

## Revisiting Rule 1 of Centering Theory

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A crucial question for models of the processing of referential expressions is how the factors determining the ranking of entities in discourse are weighted. Psycholinguistic research has concentrated on single referential expressions, typically for referents in subject position, and has rarely considered the joint occurrence of referential expressions (but see Song & Kaiser, 2024). In research on discourse structure, this issue has played a prominent role in Centering Theory (Grosz et al., 1995). According to Rule 1 of Centering Theory, non-topical referents can be pronominalized only when the topic is pronominalized too. Contrary to Rule 1, Bader & Portele (2025) found that the joint occurrence of referential expressions is governed by animacy, not topichood: inanimate patients were pronominalized only when the animate agent was also pronominalized, independently of which referent was established as topic in the preceding context. Because animacy and thematic roles were confounded in Bader & Portele (2025), either of them could replace topichood in Rule 1. Furthermore, there is no single notion of *topic*, since prior research reveals that *discourse topics* (e.g., Van Kuppevelt, 1995) and *sentence topics* (Grosz et al., 1995; Reinhart, 1981) need to be distinguished. This distinction has been neglected in previous work showing that topics are pronominalized more often in subsequent utterances. It is therefore unknown how a mismatch in topic status – one referent is discourse topic, one is sentence topic – influences the choice of referential expressions (for pronoun interpretation, see Buchholz & Von Heusinger, 2024; Schumacher et al., 2024).

To address these issues, we ran a series of picture description experiments with German-speaking participants. All pictures depicted transitive events with an animate agent acting on an animate patient. One experiment (24 items, 24 participants) investigated the influence of discourse vs. sentence topic on the production of personal and demonstrative pronouns. Each picture was preceded by a written context consisting of a headline and three sentences. The contexts preceding the pictures varied according to a  $2 \times 2$  design. A complete example is shown in (2), (3), and Figure 1. The factor *Discourse Topic* varied whether the agent or patient of the depicted event served as discourse topic in the previous context. The factor *Sentence Topic* varied whether the agent or the patient of the target description was the sentence topic by varying which referent was the subject or the object within the final context sentence.

Figure 2 shows the rates of referential expressions for agents and patients. Personal pronouns were more often used for discourse topics than non discourse topics and for sentence topics more often than non sentence topics, resulting in two main effects and no interaction. When discourse and sentence topic status align, pronoun rates are much higher for topics than non-topics; with a mismatch between discourse and sentence topic, pronominalization rates for agent and patient are of about equal size.

Demonstrative pronouns were mostly used for non sentence topics. The rate of demonstratives was particularly high for agent referents that were neither discourse nor sentence topics. Participants strongly preferred descriptions such as *Der hat ihn untersucht* (DEM examined him) over *Er hat ihn untersucht* (He examined him). Since a subject pronoun preferentially refers to the topic (the patient in this case), a demonstrative may be used for the agent in order to counteract this preference.

In sum, our results show that the production of pronouns is governed by topic status and not by thematic roles when agent and patient are of equal animacy. In order to also account for the primacy of animacy found by Bader & Portele (2025), we propose to revise Rule 1 in terms of prominence (see (1)), where prominence is defined in terms of animacy, topichood, and other features, with animacy ranked highest, sentence and discourse topic jointly ranked second highest, and other features ranked lower.

- (1) **Rule 1 revisited:** The referential expression used for the most prominent referent in the current utterance must be at least as high on the referential hierarchy as the referential expression used for any other referent in the utterance.

We discuss implications of our results with regard to how discrete discourse notions (topichood) are mapped to gradient mental notions (accessibility). More specifically, we will propose how the Bock-Levelt-model of language production must be modified to account for our results.

(2) **Discourse Topic = Agent**

**Der beste Arzt** In unserem Viertel gab es **einen sehr guten Arzt**. **Dieser Arzt** konnte fast immer helfen. ‘The best doctor – A very good doctor was practicing in our quarter. This doctor could help almost always.’

**Sentence Topic = Agent:**

Einmal musste **er** **einen scheinbar schwerhörigen Klavierlehrer** behandeln.

‘Once he had to treat a seemingly hearing-impaired piano teacher.’

**Sentence Topic = Patient:**

Einmal suchte **ihn** **ein scheinbar schwerhöriger Klavierlehrer** auf.

‘Once a seemingly hearing-impaired piano teacher visited him.’

(3) **Discourse Topic = Patient**

**Sorgen eines Klavierlehrers** In unserem Viertel gab es **einen guten Klavierlehrer**. **Dieser Klavierlehrer** hatte eine Zeit lang Probleme beim Hören. ‘Sorrows of a piano teacher – A good piano teacher was living in our quarter. This piano teacher was having hearing problems for quite a while.’

**Sentence Topic = Agent:**

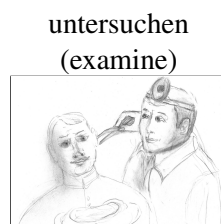
Einmal musste **ihn** **ein angesehenen Ohrenarzt** behandeln.

‘Once a respected ear specialist had to treat him.’

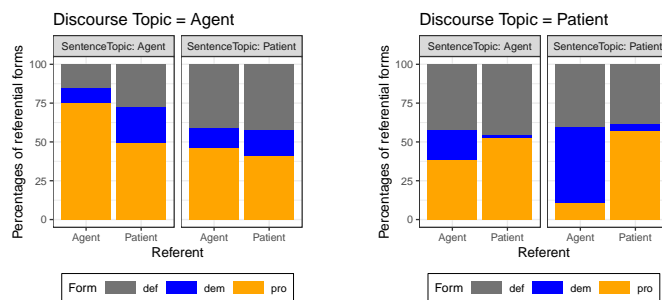
**Sentence Topic = Patient:**

Einmal suchte **er** **einen angesehenen Ohrenarzt** auf.

‘Once he visited a respected ear specialist.’



**Figure 1:** Example picture from Experiment 1.



**Figure 2:** Referential forms used for referring to agent and patient in Experiment 1 (def = definite NP, dem = demonstrative, pro = pronoun).

Note: Most of the demonstratives produced by participants were *dieser* demonstratives whereas *der* demonstratives occurred rarely.

## References

- Bader, Markus & Yvonne Portele. 2025. Animacy outweighs topichood when choosing pronouns and word order. *Journal of Memory and Language* 142. 104615. doi:10.1016/j.jml.2025.104615.
- Buchholz, Timo & Klaus Von Heusinger. 2024. German demonstrative pronouns differ in their sensitivity to discourse and sentence topics. *Frontiers in Communication* 9. 1369290.
- Grosz, Barbara J., Aravind K. Joshi & Scott Weinstein. 1995. Centering: A framework for modeling the local coherence of discourse. *Computational Linguistics* 21. 203–225. doi:10.21236/ada324949.
- Reinhart, Tanya. 1981. Pragmatics and linguistics: An analysis of sentence topics. *Philosophica* 27(1). 53–94. doi: 10.21825/philosophica.82606.
- Schumacher, Petra B., Clare Patterson & Magdalena Repp. 2024. Famous protagonists interfere with discourse topicality during pronoun resolution. *Glossa Psycholinguistics* 3(1). 9. doi:10.5070/G60111226.
- Song, Jina & Elsi Kaiser. 2024. Effects of referential structure on pronoun interpretation. *Language, Cognition and Neuroscience* 39(1). 98–117. doi:10.1080/23273798.2023.2250481.
- Van Kuppevelt, Jan. 1995. Main structure and side structure in discourse. *Linguistics* 33(4). 809–833. doi: 10.1515/ling.1995.33.4.809.