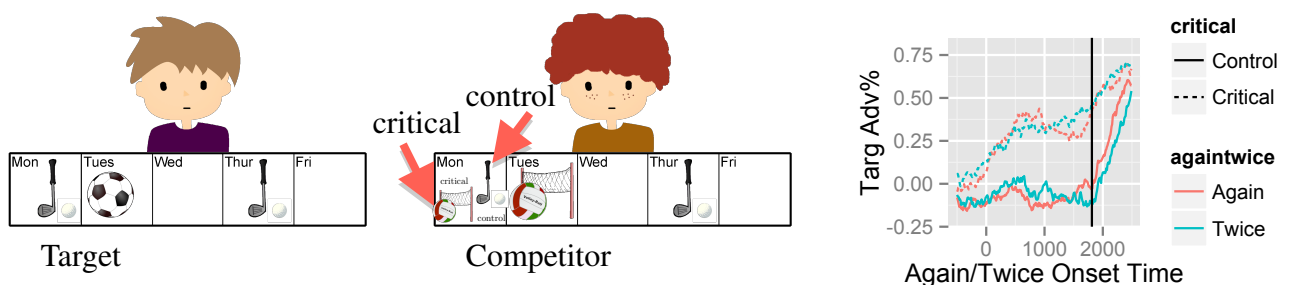


Presuppositions are Fast, whether Hard or Soft - Evidence from the Visual World Paradigm

Introduction Much work on the processing of linguistic meaning has been concerned with the relative processing speed of different aspects of meaning, in particular with regards to implicatures in comparison to literal asserted content (e.g., Bott & Noveck 2004, Huang & Snedeker 2009, among many others). More recently, researchers have begun to investigate presuppositions experimentally as well, but mostly using offline measures. Initial reading time results for *again* based on the timing of infelicity effects suggest relatively fast availability of presupposed content (e.g., Schwarz & Tiemann 2012), as do a couple of visual world studies on *also* (e.g., Romoli et al. 2012), which track the interpretive effect of felicitous presupposition interpretation online. The present studies extend these efforts by investigating *again* and *stop* with the visual world paradigm, and provide further evidence for rapid processing of presupposed content when compared to control conditions. The equivalence of the two in processing is of theoretical relevance given proposals for distinguishing classes of hard vs. soft triggers (e.g., Abusch 2010). For a more direct comparison with asserted content, we also included *twice* as a minimal comparison to *again*, which expresses essentially the same meaning without a presupposition. Shifts in eye movements for these two cases appear to be entirely on par, further supporting the notion that presupposed and asserted content are available in parallel early on in online processing.

Experiment 1 Subjects carried out an indirect reference identification task by determining which of four figures - depicted on the screen with a schedule of activities - a linguistic description like (1) was about. Two were distractors of opposite gender, the target always matched the description throughout, and the competitor was varied as to whether or not it met the condition introduced by *again/twice* (control vs. critical). In the critical condition, the target could already be identified during the otherwise ambiguous time window (indicated by underlining), based on the implication that it would involve two occurrences of golf, which was either presupposed or asserted. The last-mentioned activity provided independent disambiguation in both critical and control conditions.

- (1) a. **Context:** *Some of these children went to play golf on Monday, and some to play volleyball.*
b. **Target:** *John went to play golf again later on / twice this week} and also played soccer on Tuesday.*

