

Dissociating sublexical and lexical masked priming effects: Only words are morphologically decomposed.

Crystal Jemy¹, Roberto Petrosino², Diogo Almeida¹

¹ Psychology, New York University, USA

² Psychology, New York University Abu Dhabi, United Arab Emirates

Background: The Morpho-Orthographic Decomposition (MOD) hypothesis proposes an obligatory, sublexical, blind-to-meaning, visual decomposition process of morphologically complex words triggered by morpho-orthographic regularities. Supporting evidence comes from masked priming studies where the appearance of morphological structure in a prime word (*painter-PAINT*, *corner-CORN*) facilitates target recognition more than morphologically simple controls (*cashew-CASH*) [1]. However, the same does not hold with pseudoword primes (*cashic*, *cashel*, with *-ic* but not *-el* a potential suffix), which consistently facilitate embedded stems (*CASH*) to a similar degree regardless of apparent structure [2–4]. This discrepancy is often attributed to lexical inhibition, a process triggered only by morphologically simple word primes (*cashew*). While this might explain why simple pseudoword priming is often larger than simple word priming (*cashic-CASH* > *cashew-CASH*) [1, 5], it remains unclear whether orthographic and morphological priming are distinguishable when using pseudoword primes, as no study has fully crossed the lexical status and apparent morphological structure of primes. We do so here in two experiments with large sample sizes, guaranteeing high statistical power and precise estimates of priming effects for each condition.

Method: Two masked priming experiments in English were conducted online ($N_1=1812$, $N_2=1726$), with four conditions tested, crossing the lexical status and apparent morphological structure of the prime: a complex word prime condition (*cashless*), a simple word prime condition (*cashew*), a complex pseudoword prime condition (*cashic*), and a simple pseudoword prime condition (*cashel*). An unrelated simple word prime condition served as control (*rope*) using the same target (*CASH*). We also investigated whether task difficulty, a factor previously linked to orthographic priming [6–8], modulates MOD, by increasing the difficulty of pseudoword foils between study 1 and 2. Trials consisted of a 50ms-long prime preceded by a 500ms-long forward mask, and followed by a target, on which participants performed a lexical decision task. The results were analyzed using a generalized linear mixed model (inverse gaussian distribution, identity link function), with participants and items as crossed random effects.

Results: (rounded; CI=95%CI). The appearance of structure interacted with the lexical status of the prime: complex words elicited identical larger priming effects than complex pseudowords in experiments 1 and 2 ($M_1=M_2=10\text{ms}$, CI 8, 12; $\Delta=0\text{ms}$, CI -3, 3). In contrast, simple words produced slightly larger priming effects compared to simple pseudowords in experiment 1 ($M_1=2\text{ms}$, CI 0, 4), but the opposite effect in experiment 2 ($M_2=-5$, CI -7, -3). Thus, the interaction of lexicality and morphological complexity increased across experiments ($M_1=8\text{ms}$, CI 5, 11; $M_2=15\text{ms}$, CI 12, 18, $\Delta=7\text{ms}$, CI 3, 11). Linear contrasts comparing complex words against the other three conditions were virtually identical across experiments ($M_1=8\text{ms}$, CI 7, 10, $M_2=9\text{ms}$, CI 8, 11, $\Delta=1\text{ms}$, CI -1, 4). Within the pseudoword prime conditions, complexity produced negligible effects across experiments ($M_1=2\text{ms}$, CI -1, 4, $M_2=3\text{ms}$, CI 1, 5, $\Delta=2\text{ms}$, CI -1, 5).

Discussion: Complex pseudowords (*cashic*) exhibit priming effects indistinguishable from simple words (*cashel*) and simple pseudowords (*cashew*), suggesting that only *orthographic priming* is at play in these conditions. Only complex word primes (*cashless*) show effects larger than simple orthographic priming, suggesting that these items are indeed morphologically decomposed. Task difficulty does not affect decomposition, but seems to affect orthographic priming. This supports a model in which two distinct and mutually exclusive processes are at play: a *prelexical* priming process based on orthographic similarity that is sensitive to task difficulty, and a *lexical* morphological decomposition priming process that is not.

