

Incremental Turn Processing in Dialogue

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Incrementality in dialogue

A: They X-rayed me, and took a urine sample, took a blood sample. Er, the doctor ...
B: Chorlton? [Clarification Request (CR)]
A: Chorlton, mhm, **he** examined me ...

This example demonstrates that:

1. sentence (turn) processing is incremental (the clarification request can be understood and responded to, even though the antecedent turn is not yet complete)
2. such incremental processing must **make prior material** available for later reference/clarification

What are the increments?

How are they processed?

Does the syntactic point of interruption affect the processing of the clarification request?

Predictions

Word/String Based Models predict accessibility of an antecedent is solely a function of (string) distance from the target.

Unstructured Semantic Models unstructured records of discourse referents predict no effect of the point of the clarification request insertion on accessibility of antecedent e.g. DRT, Kamp & Reyle (1993)

Constituent Structure Models predict accessibility depends on the structural characteristics at the point of interruption, e.g. whether the interrupted constituent is complete, Dynamic Syntax, Kempson et. al. (2001)

Experimental Approach

Insert 'spoof' artificial clarification requests into real on-going dyadic dialogues in real-time, using a character-by-character version of the DiET chat-tool (Healey et. al., 2003).

- Target is a **prior, completed NP**.
- Probe clarification request is a **verbatim repeat of target** plus a question mark, i.e. a Reprise Fragment. Example:

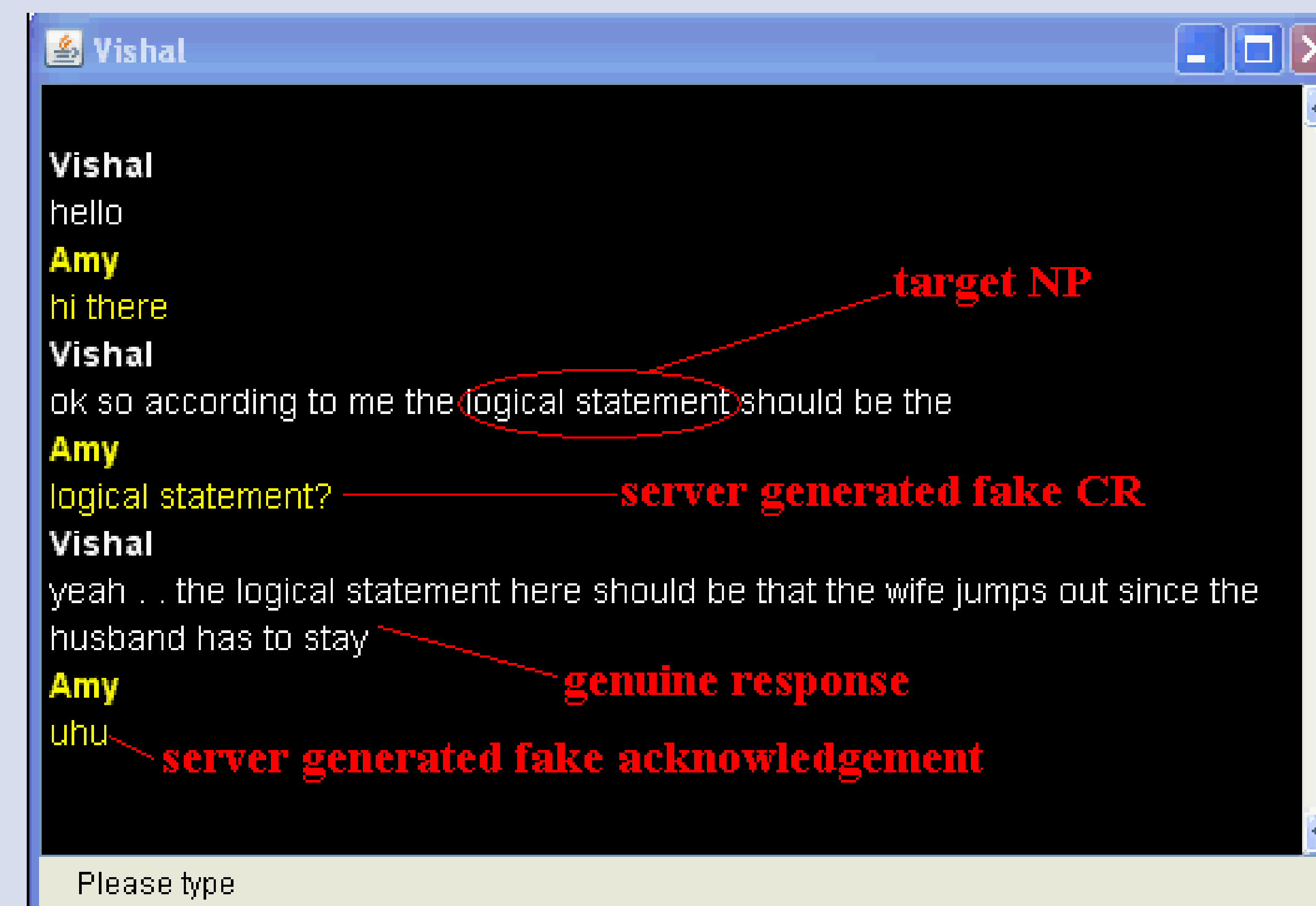


Figure 1: A Within-Constituent Manipulation

Manipulation of Insertion Point:

- WITHIN-CONSTITUENT: Mid-NP, Mid-PP
- CONSTITUENT-BOUNDARY: End-of-NP, End-of-PP

Manipulation ensures that Within-Constituent clarification requests are **on average nearer** to their target than Between-Constituent clarification requests.

24 pairs of participants carried out 'balloon task' dialogues. The manipulation was **within-subjects**.

Results

Effects of Insertion Point

- No reliable difference in the overall likelihood of a response, nor in the likelihood that the target NP is reformulated ($\chi^2_1 = 0.57, p > 0.05$).
- Within-Constituent clarification requests are **more likely to cause a restart** from the beginning of the interrupted clause ($\chi^2_1 = 6.6, p < 0.05$). See example of a restart in Figure 1.
- Within-Constituent clarification requests are **less likely to be interpreted as a clarification request** ($\chi^2_5 = 12.1, p < 0.05$).

Within-Constituent clarification requests are thus **more disruptive and harder to integrate**. This is not an effect of distance or memory decay as the Within-Constituent clarification requests were closer to their targets on average (21.4 vs. 25.2 characters ($Z = -3.07, p < 0.05$)).

Conclusions

Accessibility of prior material is sensitive to the incremental unfolding of constituent structure.

Evidence of constituency: increments in dialogue processing are organised in terms of structured syntactic/semantic constituents, rather than simple strings/words or unstructured semantic referents.

Need for a sub-sentential, highly-structured and incremental concept of context (e.g. Cann et. al. (2007)).

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