

INTERFERENCE AND MEMORY OVERLOAD DURING PARSING

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I. Introduction

Theories like DLT predict that 1(b) is more acceptable than 1(a). At a point of high memory complexity the syntactic predictions of the second VP is forgotten, because it is associated with the most memory load. This has only been tested in got-it tasks (Christiansen 1997) and in acceptability ratings (Gibson & Thomas 1999).

1(a) # [The patient [who the nurse [who the clinic had hired] admitted] met Jack.]
[NP1 [NP2 [NP3 VP3] VP2] VP1] (b) * [The patient [who the nurse [who the clinic had hired] ...] met Jack.]
[NP1 [NP2 [NP3 VP3] ...] VP1]

If SBI operates independently and in addition to high memory load as defined in e. g. DLT, difficulties in creating (*encoding*) and *retrieving* a working memory trace T should show up when these items are processed. This difficulty should arise in 2(a) in contrast to 2(b) and is due to the similarity between the features of a stored set of items X (*carpenter, craftsman*) and the to-be encoded and retrieved item T (*peasant*).

2(a) The carpenter who the craftsman that the peasant had carried to the bus-stop had hurt yesterday supervised the apprentice.
[NP1+ [NP2+ [NP3+ VP3] VP2] VP1] (b) The carpenter who the pillar that the peasant had carried to the bus-stop had hurt yesterday supervised the apprentice.
[NP1+ [NP2- [NP3+ VP3] VP2] VP1]

II. Materials

We contrasted unacceptable nested sentences with their ungrammatical, but seemingly more acceptable counterparts in which:

- (a) the three NPs preceding the VPs were either all human
(b) the second was inanimate

resulting in a 2×2 design.

1 a) # [NP1+ [NP2+ [NP3+ VP3] VP2] VP1] 2 a) * [NP1+ [NP2+ [NP3+ VP3] ...] VP1]
b) # [NP1+ [NP2- [NP3+ VP3] VP2] VP1] b) * [NP1+ [NP2- [NP3+ VP3] ...] VP1]

In order to control that NP1+ and NP2+ are equally likely to be agent for VP1, an offline acceptability rating study was conducted:

Who is more likely to supervise the apprentice?
the carpenter the craftsman

[The carpenter [who the craftsman/pillar [that the peasant had carried to the bus-stop] (had hurt yesterday)] supervised the apprentice.]

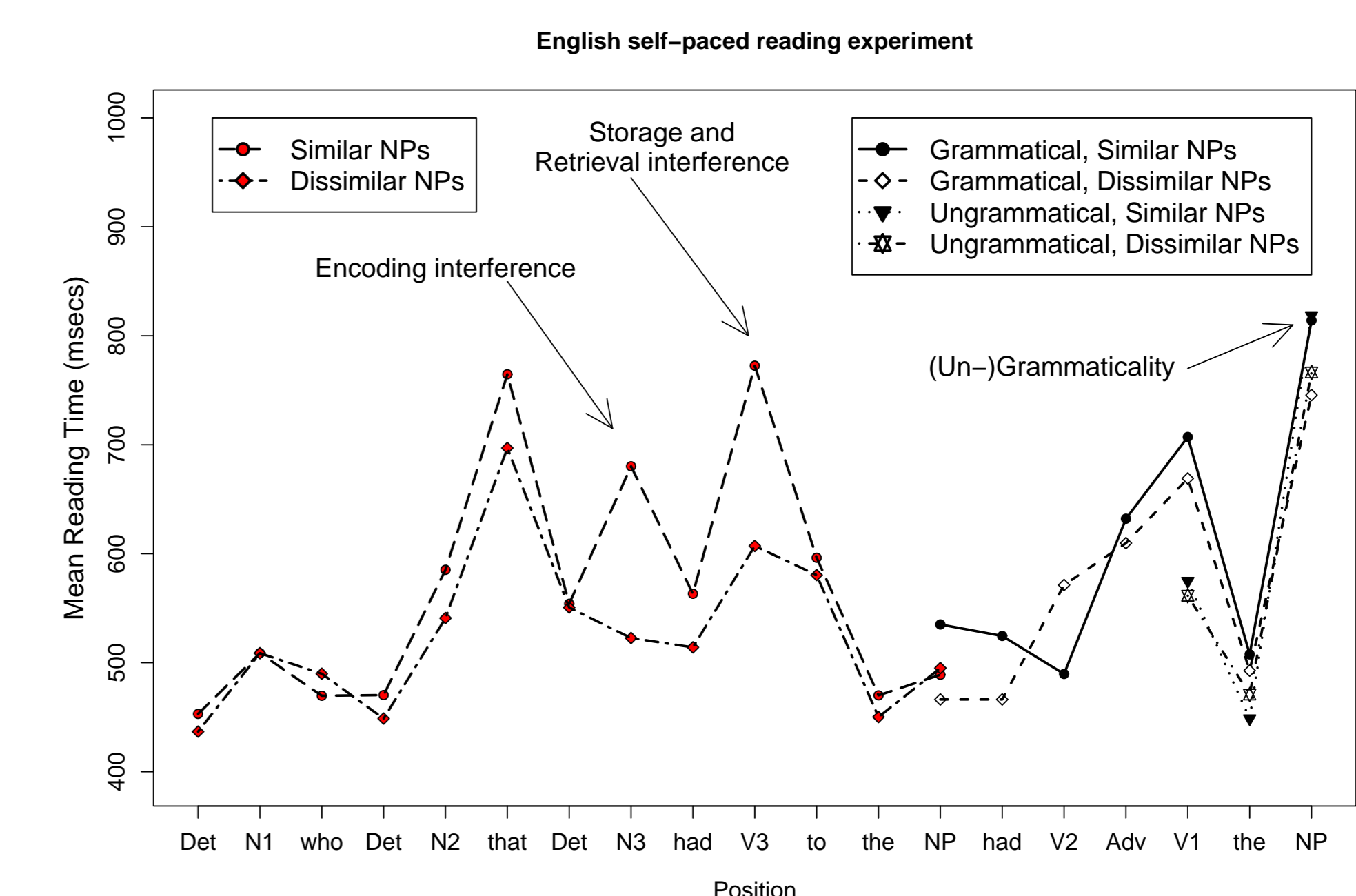
Wer verarztete wahrscheinlicher den Verletzten:
der Anwohner oder der Wanderer?

