

Evidence for shared conceptual structure for psychological & physical events

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1. Introduction

- Natural language is characterized by systematic correspondences between meaning & form (e.g., causal agents=transitive subjects)

- Psych verbs** pose a challenge to this:

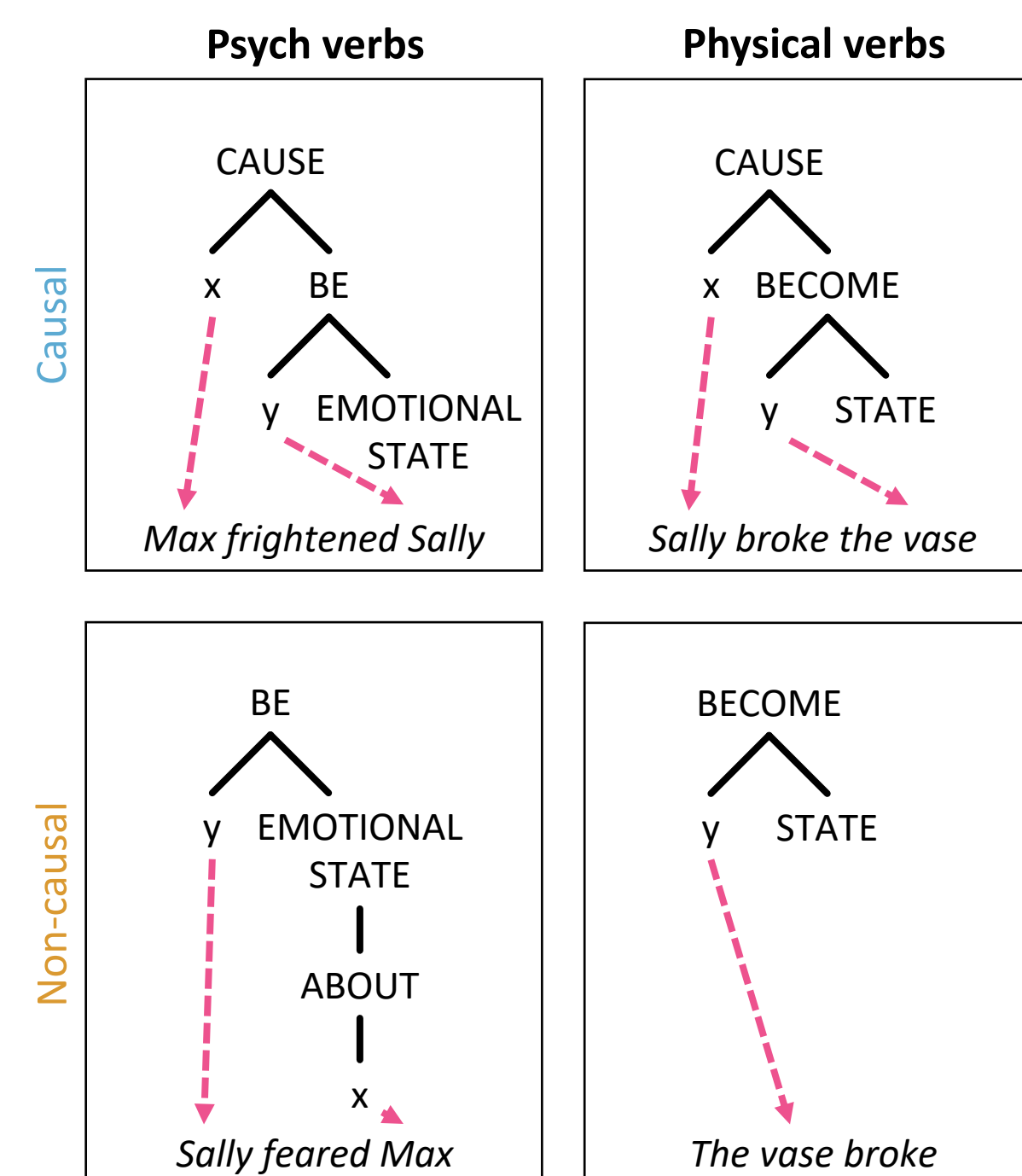
- Max_{STIMULUS} frightened Sally_{EXPERIENCER}
- Sally_{EXPERIENCER} feared Max_{STIMULUS}



- But only if we think frighten & fear actually mean the same thing...

