

WHY OR WHAT NEXT? EYE MOVEMENTS REVEAL EXPECTATIONS ABOUT DISCOURSE DIRECTION

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Previous research provides evidence for expectation-driven processing within sentences at phonological, lexical, and syntactic levels of linguistic structure (Kamide et al. 2003; Levy 2008; inter alia). Less well-established is whether comprehenders also anticipate pragmatic relationships between sentences. To address this, we evaluate a unit of discourse structure—the intersentential coherence relation—which comprehenders must infer to hold between sentences in order for a discourse to make sense (Mann & Thompson 1988; Kehler 2002; Asher & Lascarides 2003). In a novel paradigm, we trained subjects to associate regions of their visual field with particular coherence relations. Subsequently, listeners' anticipatory eye movements during critical sentences confirmed that the relationship between the current sentence and an upcoming sentence is subject to expectation-driven processing. This study extends the work on prediction beyond sentence-internal structure, and provides a new methodology for examining the cues that comprehenders use to establish relationships at the discourse level.

Implicit-Learning Training: To establish specific region~relation mappings, we adapted an infant category-learning paradigm in which an item is shown entering the bottom of a Y-shaped tube and then emerging from the left or right output end, depending on its classification (McMurray & Aslin 2004). To train comprehenders to implicitly identify specific discourse relations, we asked subjects to figure out how a virtual “tube” classified stories. For each item, a ball entered the tube, a two-sentence passage played, and subjects selected the output end where they thought the ball would re-appear. The emerging ball then provided feedback as to the correct classification. Post-training items showed that a third of subjects learned the correct classification—that one output end corresponded to Explanations like (1), in which the second sentence answers the question ‘why’ relative to the first, and the other corresponded to Occasion passages like (2), in which the relevant question is ‘what next’.

Eye-tracking: The second phase consisted of a speeded-response task with the same classification tube. Subjects listened to the first sentence of a passage (3a, 4a) and clicked on the ball when it appeared at one of the two tube output ends in order to hear the second sentence (3b/b', 4b/b'). Crucially, the first sentence contained a coherence-biasing cue (Kehler et al. 2008): either a ‘why’-biasing implicit-causality verb (3a) or a ‘what-next’-biasing transfer verb (4a). While listening to the first sentence and waiting for the ball to re-appear, subjects looked to the region corresponding to the verb-indicated relation, although the timecourse of the effect differed by verb type and post-training test performance. Subjects who were successful during training looked to the ‘why’ region as early as 400-600ms after implicit-causality verbs (i.e., before the current proposition was complete), whereas less-successful subjects failed to show the same pattern until 2000ms after the verb. Both groups looked to the ‘what-next’ region ~1000ms after transfer verbs.

To our knowledge, this is the first demonstration of online expectation-driven processing at the level of discourse structure, extending claims of such processing beyond sentence-internal levels and showing that pragmatic reasoning about upcoming discourse relations need not wait until the end of the sentence.

1. ‘Why’ relation implicit-learning training item: Leo takes the bus to work. He doesn't have a car.
2. ‘What next’ relation implicit-learning training item: Melissa ran towards Trevor. They embraced.
3. Critical item with ‘why’-biasing implicit causality verb in first sentence:
 - a. first sentence: Arthur scolded Patricia in the hallway.
 - b. ‘why’ continuation: She had put thumbtacks on the teacher's chair.
 - b'. ‘what next’ continuation: He then sent her to the principal's office.
4. Critical item with ‘what-next’-biasing transfer verb in first sentence:
 - a. first sentence: Heidi shipped Eric a package.
 - b. ‘why’ continuation: She thought he would like some cookies from home.
 - b'. ‘what next’ continuation: He wrote her a thank you note.