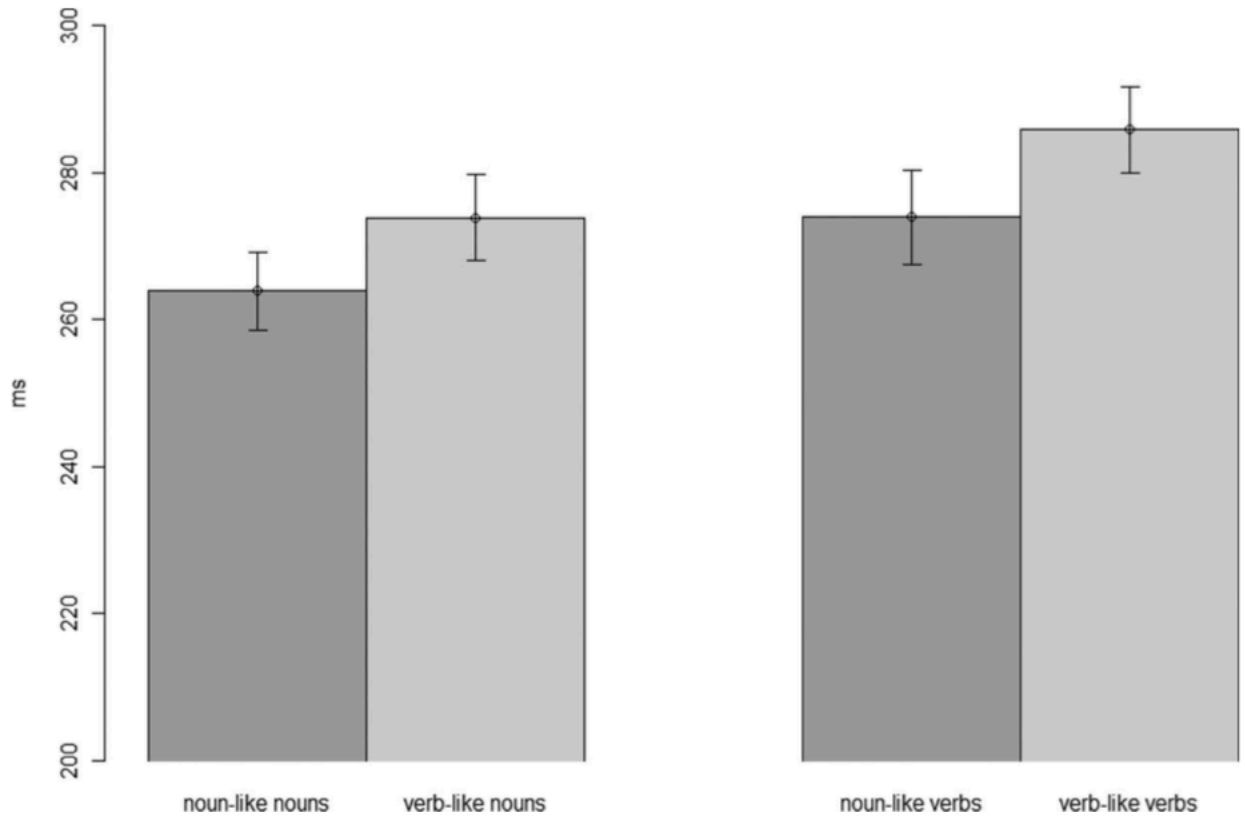

Figure 1. Gaze duration means in Experiment 1, collapsed across the sentence-frame factor. Error bars represent standard error of the mean.

