False Remembering Elicited by Disconfirmed Predictions: Do Semantic and Word Form Features Linger in Memory?

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Prediction during language comprehension involves the pre-activation of expected words (Huettig et al., 2022) and their semantically-related (Federmeier & Kutas, 1999) and possibly word form-related neighbors (DeLong et al., 2019). If predictions are disconfirmed, expected words linger in memory and elicit false remembering of expected words and of semantically-related words (Haeuser & Kray, 2024; Hubbard & Federmeier, 2024; Hubbard et al., 2019). False remembering of word form-related words has not been found yet. The lack of a word form-related effect might be due to the manipulation of word form similarity at word offset (Haeuser, 2022). Since there are inconsistent results regarding prediction-related pre-activation of word form features, which might be attributable to different manipulations of word form similarity (i.e., onset vs. offset, Li et al., 2022), manipulating word form similarity at word onset might more readily elicit false remembering. In line with this, the cohort-model of word recognition suggests stronger activation of onset- than offset-related neighbors (Simmons & Magnuson, 2018).

Here, participants (n = 142, m = 43, f = 96, nb = 3, *M* = 23.3 years old, range = 18 - 34 years old) read highly constraining sentences which ended with an unexpected word. After a 10-minute retention interval, participants were presented with single words and indicated whether the word was “old” or “new”. To additionally measure qualitative differences in recognition memory, participants indicated for old judgements whether they remembered details of the encoding phase (i.e., recollection) or just had a familiar feeling about having read this word (i.e., familiarity, Yonelinas, 2002). Presented words were old (e.g., “Uhr”, “clock”), new (e.g., “Fisch”, “fish”), expected but disconfirmed (e.g., “Reifen”, “tires”) and semantically- (e.g., “Auto”, “car”) and word form-related words (e.g., “Reihen”, “series”) to these expected words. Participants also completed a test battery of individual difference tests.

According to the results, expected and semantically-related words elicited higher levels of false remembering than new words (see Figure 1), and expected words elicited more recollection judgements than semantically-related words, suggesting a false memory effect over and above a backward semantic context association effect (see Figure 2). Surprisingly, word form-related words elicited less false remembering than new words (see Figure 1), especially in familiarity judgements (see Figure 2). We hypothesized that this effect was driven by prior suppression of onset-related neighbors (i.e., predicting “Reifen” inhibits “Reihen”, Haeuser & Borovsky, 2024). Indeed, in an exploratory analysis there was a correlation of the false alarm rate of word form-related words and inhibitory control (operationalized as *d’* which reflects the scaled hit rate minus the scaled false alarm rate of a go/nogo inhibition task). However, a similar correlation was found for new words, suggesting that the inhibitory control effect was not specific to word form-related words (see Figure 3).

In sum, we replicated effects of lingering predictions for expected and semantically-related words. Word form-related words do not elicit false remembering, possibly because they become suppressed during initial activation of the expected word.

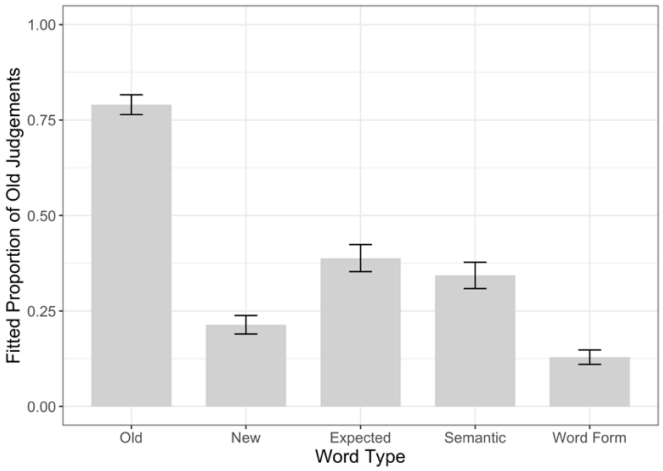

Figure 1. Fitted proportion of old judgements (aggregating over recollection and familiarity judgements) across the different word types

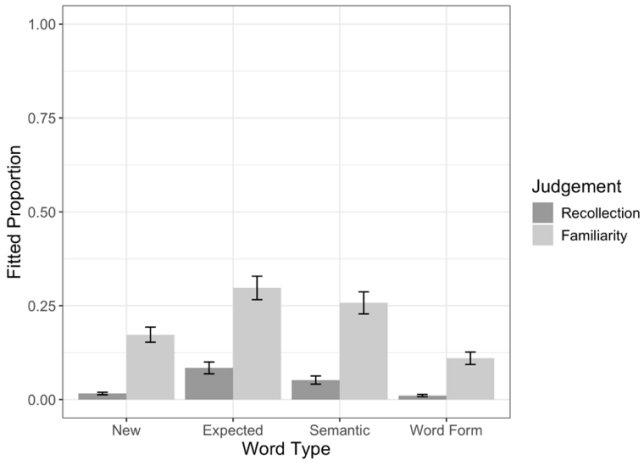

Figure 2. Fitted proportion of recollection and familiarity judgements across new, expected, semantically- and word form-related words

