Asymmetries in the stem and affix masked priming response: a large-scale online study

Roberto Petrosino, Jon Sprouse & Diogo Almeida

Psychology, Division of Science, New York University Abu Dhabi

In a nutshell

- Reportedly, the affix masked priming response is much less robust than the stem counterpart.
- This asymmetry support the affix-stripping model of decomposition based on stem activation, with the affixes being just stripped off.
- Other than possibly due to low statistical power, this asymmetry may be driven by their inherently different nature:
  - stems may be stand-alone words
  - affix are always stem-bound
- This study addresses both issues and shows that the stem priming response is larger than the affix priming response, in support of the affix-stripping model.

Introduction

- The morphological masked priming literature reports differential effects between:
  (a) the stem masked priming response (e.g., *driver-DRIVE*), which is fairly robust across languages (e.g., English, French, Italian, Spanish), regardless of concatenativity of word formation (cf., Arabic) [1, 2]; and
  (b) the affix masked priming response (prefix priming: *unfair-UNCOMMON*; suffix priming: *jogger-FREEZER*), which seems less robust and smaller in size than (a) [3–6]).
- This asymmetry supports the **prefix-stripping model** of lexical access, in which affixes are just stripped off, and word recognition occurs via stem activation only [7].

Two potential confounds

1. low statistical power [8, 9]
2.

stems	affixes
stand-alone words in some lgs. (e.g., English)	inherently bound to stems
↓ directly testable	↓ *never* directly testable

This study was designed to eliminate both confounds, and provide a reliable comparison between the stem and affix masked priming responses.

This study

Experiment 1

Materials

- identity: *scorpion-SCORPION*
- morphological conditions:

		word pairs	
		prefixed	suffixed
priming	stem	*disuse-MISUSE*	*lovable-LOVELESS*
priming	affix	*unfair-UNCOMMON*	*jogger-FREEZER*

