

On the emergence of expectations in discourse introduced by ambiguous cues

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In discourse processing, readers make use of a variety of (explicit and implicit) cues to facilitate coherence. Many of these cues do not signal one but potentially multiple discourse relations. So, if there is no one-to-one relationship between cues and relations, which relation does an ambiguous cue facilitate? We argue that probability distributions can explain the emergence of specific expectations introduced by ambiguous cues, as proposed by, e.g., Asr and Demberg (2020).

For unmarked cases, it has been proposed that readers assume certain default interpretations. For example, readers will usually infer a causal relation between the two clauses in (1a), even in the absence of any explicit cue (Sanders, 2005):

- (1) a. She wants to marry him. He is a linguist.
- b. She wants to marry him, but he is a linguist.

At the same time, it has also been shown that various cues can override this default causal inference, see (1b). This effect has been observed both in corpus studies (Hoek & Zufferey, 2015) and experimental work (Koornneef & Sanders, 2013; Chen et al., 2019; Seemann et al., 2026; Yao et al., 2026). Yet, the exact process underlying the effects observed in these prior studies remains elusive and might differ between individual cues.

For example in one of the studies mentioned above, Seemann et al. (2026) showed in a forced-choice study that the German modal particle *doch* and the Dutch equivalent *toch*, both encoding shared knowledge and a salient contrast in the communicative context (cf. Karagjosova, 2004), lead to participants assuming a concessive rather than the equally licensed causal discourse relation. Thus, the particles are considered non-connective signals for CONCESSION. Following up on this result, we test how suitable models of discourse processing are for accommodating such effects. Given the ample evidence for discourse processing to be expectation-driven, we test predictions arising from predictive processing accounts (Kehler et al., 2008; among others). If *doch* raises expectations about the following discourse segment to facilitate a concessive relation, we would expect to see an increase in processing difficulty if an explicit connective encoding a different relation follows. We conduct a self-paced reading experiment (120 participants) presenting the ambiguous cue *doch* in sentences disambiguated by either a causal (*deshalb* ‘that’s why’) or a concessive connective (*trotzdem* ‘nevertheless’) to test this hypothesis. Given the prior results of *doch* signaling CONCESSION, we expect to see lower reading times at the concessive connective than at the causal connective. However, our study shows no statistically significant when fitting a linear-mixed effects regression model to the difference between the two relation conditions presented in (2).

- (2) Jeden Freitag essen die Kollegen gemeinsam im Büro. Peter kocht **doch** meistens ein Nudelgericht. **Deshalb/Trotzdem** bestellt Zara lieber indisches Essen für das ganze Team.
,Every Friday, the colleagues eat together at the office. (As is generally known,) Peter cooks a pasta dish most of the time. **That’s why/Nevertheless**, Zara prefers to order Indian food for the team.’

To ensure that the pragmatic information conveyed by modal particles is available to participants in such an experimental setting, we conduct a follow-up study with 80 participants to test whether presenting a modal particle in a discourse relation semantically incompatible with the particle leads to an increase in processing difficulty. Fitting a linear mixed-effects regression model to the log-transformed reading times on the region introducing the mismatch, we observe a statistically significant increase in reading times in the relation-particle mismatch condition ($\beta = -0.098$, std. error = 0.033, $p < 0.05$). Therefore, we conclude that introducing processing difficulties by mismatching a particle as a cue and

the discourse context is possible. Thus, *doch* does not appear to introduce exclusively concessive expectations about the upcoming discourse.

Still, the original study showed a strong effect for *doch* to signal CONCESSION over CAUSE. This effect can be explained by the probabilistic distribution underlying the co-occurrence of *doch* with the two discourse relations. Asr & Demberg (2020), building on the distributional hypothesis, propose that in the case of ambiguity, readers infer the more frequent co-occurrence pair of cue and discourse relation. For our case, this proposal is supported by corpus data: Queries on the combination of *weil* ('because') ... *doch* and *obwohl* ('even though') ... *doch* with zero to three word tokens in between in two large reference corpora, the Digital Dictionary of the German Language (DWDS) and the German Reference Corpus (DeReKo), show that *doch* indeed co-occurs approx. 1.5 times more often with concessive than with causal contexts. The same frequency pattern is reported in a corpus annotated for both discourse relations and modal particles (Döring & Repp, 2019).

Thus, when forced to choose between two discourse relations that are compatible with the presented ambiguous signal *doch*, the participants decided on the more frequent cue-relation pairing. At the same time, the causal interpretation is still licensed by the particle's semantics, so no measurable processing difficulties arise when presenting *doch* in a causal discourse relation. Combining the insights from the two experimental studies and the corpus results outlined above, we provide further evidence for the facilitation of discourse coherence to be driven by expectations. Our results indicate that, if presented with a cue that is ambiguous between multiple relations, readers tend to infer the more frequent relation for this cue, as predicted by probabilistic approaches to discourse processing.

References

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