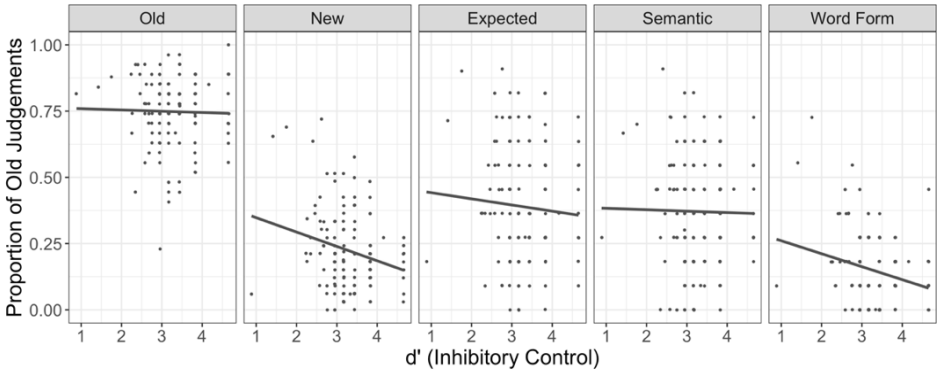

Figure 3. Correlation of the proportion of old judgements of each word type and inhibitory control
Note. Higher *d'* indicate better inhibitory control.

References

DeLong, K. A., Chan, W. H., & Kutas, M. (2019). Similar time courses for word form and meaning preactivation during sentence comprehension. *Psychophysiology*, *56*(4), e13312. https://doi.org/10.1111/psyp.13312

Federmeier, K. D., & Kutas, M. (1999). A rose by any other name: long-term memory structure and sentence processing. *Journal of Memory and Language*, *41*(4), 469-495. https://doi.org/10.1006/jmla.1999.2660

Gomez, P., Ratcliff, R., & Perea, M. (2007). A model of the go/no-go task. *Journal of Experimental Psychology: General*, *136*(3), 389-413. https://doi.org/10.1037/0096-3445.136.3.389

Haeuser, K. I., & Borovsky, A. (2024). Predictive processing suppresses form-related words with overlapping onsets. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *46*. https://escholarship.org/uc/item/95w210ck

Haeuser, K. I., & Kray, J. (2022). Uninvited and unwanted: False memories for words predicted but not seen. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *44*. https://escholarship.org/uc/item/7w22b8gm

Haeuser, K. I., & Kray, J. (2024). Age differences in context use during reading and downstream effects on recognition memory. *Psychology and Aging*, *39*(7), 715-730. https://doi.org/10.1037/pag0000845

Hubbard, R. J., & Federmeier, K. D. (2024). The Impact of Linguistic Prediction Violations on Downstream Recognition Memory and Sentence Recall. *Journal of Cognitive Neuroscience*, *36*(1), 1-23. https://doi.org/10.1162/jocn_a_02078

Hubbard, R. J., Rommers, J., Jacobs, C. L., & Federmeier, K. D. (2019). Downstream behavioral and electrophysiological consequences of word prediction on recognition memory. *Frontiers in Human Neuroscience*, *13*, 291. https://doi.org/10.3389/fnhum.2019.00291

Huettig, F., Audring, J., & Jackendoff, R. (2022). A parallel architecture perspective on pre-activation and prediction in language processing. *Cognition*, *224*, 105050. https://doi.org/10.1016/j.cognition.2022.105050

Li, X., Li, X., & Qu, Q. (2022). Predicting phonology in language comprehension: Evidence from the visual world eye-tracking task in Mandarin Chinese. *Journal of Experimental Psychology: Human Perception and Performance*, *48*(5), 531-547. https://doi.org/10.1037/xhp0000999

Simmons, E. S., & Magnuson, J. S. (2018). Word length, proportion of overlap, and phonological competition in spoken word recognition. In *Proceedings of the 40th Annual Conference of the Cognitive Science Society* (p. 1062-1067). Madison, WI.

Yonelinas, A. P. (2002). The Nature of Recollection and Familiarity: A Review of 30 Years of Research. *Journal of Memory and Language*, *46*(3), 441-517. https://doi.org/10.1006/jmla.2002.2864