- Turns out they don't: **language users perceive frighten verbs as more causal than fear verbs** (Hartshorne et al., 2016)

- We can capture these different *construals* with **hierarchically structured semantic event representations** that include a verbal root & one or more primitive predicates (Levin & Rappaport Hovav, 2005)



- The argument that is higher in the semantic tree becomes the subject of the sentence (which is the highest argument in the syntactic tree), while the argument that is lower in the semantic tree becomes the object (=preserve prominence)

- This approach provides a **straightforward solution to the linking problem posed by psych verbs**

- On this hypothesis, the **distinction between psych verbs is parallel to that between causal & non-causal physical verbs**

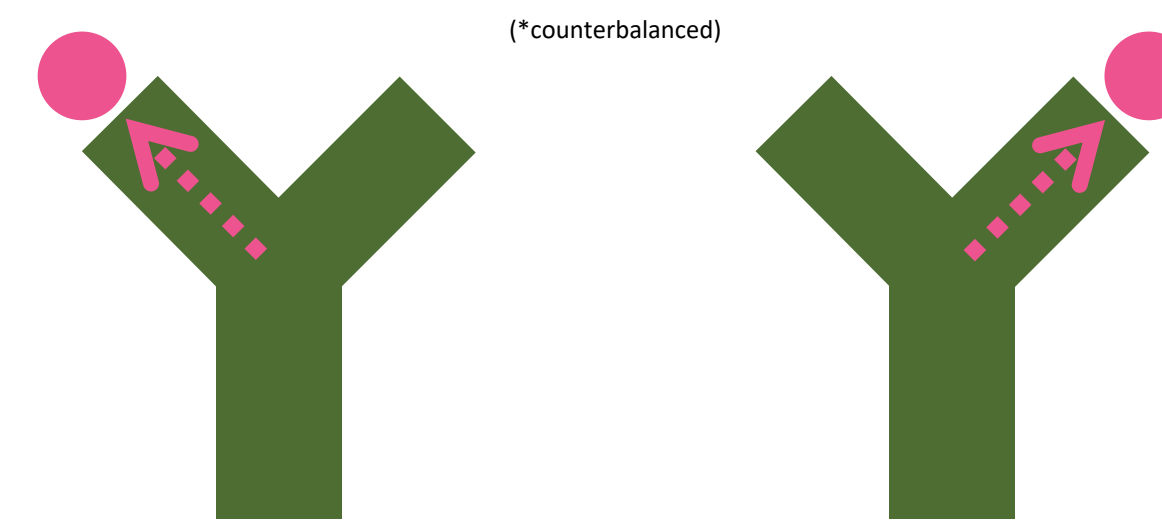
One CAUSE or many?

If participants learn a rule that applies to frighten (but not fear) verbs, will they extend it to causal (but not non-causal) physical verbs?

2. Methods

Training trials

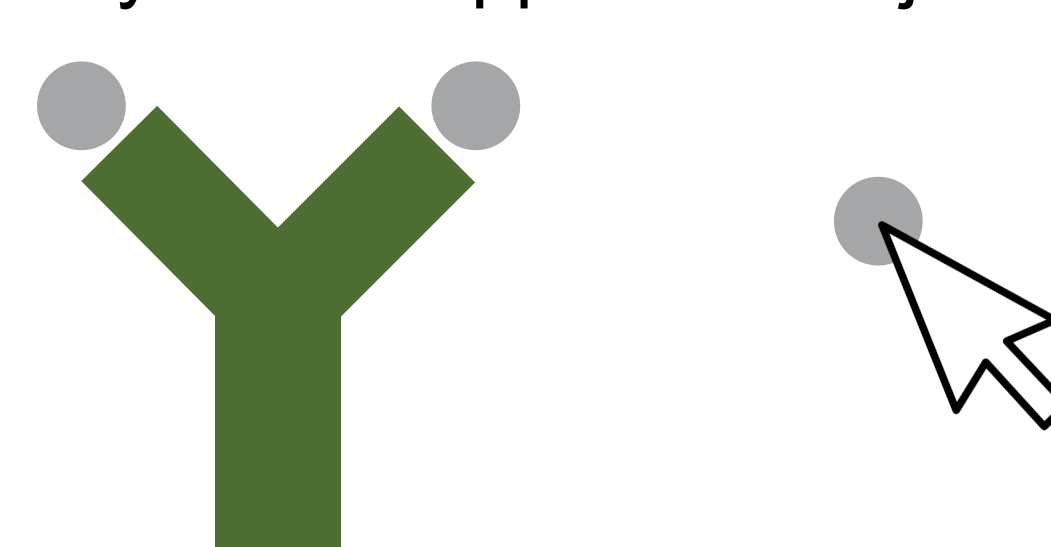
- Ball goes in while sentence plays
- Ball emerges, frighten on left & fear on right* (*counterbalanced)



