

Pronoun resolution is fast and automatic: Evidence from a German visual world experiment

Sarah Schimke¹, Saveria Colonna² & Barbara Hemforth³

¹ University of Osnabrück, ² CNRS & University of Paris 8, ³ CNRS & University Paris Diderot



Introduction

According to the « good-enough » approach to language processing (e.g., Ferreira & al., 2002), speakers' interpretations often result from shallow processing, leaving ambiguities unresolved when the motivation to undertake all the necessary processing steps is low. As a consequence, the tasks in comprehension experiments should influence whether participants fully resolve an ambiguous pronoun. Whereas some findings from reading experiments suggest that the task can determine whether participants fully interpret pronouns (e.g., Stewarts & al., 2007), data from visual world experiments suggest an immediate and automatic (i.e. independent of the task) resolution process (e.g., Arnold & al., 2000).

Visual World Experiment

Research question

Do the task demands in a visual world experiment influence whether participants automatically identify referents of ambiguous pronouns?

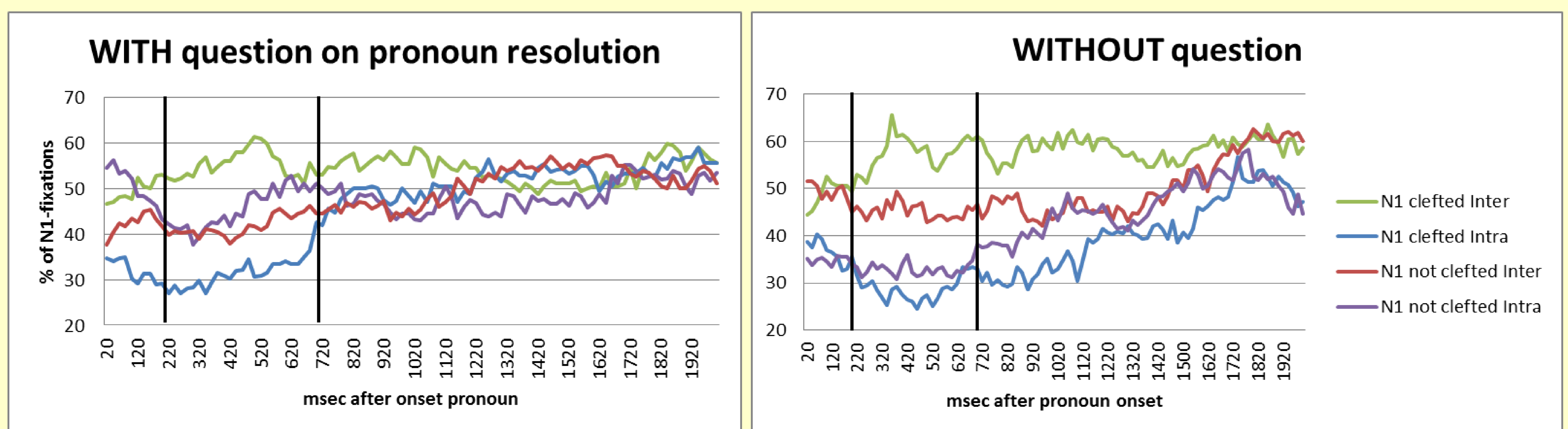
This question was studied in a visual world replication study of an off-line questionnaire (with explicit questions on pronoun resolution) comparing two different conditions: participants either had to answer an explicit question on the referent or a general sentence picture matching question.

Method

- Visual world experiment in German
- Random factors: 20 experimental items (20 fillers); 44 participants
- Fixed factors: (1) intra-sentential vs. inter-sentential pronoun resolution; (2) the first referent (N1) was either clefted or not; (3) with vs. without question on anaphora as a between-participants factor:
 - 21 participants had to answer a question concerning their interpretation of the pronoun such as “Who was a student?”
 - 23 participants just had to judge whether the sentence they heard matched the visual scene that was presented simultaneously (half of the fillers did not match)

Sample item	N1 clefted	N1 not clefted
Intra-sentential	Es ist der Straßenfeger, der den Postboten versteckt hat, als er Student war. <i>It is the street sweeper who hid the postman when he was a student.</i>	Der Straßenfeger hat den Postboten versteckt, als er Student war. <i>The street sweeper hid the postman when he was a student.</i>
Inter-sentential	Es ist der Straßenfeger, der den Postboten versteckt hat. Er war damals Student. <i>It is the street sweeper who hid the postman. He was then a student.</i>	Der Straßenfeger hat den Postboten versteckt. Er war damals Student. <i>The street sweeper hid the postman. He was then a student.</i>

Results and discussion



We chose a 500 ms window starting at 200 ms after pronoun onset for analysing **early** pronoun resolution effects.

No statistical difference between the two groups (with vs. without question) was observed:

Off-line results observed with this kind of materials were replicated both with and without explicit questions on pronoun interpretation (Colonna & al., 2012): The clefted antecedent is preferred only in the inter-sentential condition (significant interaction of fixed effects: $t = -2.977$, maximum likelihood model comparison: $\chi^2(1) = 8.454$, $p < .01$).

Even without explicit questions, the pronoun is interpreted **fast** and **automatically**.

Selected references

- Arnold, Eisenband, Brown-Schmidt, Trueswell (2000). The rapid use of gender information: Evidence of the time course of pronoun resolution from eyetracking. *Cognition*, 76(1), B13-B26.
- Colonna, Schimke, Medam, Hemforth (2012). Different effects of focus in intra- and inter-sentential pronoun resolution in German and French. *CUNY12*, New-York, March 14-16.
- Ferreira, Bailey, Ferraro (2002). Good-enough representations in language comprehension. *Current Directions in Psychological Science*, 11, 11-15.
- Stewart, Holler, Kidd (2007). Shallow processing of ambiguous pronouns: Evidence for delay. *The Quarterly Journal of Experimental Psychology*, 60(12), 1680-1696.

Acknowledgments

We would like to thank Friederike Voß for help in conducting the experiment and Emilia Ellsiepen for her help with some of the data analyses.