Lexical prediction and the processing of argument structure in English psych verbs
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Many theories of sentence processing propose that comprehenders interpret the first NP in a sentence as the agentive subject [1–2]. However, the mapping between argument structure and meaning is complex [3–5]. For instance, psych verbs, which denote mental states, often do not have agentive subjects. Instead, psych verbs may relate the experiencer thematic role to the subject grammatical function, whereas others relate it to PPs. This is reflected in real-time processing. For instance, [6] found that Spanish speakers experience processing difficulty when reading psych verbs, which they attribute to a difference in mapping between argument structure and thematic interpretation. However, if the sentence contained a fronted PP, then psych verbs were easier to process. [6] attribute this effect to a difference in canonical word order, because fronted PPs are canonical for Spanish psych verbs. Thus, Spanish speakers predicted that the upcoming predicate would be a psych predicate, facilitating processing.

A similar pattern holds in English. A PP may occur at the beginning of the sentence if it expresses an experiencer, e.g., [PP To me], this dish tastes great. However, verbs that take recipient PP arguments do not permit the PP to front easily: ?[PP To me], John gave a present. Additionally, psych verbs like taste, matter, and appear do not clearly assign an agent thematic role to their subject. In this study, we show that a fronted PP reduces the processing difficulty associated with a psych verb, like [6]. Unlike Spanish, we do not think it’s appropriate to attribute this to a canonical word order effect, since fronted PPs are likely non-canonical in English. Thus, we attribute this to lexical prediction [7–9]. Upon detecting a PP, comprehenders may interpret it as a perspective holder or experiencer, which preactivates a psych verb. Additionally, we show that processing a non-fronted PP is more difficult if the main verb is a psych verb compared to a non-psych verb. We attribute this to the non-canonical grammatical function-thematic role alignment that psych verbs impose on their arguments, such that interpreting an experiencer PP is harder than a recipient PP.

Experiment. Thirty participants read 24 sets of items (86 fillers) in a self-paced reading paradigm [10]. We manipulated ±Psych Verb and ±PP Fronting. In the +Psych Verb conditions, the main predicates were headed by psych verbs that did not assign an agent thematic role to their subject, and assigned an experiencer thematic role to a PP argument. In the –Psych Verb conditions, we used verbs with typical alignment. In the +PP Fronting conditions, there was a PP containing an argument that was either interpreted as a dative recipient (–Psych Verb) or as an experiencer (+Psych Verb):

1. +PP Fronting, {–Psych Verb/+Psych Verb}

[PP To John], Steve {waved happily and eagerly/appeared wrinkly and old} at the reunion

2. –PP Fronting, {–Psych Verb/+Psych Verb}

Steve {waved happily and eagerly/appeared wrinkly and old} [PP to John] at the reunion

We constructed mixed linear effects models with the log residual reading times as dependent variable, and the structure suggested by [10] for the main clause predicate region (waved happily and eagerly vs. appeared wrinkly and old) and for the second PP region (to John). In this latter model, we did not include ±PP Fronting as a factor, since there was no data in the –PP Fronting conditions in this region. In the main clause predicate, we did not find a main effect of either ±Psych Verb or ±PP Fronting (ps > 0.05). However, we did find an interaction effect between these factors (β = 0.024±0.009, t = 2.6, p < 0.01). We take this finding to demonstrate that comprehenders forecast a psych verb if they had encountered a fronted experiencer PP, as Spanish speakers did in [6]. Finally, in the later PP region, we found a marginal effect of ±Psych Verb (β = 0.017±0.0089, t = 1.9, p = 0.06). We take this to mean that comprehenders more easily integrate a recipient PP than an (unfronted) experiencer PP, which we attribute to the non-canonical alignment between grammatical function and thematic role that psych verbs impose.
Figure 1. Mean log residual reading times by word number and condition. Boxed reading times correspond to the regions in which analysis was conducted.