

Our aim was to investigate how adults resolve focal ambiguities in the context of *only* on-line. For this reason, we designed a processing experiment involving response time measurement and eye-tracking in a visual setting. The theoretical importance of the results is that it potentially supports Reinhart's (1995, to appear) proposal that utterances with stress shift involve reference set computation (i.e. comparison of full derivations at the interface), and thus present an increased processing load to the hearer. Furthermore, the eye tracking patterns reveal important aspects of the on-line disambiguation process.

Take the focally ambiguous utterance in (1), with neutral main accent on the final word *boy*. It allows the two interpretations in (2).

- (1) I only gave apples to the BOY.
 (2) a. The only person I gave apples to was the boy. Focus= indirect object
 b. The only thing I did was giving apples to the boy. Focus= VP

As is well-known (e.g. Selkirk 1984), the same interpretative ambiguity is lacking in utterances with marked stress, such as (3), where stress has been shifted to the direct object.

- (3) I only gave APPLES to the boy.
 (4) a. The only thing that I gave to the boy was apples. Focus= direct object
 b. #The only thing I did was giving apples to the boy. Focus= VP

Reinhart (1995, to appear) argued that the reason for the unavailability of the wide focus interpretation in (3) is due to the fact that this interpretation *is* available in the neutrally stressed (1) (see 2b). Thus, stress shift, the optional prosodic operation that places main stress on the direct object in (3), was applied unnecessarily. Assuming that such optional operations only apply if necessary, the unavailability of (4b) follows. Note that comparison of full derivations (i.e. (1) and (3)) is required at the interface to determine the unavailability of (4b).

An alternative explanation states that marked stress and neutral stress possess different focussing abilities. Marked stress, as in (3), only allows narrow focus readings, while neutral stress in (1) may project focus to higher constituents (Rizzi 1997 and subsequent work). In this view, there is no comparison of derivations at the interface. Wide focus in the case of marked stress is simply disallowed by the grammar.

Theoretical issues aside, the two approaches make different predictions for language processing. In Reinhart's view, it is expected that utterances with stress shift involve more processing cost, as they involve the comparison of full derivations. No such extra processing cost is expected in the other view.

In our experiment, subjects saw a picture depicting the result of some events, and heard a corresponding utterance describing the scene. Their task was to determine whether the utterance was true in the scene. The truth of the utterance depended upon the prosodic characteristics of the utterance (i.e. (1) vs. (3)) (cf. also Gennari et al 2004). Given the theoretical considerations above, we expected that it takes longer for subjects to decide the truth-value of the utterance in the stress shift condition than in the neutral stress condition. This was indeed what we found.

Eye-tracking experiments in visual settings of this type have previously established that subjects fixate on the images corresponding to the referents mentioned by the audio stimulus. Such experiments regard the order and duration of fixation (Cooper 1974; Eberhard et al 1995). Based on this literature we expected that the fixations reflect the elements considered during the computation of the truth-value of the utterance. In the case of (1) and (3), this includes the entity that makes the assertion part of the utterance true (i.e. in both (1) and (3) the boys apples). In addition, we expected fixations on (potentially) falsifying entities, such as apples that belong to any other person in (1), or any other fruit the boy may have in (3). These expectations were born out. We found that subjects fixate on the entities that are logically necessary to determine the truth of the utterance. This is an important outcome, given the scarcity of eye-tracking experiments involving complex linguistic material and a truth-value judgment task.

In addition, we also expected to find differences between the eye-tracking pattern of utterances with stress shift and with neutral stress. Recall that the theoretical prediction is that utterances like (3) involve an increased processing load compared to utterances like (1), with neutral stress. In self-paced reading experiments, it is often documented in the literature that computational overload manifests itself in the form of exceptionally long reading time on the element in question. In our experiment, which involves a visual setting, we assumed that extra processing load would have the effect that at a certain point during the computation, subjects would have unusually long fixations on a particular part of the visual stimulus. We expected such long fixations (i) to occur towards the end of the utterance, or after the offset of the utterance, when the subject is likely to proceed with the focus computation; (ii) to target a part of the picture that would be relevant for determining the truth-value of the utterance (see above); (iii) would differ in length in the sense that subjects who are in general slower than average in taking truth-value decisions would show the effect to a larger extent, compared to subjects who are generally fast. All three characteristics were born out by our experimental findings.

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