Elaboration of concepts facilitates their retrieval in sentence processing
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Background & research question
Sentence comprehension involves connecting current linguistic input with existing knowledge about the world in semantic memory. Here, we propose that this process is facilitated when more, compared to less, information is known about referents (such as nouns) in a sentence, even when that information is provided outside the local sentence.

In basic human memory paradigms, people are faster to verify propositions when they have learned more (compared to fewer) associated propositions, as long as the information can be meaningfully organized (Myers et al., 1984; Cantor & Engle, 1993). In psycholinguistic research, a noun which has been described with a greater number of modifiers (e.g., a Texas cattle rancher: compared to simply a rancher) leads to faster reading times in regions thought to index subsequent retrieval of the noun (Hofmeister, 2011). For instance, faster reading times were observed at the word subsidized when rancher was preceded by Texas cattle, compared to when it was bare.

It was a (Texas cattle) rancher that the officials for the state subsidized throughout the worst drought periods.

Here, we describe an experiment which replicates and extends the findings of Hofmeister (2011), in which the elaborative information was provided not with adjectives within a single sentence, but with descriptive noun phrases and relative clauses over the course of a short discourse.

Question: Does the richness of semantic representations, even descriptive noun phrases and relative clauses over the course of a sentence, influence moments of retrieval in sentence processing?

Experimental design & materials
48 participants (native English-speaking UCSD undergraduates) 24 experimental items & 36 fillers of similar form and complexity
Design: 2 (cue condition: many, one) x 2 (order of mention: first, second) of the items, with the elaborative material presented earlier or later.

Materials & Procedure: Sentences 1-2 read one sentence at a time; sentence 3 presented with moving-window self-paced reading.

Sentence 1: Two senators were arguing with a Democrat and a Republican after a big debate.
Sentence 2 (Vi): The Democrat had voted for the use of the senator, and the Republican had voted for the other, a man from Ohio who was running for president.
Sentence 3: The senator who the Democrat / Republican had voted for was picking a fight about health care reform.

Sentence regions (regions 2-5 analyzed):
(1) The senator / (2) who the Democrat / (3) had voted for / (4) was picking a fight / (5) about health care reform.

We present residual log reading times with length (in characters), log list position, and the restricted cubic spline of word position residualized out, as well as raw reading times (trimmed to include only reading times between 100 and 5000 ms) as a comparison.

Statistical analyses used multiple regression mixed-effects models incorporating random effects for both items and subjects as well as fixed effects of cue condition (many, one), order of mention (first, second), and spillover (from the preceding region). These analyses and correlations were all performed in the statistical programming environment R.

For scores on ART/MRT and for mean reading time of sentence 2, median-half splits were performed, and reading time analyses were also carried out for the high- and low-scoring ART/MRT groups and for fast and slow readers.

Conclusions
These results replicate and extend the findings of Hofmeister (2011), showing that elaboration of conceptual information influences the ease of moment-by-moment sentence processing, even when the information is provided outside of the local sentence, in the discourse.

The effects were influenced by individual differences, suggesting that greater print exposure may drive effects at retrieval sites (region 3) and earlier in the sentence (region 2) and that reading speed may partially determine the point at which (and the extent to which) an individual may use available cues for processing.

Though models like that of Lewis and Vasishth (2005) predict that greater activation of an item should lead to greater ease of retrieval, they do not directly predict that elaboration of material outside of the local sentence should necessarily lead to an item’s increased activation (and, subsequently, easier retrieval). These findings constitute novel evidence that when more (potentially) relevant information is associated with a concept, even earlier in the discourse, this information can impact ease of retrieval in sentence processing.

References