- Subject clicks ball

Test trials

- Ball goes in while sentence plays
- Gray circles appear & subject clicks

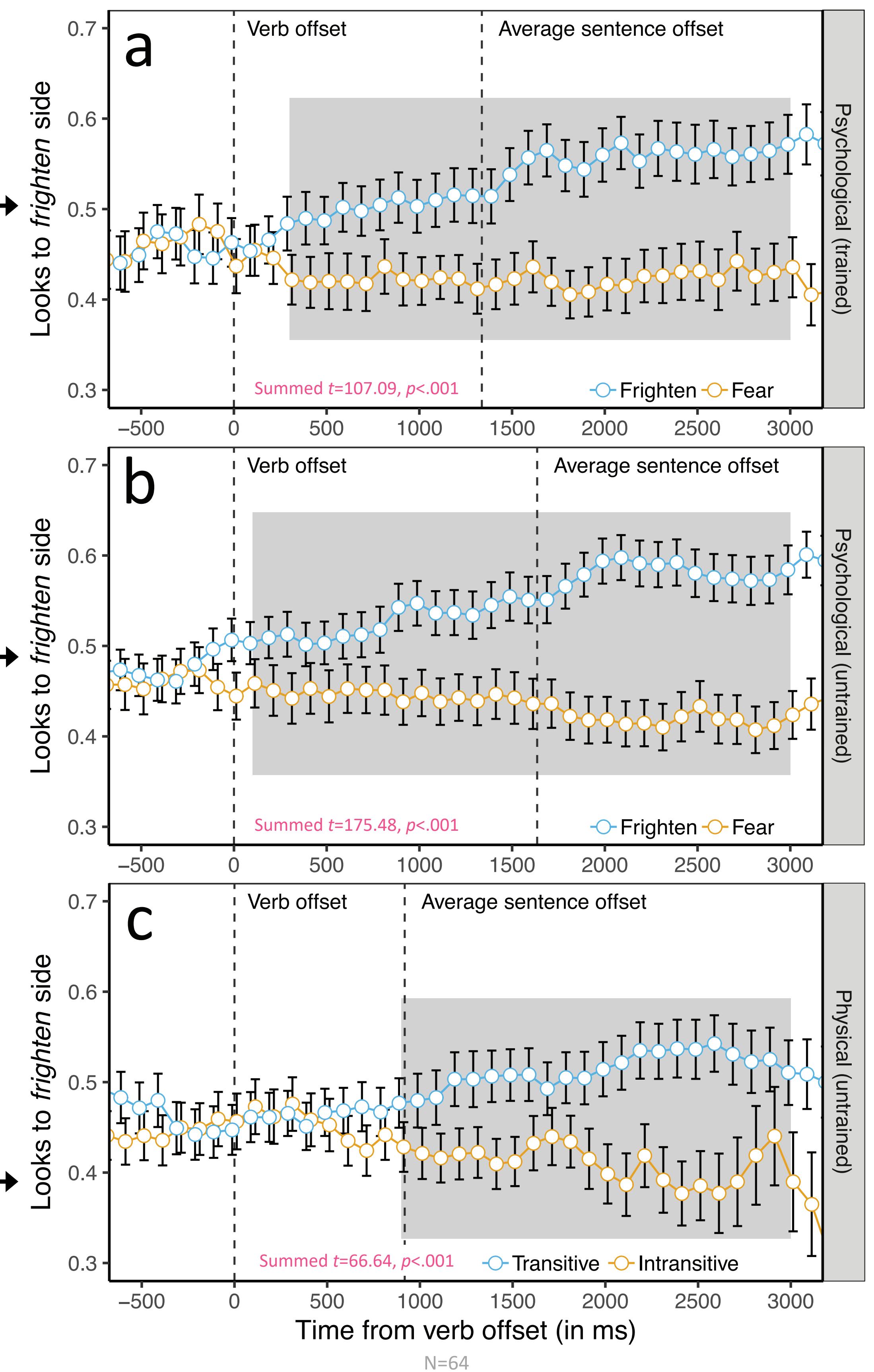


Trial type	Description	Predictions
a	Psychological (trained)	Frighten ↑ Fear ↓
b	Psychological (untrained)	Frighten ↑ Fear ↓
c	Physical (untrained)	Causal ↑ Non-causal ↓

Analysis

- Cluster-based permutation testing (Maris & Oostenveld, 2007)

3. Results



4. Discussion

- Participants learned to associate each side of the screen with the correct landing site for **trained psych verbs** & extended this rule to **untrained psych verbs & physical verbs**
 - I.e., when they heard a causal physical verb, participants looked more to the side of the screen associated with frighten verbs
- Our design allowed us to rule out a number of possible confounds: syntax, number of event participants, stativity, duration, animacy, valence, intentionality – ask me about them!
- These results provide evidence that **language relies on a representation of CAUSE that is broad enough to encompass both physical & psychological causation**
- This work **supports event decomposition approaches to semantic representation**: primitive predicates encode aspects of meaning that are *present in many different verbs*

References: [1] Hartshorne, J. K., O'Donnell, T. J., Sudo, Y., Uruwashii, M., Lee, M., & Snedeker, J. (2016). Psych verbs, the linking problem, and the acquisition of language. *Cognition*. • [2] Levin, B., & Rappaport Hovav, M. (2005). *Argument realization*. Cambridge, UK: Cambridge University Press. • [3] Maris, E., & Oostenveld, R. (2007). Nonparametric statistical testing of EEG- and MEG-data. *Journal of Neuroscience Methods*. • **Paradigm from:** Wittenberg, E., Khan, M., & Snedeker, J. (2017). Investigating thematic roles through implicit learning: Evidence from light verb constructions. *Frontiers in Psychology*.

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