- orthographic: *bounds-BOUNCE*
- semantic: *captive-PRISONER*

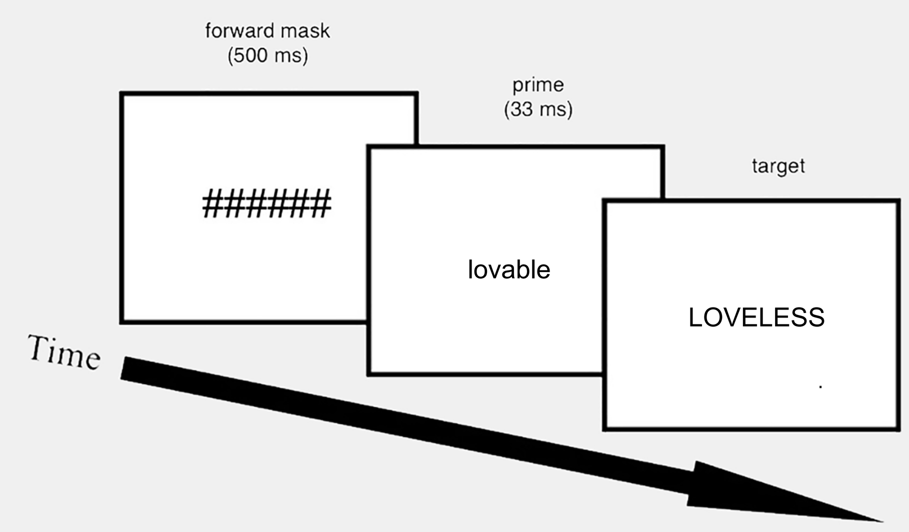
Experiment 2

Materials

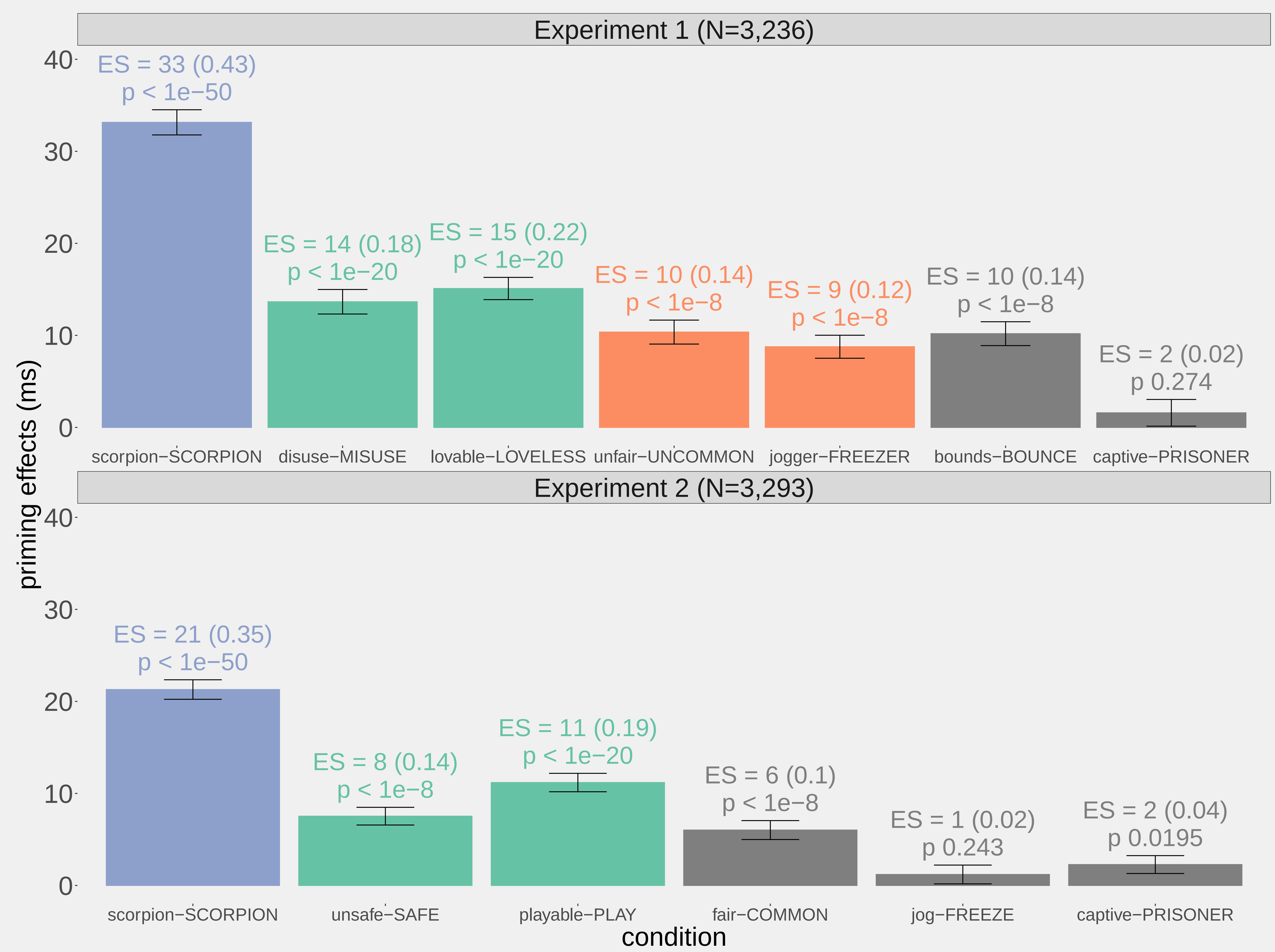
- identity: *scorpion-SCORPION*
- stem priming conditions:
  - prefixed prime: *unsafe-SAFE*
  - suffixed prime: *playable-PLAY*
- stems from the exp. 1 affix conditions:
  - *fair-COMMON*
  - *jog-FREEZE*
- semantic condition: *captive-PRISONER*

Methods

- **Procedure:**
  - power simulations $\rightarrow \hat{N} = 12,000$
  - $SOA = 33ms$
  - delivered online [10]
- **Data analysis:**
  1. prime duration cut-off: [25ms 60ms]
  2. subject and item error rate cut-off: 30%
  3. RT outlier removal cut-off: [200ms 1800ms]



Results



Discussion

Result summary

- stem priming < identity priming
- affix priming < stem priming
  - suffix priming ≠ suffixed stem priming
  - prefix priming ≃ prefixed stem priming
- affix priming ≃ orthographic priming
- $0ms$ < semantic priming < $5ms$
- *fair-COMMON* priming is hard to explain, and may impinge on the interpretation of the effects involving prefixes.

Conclusions

- We show a gradience in the visual masked priming response:

  identity > stem > affix ≃ ortho
- These results support the affix-stripping model, in which decomposition is *primarily* driven by stem activation.
- The affix priming effects reported may be just due to orthographic similarity, and not to activation of the relative lexical entries.

Pairwise comparisons

exp.	group 1	group 2	adjust. p
1	*scorpion-SCORPION*	*disuse-MISUSE*	$< .001^{***}$
	scorpion-SCORPION	*lovable-LOVELESS*	$< .001^{***}$
	unfair-UNCOMMON	*disuse-MISUSE*	.46
	jogger-FREEZER	*lovable-LOVELESS*	$.004^{**}$
	unfair-UNCOMMON	*bounds-BOUNCE*	1
	jogger-FREEZER		1
2	*scorpion-SCORPION*	*unsafe-SAFE*	$< .001^{***}$
	scorpion-SCORPION	*playable-PLAY*	$< .001^{***}$

Selected references. [1] K. Rastle, M. H. Davis, W. D. Marslen-Wilson, L. K. Tyler, *Lang. Cogn. Process* **2000**, *15*, 507–537.[2] K. Rastle, M. H. Davis, B. New, *Psychon. Bull. Rev.* **2004**, *11*, 1090–1098.[3] S. Amenta, D. Crepaldi, *Frontiers in Psychology* **2012**, *3*, 232.[4] D. Chateau, E. V. Knudsen, D. Jared, *Brain and Language* **2002**, *81*, 587–600.[5] A. Dominguez, M. Alija, J. Rodriguez-Ferreiro, F. Cuetos, *European Journal of Cognitive Psychology* **2010**, *22*, 569–595.[6] J. Andoni Duñabeitia, M. Perea, M. Carreiras, *Language and Cognitive Processes* **2008**, *23*, 1002–1020.[7] M. Taft, K. I. Forster, *J. Verbal Learning Verbal Behav.* **1975**, *14*, 638–647.[8] M. Brysbaert, M. Stevens, *Journal of Cognition* **2018**, *1*, DOI `10.5334/joc.10`.[9] P. J. Potvin, R. W. Schutz, *Behavior Research Methods, Instruments, & Computers* **2000**, *32*, 347–356.[10] H. Finger, C. Goeke, D. Diekamp, K. Standvoß, P. König in 2017 International Conference on Computational Social Science, Cologne, Germany, **2017**.