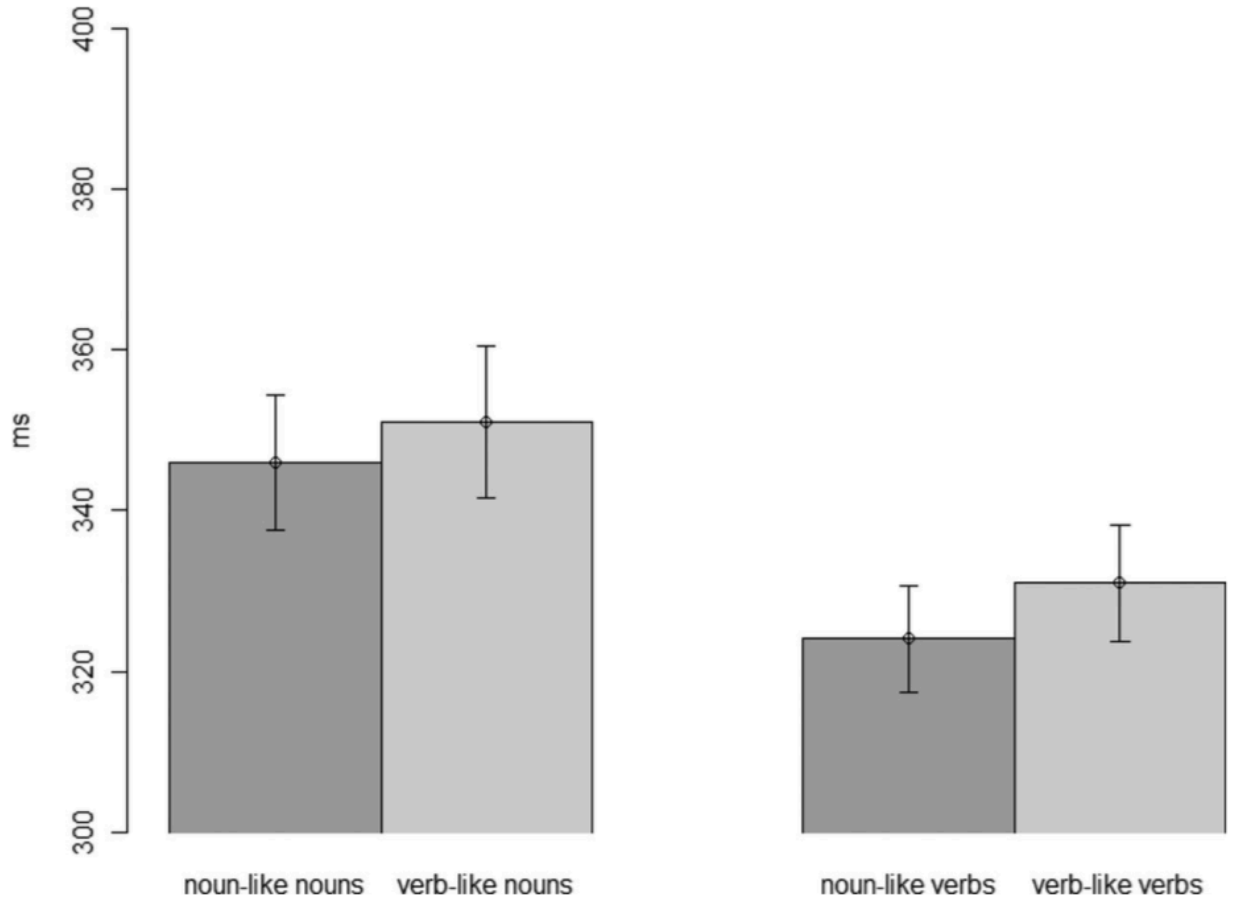

Figure 2. Reading-time means on the critical word in Experiment 2, collapsed across the sentence-frame factor. Error bars represent standard error of the mean.

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Phonological Typicality Does Not Influence Fixation Durations in Normal Reading

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Using a word-by-word self-paced reading paradigm, T. A. Farmer, M. H. Christiansen, and P. Monaghan (2006) reported faster reading times for words that are phonologically typical for their syntactic category (i.e., noun or verb) than for words that are phonologically atypical. This result has been taken to suggest that language users are sensitive to subtle relationships between sound and syntactic function and that they make rapid use of this information in comprehension. The present article reports attempts to replicate this result using both eyetracking during normal reading (Experiment 1) and word-by-word self-paced reading (Experiment 2). No hint of a phonological typicality effect emerged on any reading-time measure in Experiment 1, nor did Experiment 2 replicate Farmer et al.'s finding from self-paced reading. Indeed, the differences between condition means were not consistently in the predicted direction, as phonologically atypical verbs were read more quickly than phonologically typical verbs, on most measures. Implications for research on visual word recognition are discussed.