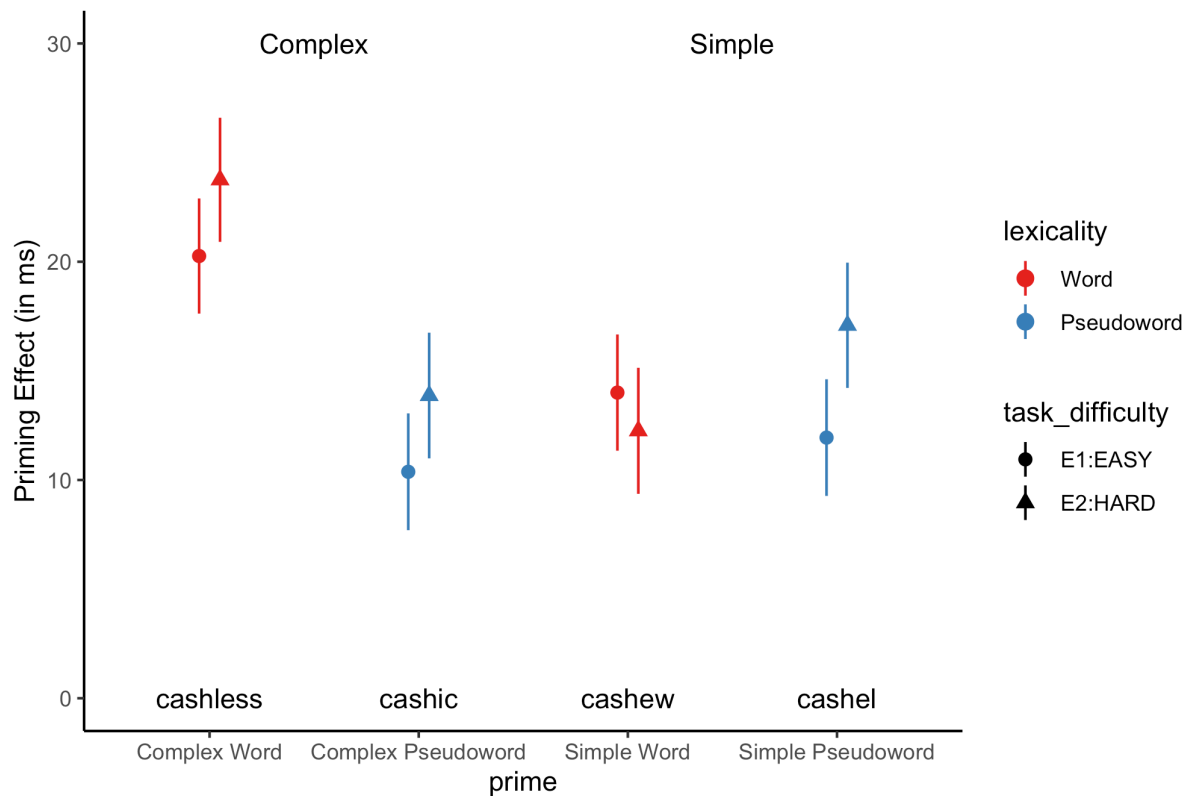


Figure 1: Priming effects estimates from GLMM (inverse gaussian with identity link, subjects and items as random intercepts and slopes). Error bars indicate the 95% CI.

References

- [1] Rastle, K., & Davis, M. (2008). Morphological decomposition based on the analysis of orthography. *Language and cognitive processes*, 23(7-8), 942–971. <https://doi.org/10.1080/01690960802069730>
- [2] Morris, J., Porter, J., Grainger, J., & Holcomb, P. (2011). Effects of lexical status and morphological complexity in masked priming: An ERP study. *Language and cognitive processes*, 26(4-6), 558–599. <https://doi.org/10.1080/01690965.2010.495482>
- [3] Beyersmann, E., Cavalli, E., Casalis, S., & Colé, P. (2016). Embedded Stem Priming Effects in Prefixed and Suffixes Pseudowords. *Scientific Studies of Reading*, 20(3), 220–230. <https://doi.org/10.1080/10888438.2016.1140769>
- [4] Tseng, H., Lindsay, S., & Davis, C. (2020). Semantic interpretability does not influence masked priming effects. *Quarterly Journal of Experimental Psychology*, 73(6), 856–867. <https://doi.org/10.1177/1747021819896766>
- [5] Adelman, J., Johnson, R., McCormick, S., Mckague, M., Kinoshita, S., Bowers, J., & Davis, . (2014). A behavioral database for masked form priming. *Behavior research methods*, 46(4), 1052–1067. <https://doi.org/10.3758/s13428-013-0442-y>
- [6] Forster, K., & Veres, C. (1998). The prime lexicality effect: form-priming as a function of prime awareness, lexical status, and discrimination difficulty. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 24(2), 498. <https://doi.org/10.1037/0278-7393.24.2.498>
- [7] Forster, K., & Azuma, T. (2000). Masked priming for prefixed words with bound stems: Does submit prime permit? *Language and Cognitive Processes*, 15(4-5), 539–561. <https://doi.org/10.1080/01690960050119698>
- [8] Qiao, X., & Forster, K. (2013). Novel word lexicalization and the prime lexicality effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 39(4), 1064–1074. <https://doi.org/10.1037/a0030528>