

### The effect of context on the online processing of adversatives: an eyetracking study

The meaning of adversative connectives such as English *but* relies on an opposition between the properties and entities of the propositions it conjoins. The exact **nature** of that opposition is discussed in most works on the semantics of *but*. This research focuses on identifying **what** in the conjuncts is used as information to be subject to this opposition, and **when/how** this information is taken into account in the processing of adversative conjunctions, especially in relationship with contextual information. We rely on sentences such as (1) which involve an interaction between adversative conjunctions and comparative structures involving gradable predicates.

1. Alex is tall, but (less/ \* more) tall than Riley.

Author et al. (2014) report that speakers judge that superiority comparatives (*more X than*) in the conjunct introduced by *but* are degraded compared to inferiority ones; a difference which disappears when the target sentence is placed in a context that facilitates the contrast as in (2).

2. We are looking for a stunt double to replace Riley, an actor, in a movie. The stunt double must be of the same height as Riley for the scene to be believable. The hunt proves to be difficult because Riley is tall. Alex is considered as a potential double.

Using a self-paced reading paradigm, the same study shows that despite the effect of context on offline acceptability judgments, the superiority cases still show significantly longer reading times in the post-*but* regions, suggesting that online processing remains affected by these constructions, and that contextual information is integrated at a later stage of the interpretation of the conjunction. Building on these results, we use an eye-tracking paradigm to investigate in more detail the processes of interpretation of sentences like (1). Specifically, one issue at stake is how early contextual information is integrated in the processing of adversatives. On one hand, relevance theoretic accounts of adversative consider that the interpretation of adversatives relies on the identification of a *pivot inference* made *accessible* by the first conjunct and that gets contradicted by the second conjunct (Blakemore, 2002): the more accessible that pivot, the easier the interpretation of the conjunction. On such accounts, we thus expect that contexts as in (2) should facilitate every aspect of the interpretation of (1). In contrast, within theories like argumentation within language (AwL: Anscombe and Ducrot, 1983, Author, 2019), the search for the pivot inference is first driven by lexical information, and then complemented by contextual information. Given that a predicate *P* and a form like *more P* are lexically not in opposition (Author, 2019), we expect to observe an effect of the choice of construction ("*more*" / "*less*") on measures that reflect the processing of information, even within contexts that facilitate the interpretation.

We considered two binary variables in the experiment: one for the nature of the Context (*Neutral/Helping*) and a *Valence* for the choice of construction (*Positive: "more than"/Negative: "less than"*). Materials for the experiment were produced in Quebec French, using "*mais*" as an adversative with target items comparable to example (1) and the context in (2) (as a *Helping* context, *Neutral* contexts involved material unrelated to the target predicate). We used 20 target items, meaning that participants saw each combination of conditions 5 times. 40 filler items were interspersed with target items, for a total of 60 items, presented using a pseudo-random design. 55 native speakers of Quebec French were recruited, sat in front of a computer screen equipped with a Tobii Pro Fusion 250 Hz eye tracker and were asked to read the sentences on the screen and answer a comprehension question for each item. Participants were compensated 15\$.

Measures were considered at two levels of analysis: at the sentence level, we relied on the total duration ratio (total fixation time in milliseconds divided by the number of characters in a sentence), taken as an indicator of overall sentence reading difficulty (Clifton et al., 2007). At the word level we used go-past duration, one of numerous indicators for higher-level processing

during online reading (Cook & Wei, 2019). Each measure was taken as the dependent variable in a linear mixed effect model (lme4 R package, Bates et al., 2014), using random intercepts for items and participants and assessing the significance of factors via the R package “moments” (Komsta & Novomestky, 2015). At the sentence level (Fig. 1), we found a marginally significant interaction between Valence and Context ( $t = 1.682$ ,  $p = 0.093$ ), and at the word level (Fig. 2), an effect of Context ( $t = 1.825$ ,  $p = 0.0681$ ), as well as an interaction between Valence and Context ( $t = -1.740$ ,  $p = 0.0819$ ).

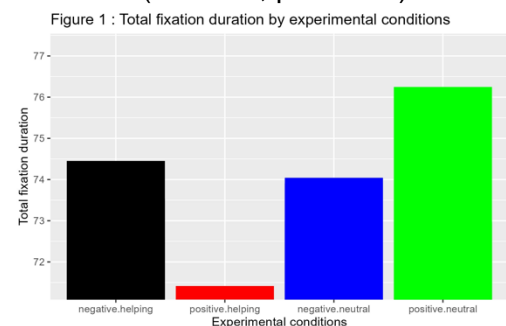
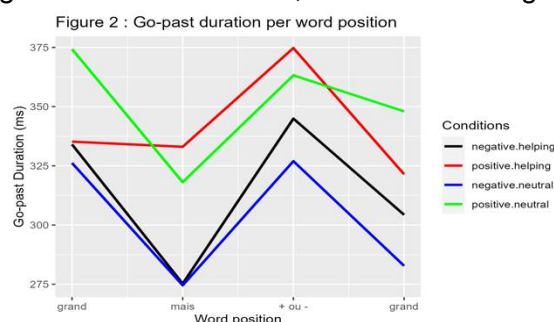


Figure 1 shows the effect of Context: in the *positive* condition *helping* contexts lower the total time spent reading the sentence, unlike in the *negative* condition in which Context has no effect. This is consistent with the AwL hypothesis that inferiority comparatives are lexically opposed in a way that make them compatible with the semantics of *but* without recourse to context, contrary to superiority comparatives, which prompt readers to access the necessary pivot via abduction of the

contextual information. When that inference is contextually accessible, the total reading time is overall reduced, though not in the *Negative.helping* cases. Nevertheless, as shown on Fig. 2, participants still take more time to go past “*mais*” and the second gradable adjective on a first reading in the *Positive* cases, irrespective of the nature of context. This is again congruent with the AwL-based hypothesis that the processing of information is initially lexically based: the contrasted predicates in the *Negative* are in lexical opposition, unlike the ones in the *Positive*, which accounts for their higher processing times.



Our results thus seem to generally support the hypothesis that the interpretation of adversative conjunctions relies on the lexical properties of its conjunct, before integrating potential contextual information. In that way, our results seem to contradict the predictions of Relevance Theory. Note however that those predictions seem borne out at the sentence level (in a marginally significant way), suggesting that RT might be on the right track as far as secondary inferential processes are concerned. Overall, we thus take our results to be consistent with a two-time interpretation process: extracting the opposition pivot from lexical properties first, then searching for it in context (or the memory of context) if that failed. This is in line with the general claims of AwL about “integrated pragmatic” effects in the semantics of certain linguistic expressions. Further work will analyze other eye-tracking measures, in particular backward regressions to investigate which elements are perceived as problematic in the processing of *Positive* cases.

**References:** Anscombe, J-C. and Ducrot, O. (1983) *L'argumentation dans la langue* Pierre Mardaga ♥ Bates, D., Mächler, M., Bolker, B., & Walker, S. (2014). Fitting linear mixed-effects models using lme4. *arXiv preprint arXiv:1406.5823*. ♥ Blakemore D. (2002) *Relevance and Linguistic Meaning. The semantics and pragmatics of discourse markers*. CUP ♥ Clifton Jr, C., Staub, A., & Rayner, K. (2007). Eye movements in reading words and sentences. *Eye movements*, 341-371. ♥ Cook, A. E., & Wei, W. (2019). What can eye movements tell us about higher level comprehension? *Vision*, 3, 45. ♥ Komsta, L., & Novomestky, F. (2015). Moments, cumulants, skewness, kurtosis and related tests. *R package version*, 14(1).