Multiple cue integration in discourse expectations:
experimenting with German *zwar...aber* vs. English *sure...but*

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Existing literature shows that readers and listeners rapidly adjust their expectations about discourse continuations through discourse markers ([4];[5];[7]), as well as through other linguistic [3] and extra-linguistic cues [1]. Still, it is unclear whether (i) the facilitative effects of various (extra-)linguistic cues differ in quantity and (ii) whether the effects interact with one another in any principled manner. In the current study, we report on two experiments on concessive constructions in German and English. In both languages, a concessive relation can be expressed by the connective *but* (e.g. *John has a treadmill in the living room, but he often jogs in parks.*). However, there can be additional cues, such as for example by discourse context, or by lexical devices indicating concessivity prior to the occurrence of *but,* i.e. *zwar S1, aber S2* [2] in German and *sure/true, S1, but S2* in English. We used a moving window self-paced reading task in combination with a rating task to test the effects of contextual and lexical cues on readers' expectation for the contrast with *aber/but*.

The German experiment was based on a 2*2 (context-cue*lexical-cue, henceforth CC*LC) design, see examples of the stimuli in (1). An initial context sentence (*S0*) was used to introduce an agent and an activity the agent likes to engage in. *S0* was either underspecified or specified w.r.t. the time, place, or manner for the given activity through the absence or presence of an adverbial modifier. The second sentence (*S1*) states something that goes along with the underspecified version of *S0,* e.g. 1a/1c, which we label as the -CC conditions; *S1* creates a contrast with the specified version of *S0,* e.g. 1b/1d, which we label as +CC conditions. Lexical cues were either present (+LC) or absent (-LC): *S1* either contained *zwar* (1a/1b), or not (1c/d). After each trial participants rated the naturalness of the sentences. The critical region (CR) is the region containing the contrastive discourse marker (*aber er*, 'but he') in the coordinating sentence *S2*. Since effects in self-paced reading tasks are often delayed or distributed over multiple regions [6], we also report the results at the CR+1 region (*joggt,* 'jogs'). The English study was based on a similar design and procedure, see examples of the stimuli in (2). The German study was conducted at the behavioural lab of our home university whereas the English study was conducted at Amazon Mechanical Turk.

Results of the German experiment (subject N=50, item N=28, filler N=68): For the reading times, we found significant effects for both CC (p<.05) and LC (p<.001): the critical region was read faster if *S1* was explicitly marked with *zwar*, or if *S1* was incongruous with *S0*, but the two effects were independent of another (Interaction Context*Marking p=.64). Crucially, this means that even after *S1* was LC-marked, the incongruence between *S0* and *S1* maintained a facilitative effect. At the post-critical region (CR+1), we found a significant effect of CC (p<.05), such that the region was read faster if *S1* was incongruous with *S0*. There was no effect of LC, and no interaction. The naturalness ratings show a main effect of CC (p<.01) such that the +CC conditions were rated more natural than the -CC conditions. No other effect was significant.

Results of the English experiment (subject N=55, item N=24, filler N=48): Using the same paradigm, the results of the English experiment only partially match the results found for German. For the reading times, there were no significant effects at the CR. At the post-critical region (CR+1), however, we found a significant effect of LC (p<.001), such that the region was read faster if *S1* was LC-marked. The effect of CC (p=.075) failed to reach significance and there was no interaction effect. The naturalness ratings revealed a significant interaction between CC*LC (p<.05). Post-hoc pairwise comparisons show that in the +LC conditions, there was no difference between the +CC vs. -CC condition (p=.31). In the absence of marking (-LC), however, the +CC condition was rated significantly more natural than the -CC condition (p<.0001), suggesting that a contextual incongruence, even if it was unable to facilitate one-line processing, gave a motivation for the contrast that rendered the concessive more natural.

Conclusions: The current study provides novel evidence that readers use discourse markers and/or contextually available pragmatic inferences to anticipate upcoming discourse relations. While discourse markers functioned as salient cues to generate expectations in both studies, German readers

further made immediate use of contextual incongruences to predict an upcoming contrast. The lack of the CC effect in the RT data of the English study needs further investigation.

