

## **Context and connective effects on the processing of concessive discourse relations: a VWP experiment**

Understanding a discourse involves interpreting discursive relations. Concessive relations (a.k.a. negative causal relations) have been proved to be more costly to process than other relations (Xu et al., 2017). Connectives can explicitly mark discourse relations and, by constraining expectations about the upcoming discourse, guide the interpretation and reduce their processing cost (Köhne et al., 2013). In turn, it is known that discourse relations are interpreted in contexts, but how context and connectives interact in the processing of discourse relations is a question that has not been sufficiently addressed. This study investigates how previous context and connectives affect the processing of concessive discourse relations. We address the following research questions: a) Does the presence of a biasing context reduce the cognitive cost of processing a concessive discourse relation? and b) Does the connective have the same facilitating effect independently of the biased or neutral context?

The study consists of a *Visual World Paradigm* experiment, in which 39 Mexican participants listened to 20 stimuli in Spanish with the following form: context sentence; cause sentence; negative consequence sentence (see Fig. 1). Half of the stimuli had a biasing context: it favored the anticipation of the negative consequence (congruent with the Target image); in the other half, the context was neutral (congruent with the Target or Competitor image). Half of the stimuli contained the connector *pero* (but) preceding the negative consequence sentence, and the other half had no connector. Participants listened to the auditory stimuli while looking at four pictures on the screen (Fig. 2): two Distractors, Target (congruent with the heard negative consequence) and Competitor (congruent with the cause sentence). Participants' task was to choose the image that best matched the content at the end of the auditory stimuli. The stimuli were divided into windows for the analysis (Fig. 1). We measured both response times and looking times at the objects in each of the windows, using a Tobii Pro X2-30. The data were analyzed using linear mixed effects regression models (lmerTest package in R (Bates et al. 2015)). The models included Object (Target, Competitor, Distractors), Context (biasing / neutral) and Connector (present/absent) as fixed effects and Item and Participant as random effects.

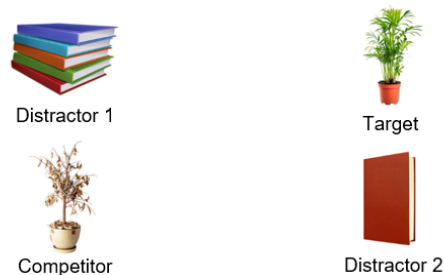
The results are as follows. Response times are significantly affected by the interaction of Context and Connective: items in the condition of neutral context without connective require significantly longer response times than the rest. The eye-tracking data shed light on the integration of both signals: in the Context window, participants discard distractors and, in the Context-extended window, looking times are significantly longer for T vs. C only in the biasing context window, as expected. In the Cause window, and even more clearly in the Cause-extended window, whose linguistic content is compatible with the Competitor, looking times are significantly influenced by Object, Context and their interaction: in the neutral context condition, C receives significantly longer looking times than T, which is practically discarded; in the Biasing context condition, on the contrary, the activation of T -due to the effect of the biasing context- is maintained, therefore, T receives significantly longer looking times than C. Finally, the effect of the connective and its interaction with the biasing context is observed in the Consequence window: T receives significantly longer looking times than C in the condition with connective (with biasing and neutral context), as well as in the condition with biasing context and without connectives. In items without connective and with neutral

contexts, looking times to T and C in the Consequence condition are not significantly different. In these items, the looking preference for T is captured later, after the end of the auditory stimuli. The results indicate that the biasing context reduces the cost of processing a concessive relation, and its facilitating effect is comparable to the effect of an explicit connective. The experiment also sheds light on the online processing of these utterances: the negative consequence in our stimuli, which is preactivated as a result of the integration of the biasing context, remains activated throughout the stimulus, despite the presence of a sentence congruent with the positive consequence. Finally, the facilitating effect of the connective is notorious when there is a neutral context, but it is not perceived in our results when the context has already created the expectation of a negative consequence. The rigid meaning of connectives (Blackmore, 1997) is often assumed to have a constant, pervasive facilitating effect on utterance processing. This study shows that the rigid meaning does not always translate into facilitating effects, as these effects seem to be stronger or present only when the relation itself is difficult to process, but disappears when the relation is intrinsically easy to process (Aragón, 2021) and when other discourse elements already reduce the cost of the relation.

**Figure 1. Structure of auditory stimuli, by Context and Connective**

<b>CONTEXT</b>	<b>Biasing Context</b>	<b>Context-extended</b>	<b>Cause</b>	<b>Cause-extended</b>	<b>Connective</b>	<b>Negative consequence</b>
	1700 ms	700 ms	1700 ms	700 ms	700 ms	1700 ms
<b>neutral</b>	<i>Esta planta es de Ana</i> This is Ana's plant		<i>Estuvo muchos días al sol</i> It was in the sun for many days		(pero)  (but)	<i>No se secó ni un poco</i> It did not dry out a bit
<b>biasing</b>	<i>Esta planta es muy resistente.</i> This plant is very resistant		<i>Estuvo muchos días al sol</i> It was in the sun for many days		(pero)	<i>No se secó ni un poco</i> It did not dry out a bit

**Figure 2. Example of visual stimuli (Labels not displayed in the experiment)**



## References

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