Keywords: reading, word recognition, eye movements, language processing

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0278-7393/11/$12.00 DOI: 10.1037/a0023063

Phonological Typicality Influences Sentence Processing in Predictive Contexts: Reply to Staub, Grant, Clifton, and Rayner (2009)

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Lancaster University

Jennifer B. Misyak and Morten H. Christiansen
Cornell University

In 2 separate self-paced reading experiments, Farmer, Christiansen, and Monaghan (2006) found that the degree to which a word's phonology is typical of other words in its lexical category influences online processing of nouns and verbs in predictive contexts. Staub, Grant, Clifton, and Rayner (2009) failed to find an effect of phonological typicality when they combined stimuli from the separate experiments into a single experiment. We replicated Staub et al.'s experiment and found that the combination of stimulus sets affects the predictiveness of the syntactic context; this reduces the phonological typicality effect as the experiment proceeds, although the phonological typicality effect was still evident early in the experiment. Although an ambiguous context may diminish sensitivity to the probabilistic relationship between the sound of a word and its lexical category, phonological typicality does influence online sentence processing during normal reading when the syntactic context is predictive of the lexical category of upcoming words.

Keywords: language processing, lexical categories, learning, sentence comprehension

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0278-7393/11/$12.00 DOI: 10.1037/a0024193

REJOINDER

Still No Phonological Typicality Effect on Word Reading Time (and No Good Explanation of One, Either): A Rejoinder to Farmer, Monaghan, Misyak, and Christiansen

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Keith Rayner
University of California, San Diego

In this brief rejoinder, we respond to Farmer, Monaghan, Misyak, and Christiansen (2011). We argue that the data still do not support the claim that reading time is affected by the phonological typicality of a word for its part of speech. We also question Farmer et al.'s claim that interleaving syntactic structures in an experiment modifies grammatically based syntactic expectations.

Lack of Empirical Support

As we pointed out in Staub et al. (2009), the original Farmer et al. (2006) article did not include any analyses with items as a random factor. In our (2009) article, we found no significant, or even marginal, effects of phonological typicality. In their new experiment, Farmer et al. (2011) found no overall effect of typicality.

Farmer et al. (2011) did report a significant three-way interaction among order, part of speech, and phonological classification. (We note that reanalysis of our 2009 experiments provided no hint of an interaction with order or of a typicality effect at the beginning of the experiments.) However, this was not due to a significant phonological typicality effect at the beginning of the experiment, where the effect is putatively the strongest. The only reported test that approached significance was a one-tailed t test ($p = .07$) that assessed the typicality effect for the first three nouns. Note that with the standard two-tailed test, the p value would have been .14. We assume, by its omission, that the t test for the numerically smaller effect comparing the first three verbs was even further from significance. Thus, the interaction with order must, in fact, have been due in large part to the unexplained reversal at the end of the experiment (a reversal which, we submit, begins at the fourth item[2]).

In sum, there has yet to be a demonstration, in any experiment or in any part thereof, of an effect of the phonological typicality of a word on how fast the word is read that reaches, or even approaches, conventional standards of statistical significance. As usual, the burden of proof is carried by the argument against the null hypothesis. That burden is, in this case, made heavier by repeated null effects in well-controlled experiments.

[HTML] **Phonological typicality** influences on-line sentence comprehension

TA Farmer, MH Christiansen… - Proceedings of the …, 2006 - National Acad Sciences

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Still no **phonological typicality** effect on word reading time (and no good explanation of one, either): a rejoinder to Farmer, Monaghan, Misyak, and Christiansen.

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"Although the search for invariances has often motivated theory in other domains, it has not had as much impact in psychology. Invariances are statements of equality, sameness, or lack of association, whereas in practice, the psychological field has a Popperian orientation, in which demonstrations of effects or associations are valued more than demonstrations of invariances."
(Rouder et al., 2009)

Thanks!