The (non-)influence of *even*'s likelihood-based presupposition
on lexical predictability effects

Erika Mayer, Brian Dillon, & Adrian Staub (University of Massachusetts Amherst)
elmayer@umass.edu

Background. *Even* is a sentential operator that introduces a presupposition about the likelihood of the proposition it modifies [4, 5, 6, 7, 1, cf. 3]. When *even* modifies a proposition *p*, it introduces a presupposition that *p* is less likely than a set of contextually supplied alternatives. The following example demonstrates this:

Sentence: We even saw a shark.

Contextually supplied alternatives: {We saw a fish, We saw a bird, We saw a crab}

In this example, *even* requires its proposition, *We saw a shark*, to be less likely than the set of contextually supplied alternatives.

Given that *even* provides information to readers that upcoming material will be less likely than relevant alternatives, the presence of *even* in a sentence may influence how readers process predictable and unpredictable sentence continuations. Lexical predictability effects on reading times are well-studied [2; see 8 for review]: readers spend more time reading unpredictable words and less time reading words that are predictable in context. In addition, previous research shows that comprehenders use the semantics of connectives to predict sentence continuations: in an ERP study, Xiang and Kuperberg (2016) found that the connective *even so* influenced the N400 for coherent versus incoherent sentence continuations. If readers integrate the semantic contribution of *even* rapidly during comprehension, *even*'s presence may mediate the effects of predictability. Specifically, *even*'s likelihood presupposition may reduce facilitation for predictable words while making unpredictable words easier to process. The current study tested this prediction in an eye-tracking while reading study (N=47).

Experiment. The current study was a 2 x 2 within-subjects design with factors of object noun phrase predictability and the presence or absence of *even*. To create items with high noun phrase predictability, we collected cloze norms for a set of sentence preambles, such as *The cat chased a __* (N=19). This offline cloze task was used to create 40 items with highly predictable object noun phrases (provided by at least 40% of participants in the cloze task). These predictable noun phrases were then approximately matched for frequency and word length with 40 unpredictable but plausible noun phrase continuations. The four conditions are summarized below; the critical region is the object noun phrase (*mouse*), while the spillover region is the temporal continuation (*last night*).

1. Predictable, no *even*: /The cat chased a/ mouse/ last night/, or so I heard./
2. Predictable, *even*: /The cat even chased a/ mouse/ last night/, or so I heard./
3. Unpredictable, no *even*: /The cat chased a/ weasel/ last night/, or so I heard./
4. Unpredictable, *even*: /The cat even chased a/ weasel/ last night/, or so I heard./

Results. Mixed-effects models revealed significant main effects of noun phrase predictability in the critical region for first fixation reading times (RTs), go past RTs, and total time RTs. The presupposition introduced by *even*, then, did not eliminate or reverse lexical predictability effects: less predictable words were associated with slower RTs, while more predictable words elicited faster RTs. There is, however, weak evidence for an interaction between *even* and noun phrase predictability in later RT measures. Mixed-effects models showed a trend towards an interaction in go past RTs in the spillover region ($p = 0.065$): the mean RT for the *even* condition was 371.9 ms for predictable critical words and 373.0 ms for unpredictable critical words, while the mean RT for the *no even* condition was 336.5 ms for predictable words and 403.5 ms for unpredictable words. There was also a trend towards an interaction in total time RTs in the critical region ($p = 0.070$). For the *even* condition, the mean RT was 279.6 ms for predictable words and 314.5 ms for unpredictable words, while for the *no even* condition, the mean RT was 265.4 ms for predictable words and 336.7 ms for unpredictable words. This evidence suggests that the

presupposition introduced by *even* may be computed and integrated at a later stage of semantic processing, too late to influence early reading time lexical predictability effects.

Conclusion. Overall, the current study provides novel evidence that early RT predictability effects are not eliminated by the presence of a semantic operator signaling that upcoming material will be less likely or expected. Further, it provides preliminary evidence that the influence of *even* may mediate predictability effects in later stages of processing. These results are consistent with an account of *even* in which the comparison of the likelihood of the original proposition to the likelihood of a set of relevant alternatives occurs later in sentence comprehension.