[Der Anwohner, [den der Wanderer/Stuhl, [den der Pfortner suchte.] (störte,)] verarztete den Verletzten.]

III. Experiment 1

self-paced reading comprehension experiment in English

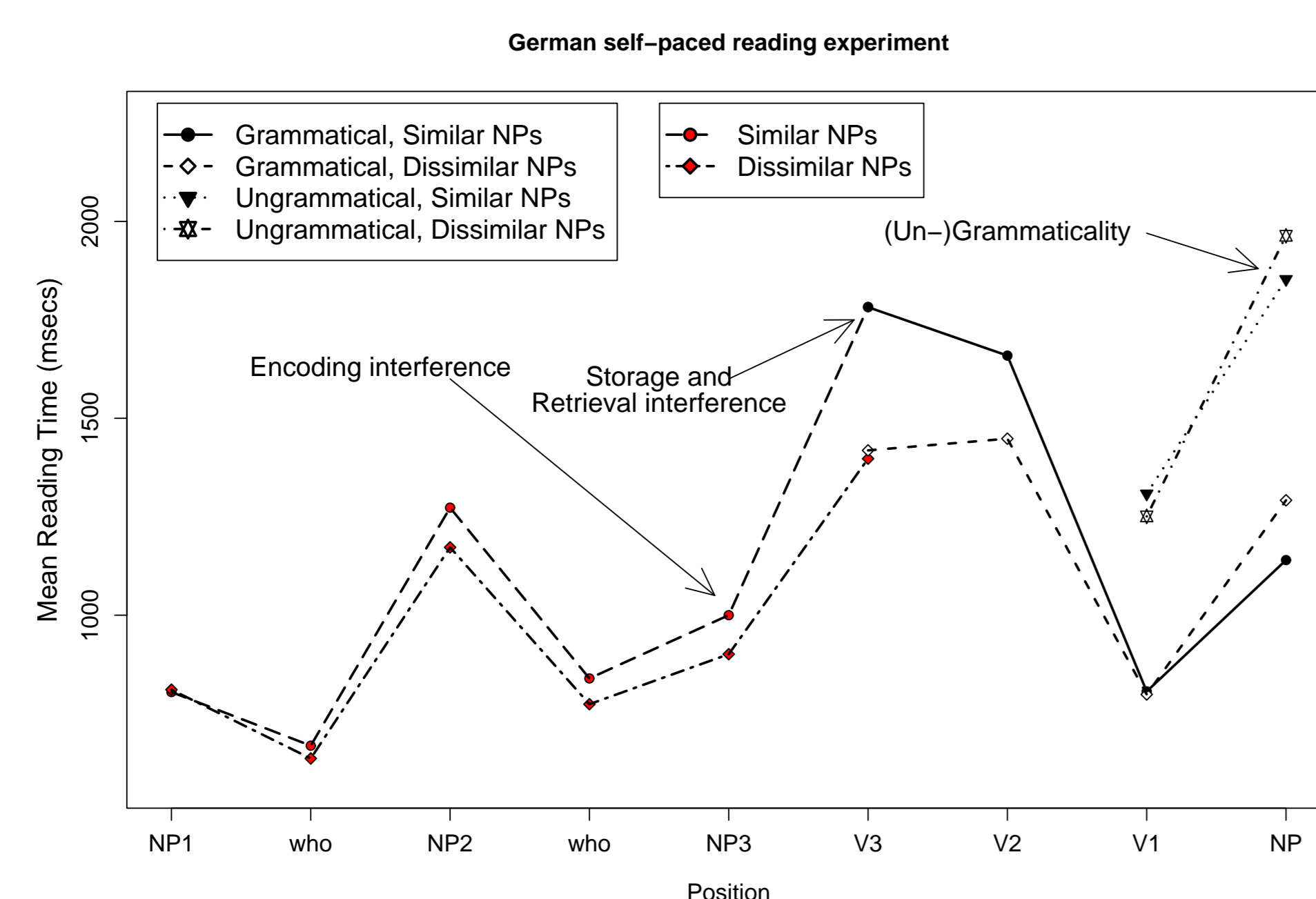
- native speakers had to read successively each word of the sentence on the computer screen; words already seen were masked
- subjects had to answer yes-no questions after each sentence



IV. Experiment 2

self-paced reading comprehension experiment in German

- German native speakers had to read sentences on the same conditions as given above for the English experiment



V. Discussion

Reading times in the German and the English experiment support the claim that interference affects the *encoding* and the *retrieval* of similar items in addition to and independently of complexity based memory overload factors.

In German the slow-down at the final NP in the ungrammatical conditions suggests German speakers detected the ungrammaticality more readily. This may be because they are reading more slowly (and therefore probably more attentive to mistakes), and/or the punctuation of German sentences is supporting parsing decisions (thereby helping detect ungrammaticality).

Comparing the two experiments, the results show two distinct loci of interference - during the creation and retrieval of a working memory trace T. In addition, forgetting the prediction of the intermediate verb due to high memory load (as defined by DLT) occurs here only in English - in German the missing VP is easier to detect.

References

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