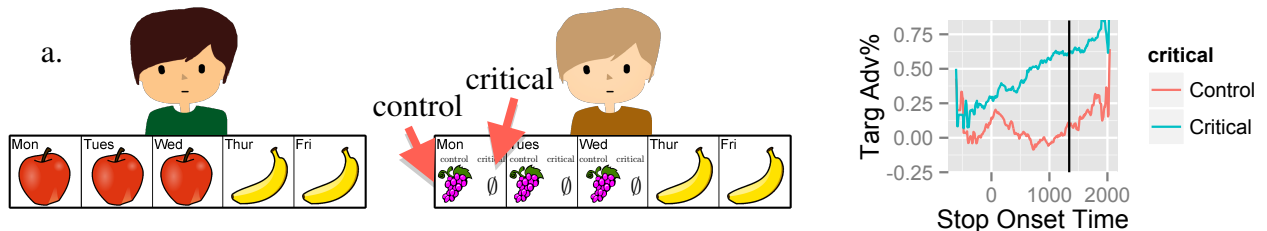


Results: 27 participants saw 24 such sentence-picture pairs in a fully counter-balanced design, after being instructed to choose the picture that matched the sentence. For purposes of analysis, Target Advantage scores (TAs) were calculated by subtracting proportion of fixations on Competitor from proportion of fixations on Target. The graph illustrates TAs as a function of time relative to the onset of *again/twice* (represented by 0; vertical black line indicates mean independent disambiguation). Eye movement patterns for *twice* and *again* in the critical conditions were indistinguishable, revealing an immediate shift to target from the earliest point on (200ms after

again/twice onset, allowing for time for planning and executing saccades). LMEM-analyses (with maximal random effect structures) were carried out on Elogit-transformed TAs, both on the entire ambiguous window and on 200ms increments within, starting 200ms after the onset of the critical word. There was a significant main effect of critical vs. control condition but no interaction or main effect for *again* vs. *twice*. Planned comparisons revealed simple effects of the critical vs. control manipulation for both *again* and *twice*. All effects were already significant in the 200-400ms time-window, suggesting that the relevant implication was immediately available, and indistinguishably so in the presupposed and asserted conditions.

Experiment 2 The same paradigm was used to investigate the time course of interpreting the presupposition of *stop* (that the relevant activity had been going on previously). Disambiguation during the underlined part of the sentence was again possible in the critical condition based on this presupposition (as the competitor had empty initial calendar slots), though final disambiguation occurred independently later on in both critical and control conditions (at *apples*):

- (2) a. **Context:** *These children got nice treats for their snacks this week.*
 b. **Target:** Henry *stopped* eating the delicious apples on Thursday.



Results: Eye movement data from 27 participants, treated in a way parallel to Experiment 1, exhibit a significant shift in TAs right upon encountering *stop* (see graph). LMEM analyses revealed a significant effect of critical vs. control, both for the overall ambiguous region and for 200ms time windows, starting from 200ms after the onset of *stop*, indicating that the presupposition is available right away in online processing.

Discussion The experimental results substantially broaden the evidence for the online processing of presuppositions. They are inconsistent with accounts that predict a delayed availability for (at least certain) presuppositions due to their assumed pragmatic derivation, as both types of triggers investigated here are available immediately. In the case of *again*, the comparison with *twice* furthermore shows that the time-course is parallel to asserted content (and even in the case of *stop*, the immediate nature of the effect would not allow for any detectable delays relative to asserted content.) The results also contribute to recent debates about potential differences between classes of presupposition triggers, e.g., hard (here *again*) vs. soft (here *stop*) ones, (Abusch 2010; for experimental work, see, e.g., Cummins & Amaral 2013). While these may need to be distinguished for other reasons, their online processing time-course does not provide independent motivation for doing so. Finally, the present approach opens up new methodological avenues for investigating a broad range of important theoretical questions that require evidence beyond the level of intuitions.

Abusch, D. 2009 Presupposition Triggering from Alternatives. *JoS* 27 • Bott, L. and Noveck, I. 2004 Some utterances are underinformative. *JML* 51 • Cummins, C. and Amaral, P. and Katsos, N. 2013 Backgrounding and accommodation of presupposition: an experimental approach. *SuB* 17 • Huang & Snedeker 2009 Online interpretation of scalar quantifiers: Insight into the semantics-pragmatics interface. *Cog. Psych.* 58 • Romoli, J., Khan, M., Sudo, Y. and Snedeker, J. 2013. Resolving temporary referential ambiguity using presupposed content. *CUNY* 26 • Schwarz, F. and Tiemann, S. 2012 Presupposition Processing - The Case of German *wieder*. *Proceedings of AC* 18