Figure 1. Mean reading times (first fixation, go past, total time) for each condition (*even* with predictable noun, *even* with unpredictable noun, no *even* with predictable noun, and no *even* with unpredictable noun) for both the critical and spillover regions.
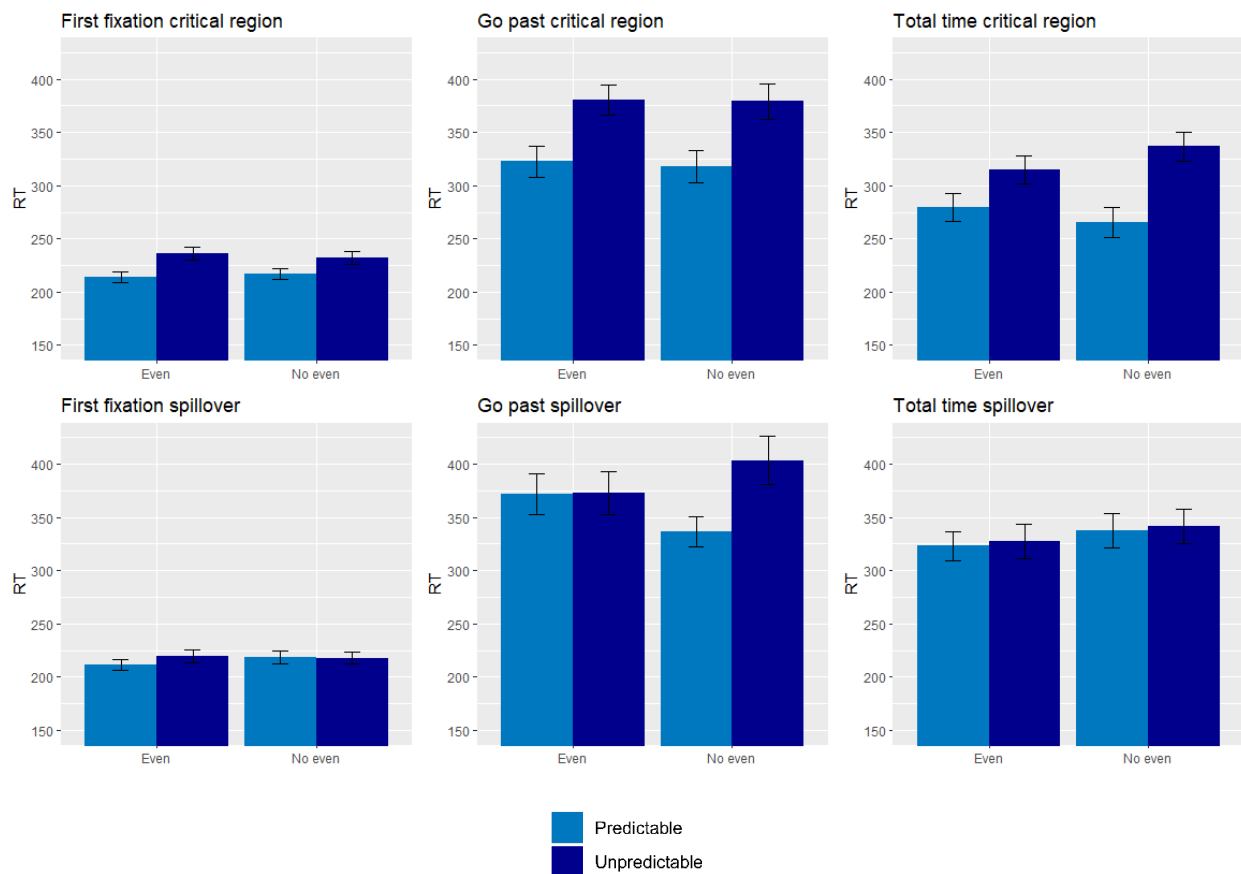
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