Interpretation of Indefinites – Information Structure and Modification

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Indefinite noun phrases, such as *a waiter (at the entrance)*, assert existence and express non-uniqueness and / or non-familiarity by implicature (Hawkins, 1978; Heim, 1982). Indefinites also show discourse dynamics by introducing referents into the discourse (Karttunen, 1976;), which are accessible to subsequent anaphoric expressions (Gundel et al. 1993). We argue that in a processing model of discourse (Arnold, 2010; Rohde & Kehler, 2014) the discourse dynamics is sensitive to different processes. First, it depends on information structure (Burkhardt, 2006; Brocher et al., 2018). Second, it is assumed that modification makes the discourse referent more accessible. We will show that both parameters are significant and that they interact.

We conducted a visual world eye tracking experiment to investigate to what extent indefinite noun phrase modification and information status affect referent accessibility at re-mention. We take the results as additional evidence for the compositional process of indefinites that is sensitive to information status and internal noun phrase modification. We constructed 40 German short stories consisting of a context sentence, a second sentence that introduced two human referents (one in subject, one in object position), and a third sentence that contained a personal pronoun that was ambiguous between the two human referents in the second sentence. An example is provided in Table 1.

Table 1. Sample stimulus used in Experiment 1 (English translations in italics).

In der Bar war es mal wieder rappelvoll. / *The bar was again very crowded.*
In der Messehalle war es mal wieder rappelvoll. / *The exhibition hall was again very crowded.*

Peter rief / *Peter called*	einen Kellner am Eingang. / *a waiter at the entrance.*
	einen Kellner. / *a waiter.*

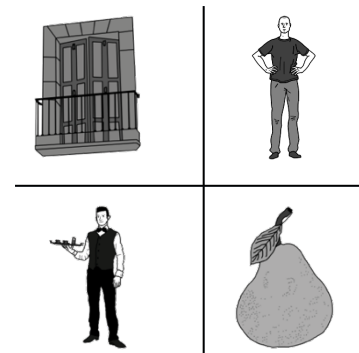| |
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| Als ein Glas vom Tisch fiel, drehte er sich verwundert um und schüttelte den Kopf. *When a glass fell off the table, he turned around and shook his head.* |

Figure 1. Example display. The subject referent (*Peter*) is presented in the upper right corner, the critical object referent (*waiter*) in the lower left corner.

The object noun phrase in the second sentence always hosted the indefinite article *einen* (*a*/*an*) and either contained a post-nominal prepositional phrase or not. In addition, the concept of the noun in object position could either be inferred from the first sentence or was brand-new. Thus, we manipulated two factors: noun phrase modification (prepositional phrase present or absent) and information status (concept could be inferred or was brand-new). All experimental materials were recorded and post-processed in a way that the critical final sentence was identical between conditions. We were interested how participants interpreted the ambiguous pronoun: as the subject, which was always a proper name, or the object of the second sentence, which was modified/inferred, modified/brand-new, simple/inferred, or simple/brand-new.

Thirty-four participants listened to the stories while looking at a computer screen displaying four pictures: a picture of the subject referent, a picture of the object referent, and two unrelated filler pictures. An example display is shown in Figure 1. For 1500 ms at ambiguous pronoun encounter, we analyzed where participants were looking. When they looked at the picture of the subject referent, we took them

to have interpreted the pronoun as the subject; when they looked at the picture of the object referent, we took them to have interpreted the pronoun as the object referent.
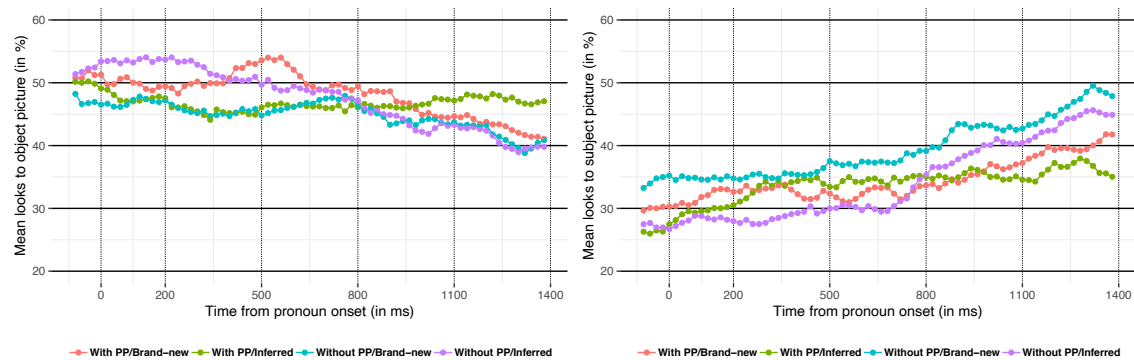

Figure 2. Time course of looks (in %) to the picture of the referent in object (left) and subject position (right); Zero marks the onset of the ambiguous pronoun; *Without PP* = object noun phrases with no prepositional phrase; *With PP* = object noun phrases with prepositional phrase; *Brand-new* = object noun phrase with brand-new concept; *Inferred* = object noun phrase with inferred concept. For the analyses on fixation times with linear mixed regressions, we found a reliable Modification x Information status interaction for the 200 ms – 500 ms window for looks to the object picture, b = -0.111, SE = 0.051, t = -2.17. For looks to the competing subject picture, we found a marginal Modification x Information status interaction for the 500 ms – 800 ms window, b = -0.084, SE = 0.045, t = 1.86, as well as a main effect of modification for the 1100 ms – 1400 ms window, b = -0.059, SE = 0.029, t = 2.03.

The time course of fixation times to the object (left) and subject picture (right) per condition are plotted in Figure 2. We can observe that brand-new indefinites, i.e. for indefinites without a link to the previous discourse, the form with more modification is more accessible than the form with less modification. However, for inferred indefinites, the form without modification is more accessible than the form with the post-nominal prepositional phrase. We find the mirror image for the accessibility of subjects (right). Taken together, our data suggest that noun phrase modification can affect referent accessibility of an indefinite at later pronoun encounter, but in different ways depending on the type of information status of the indefinite: For brand-new indefinites, more modification makes the discourse referent of the indefinite more accessible. This corresponds to predictions that more descriptive material makes the discourse referent more accessible. Surprisingly, for inferred indefinites, the form without modification is more accessible than the form with the post-nominal prepositional phrase. We speculate that this result shows that the post-nominal prepositional phrase provides more information about the frame created by the anchor ('bar') such that the discourse referent introduced by the indefinite is understood as being a more integral part of that frame than the unmodified counterpart. This observation provides challenging questions towards the discourse dynamics of indefinites in a discourse model.

Selected References:
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