1. German experiment

(1) a. (-CC+LC) Jens joggt gerne. Er hat zwar ein Laufband im Wohnzimmer, **aber er** joggt häufig im Park.

b. (+CC+LC) Jens joggt gerne draußen. Er hat zwar ein Laufband im Wohnzimmer, **aber er** joggt häufig im Park.

c. (-CC-LC) Jens joggt gerne. Er hat ein Laufband im Wohnzimmer, **aber er** joggt häufig im Park.

d. (+CC-LC) Jens joggt gerne draußen. Er hat ein Laufband im Wohnzimmer, **aber er** joggt häufig im Park.

(Jens jogs gladly (outside). He has (true) a treadmill in-the living-room, but he jogs often in-the park)
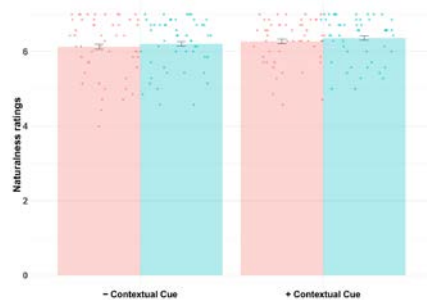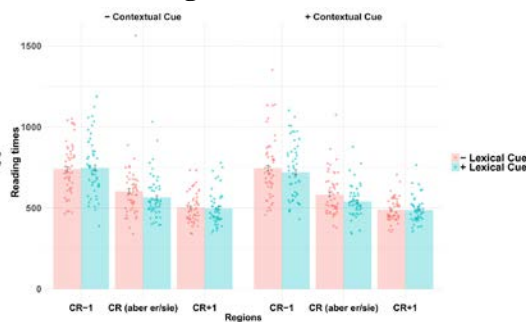
Figure 1

Figure 2

2. English experiment

(2) a. (-CC+LC) John likes to run. True, he has a treadmill in the living room, **but he** often jogs in parks.

b. (+CC+LC) John likes to run outdoors. True, he has a treadmill in the living room, **but he** often jogs in parks.

c. (-CC-LC) John likes to run. He has a treadmill in the living room, **but he** often jogs in parks.

d. (+CC-LC) John likes to run outdoors. He has a treadmill in the living room, **but he** often jogs in parks.
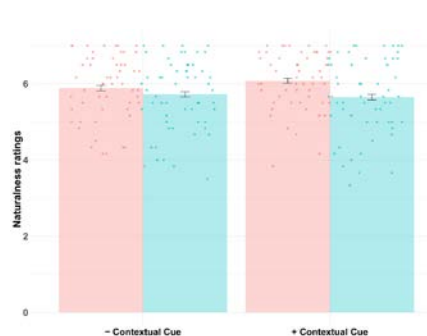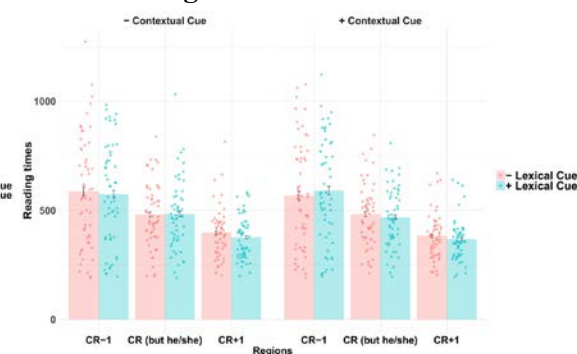
Figure 3

Figure 4

References: [1] Gambi et al. (2015). The role of prosody and gaze in turn-end anticipation. **[2]** König & Siemund (2000). Causal and concessive clauses: Formal and semantic relations. **[3]** Rohde et al. (2011). Anticipating explanations in relative clause processing. **[4]** Scholman et al. (2017). "On the one hand" as a cue to anticipate upcoming discourse structure. **[5]** Van Bergen & Bosker (2018). Linguistic expectation management in online discourse processing: An investigation of Dutch inderdaad 'indeed' and eigenlijk 'actually'. **[6]** Witzel et al. (2012). Comparisons of online reading paradigms: Eye tracking, moving-window, and maze. **[7]** Xiang & Kuperberg (2015). Reversing expectations during discourse comprehension.