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Processing of gender information of German possessives in aphasia

by Gianna Urbanczik | Seçkin Arslan | Leonie F. Lampe | Lyndsey Nickels | Sandra Hanne | Cognitive Sciences, Department of Linguistics, University of Potsdam, Potsdam, Germany; International Doctorate for Experimental Approaches to Language and Brain (IDEALAB), Universities of Groningen (NL), Potsdam (DE), Newcastle (UK), and Macquarie University (AU) | Université Côte d'Azur, CNRS, BCL, France | Cognitive Sciences, Department of Linguistics, University of Potsdam, Potsdam, Germany; School of Psychological Sciences, Macquarie University, Sydney, Australia | School of Psychological Sciences, Macquarie University, Sydney, Australia | Cognitive Sciences, Department of Linguistics, University of Potsdam, Potsdam, Germany

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Introduction and aim

Previous research has shown that people with aphasia often exhibit impairments in pronoun processing (e.g., Choy & Thompson, 2010; Grodzinsky et al., 1993). As pronouns are an essential part of languages and, therefore, of daily communication, identifying the underlying nature of processing impairments of pronominal forms is essential.

A recent meta-analysis (Arslan et al., 2021) has demonstrated that the majority of studies on pronoun processing in aphasia investigate only some of the many different pronoun types (i.e., personal pronouns, interrogatives and reflexives) while studies on other pronoun types such as demonstratives or possessives are mostly lacking. To tackle this research gap, this study focuses on processing of possessives, an understudied pronoun type, in German speakers with aphasia. Studies on English have shown that, in people with aphasia, the ability to comprehend possessives tends to be preserved, while the production of possessives can be impaired (Caplan et al., 2007; Goodglass et al., 1993). However, this may not hold for comprehension of German possessives, which are morphologically more complex than English possessives.

Possessives can be used both as determiners (PossDet; e.g., 'That is *her* car') and as pronouns (PossPro; e.g., 'That is *hers*'). In German, both possessive forms are morphologically complex: They are marked for features of the possessor (i.e., the person possessing something) as well as features of the possessee (i.e., the object being possessed). For third person singular forms, possessor marking requires marking of number and gender on the stem (*sein-* 'his' and *ihr-* 'her'). Number, case, and gender (masculine, feminine and neuter) are marked on the suffix for possessee agreement.

There are currently no studies exploring the processing of German PossPro, neither in people with aphasia nor in unimpaired individuals, and only a few studies have investigated processing of German PossDet in unimpaired individuals (e.g., Stone et al. 2021), and none

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with people with aphasia.

In the current study, we aim to explore on-line and off-line comprehension of gender marking of German third person singular possessive determiners and pronouns in people with aphasia and unimpaired individuals. Specifically, we plan to investigate comprehension of both possessor (i.e., gender on the stem) and possessee (i.e., gender on the suffix) marking.

Methods

Participants

We plan to collect data from thirty unimpaired participants and undertake a single case study with one participant with aphasia.

Materials and procedure

We use a visual world eye-tracking paradigm and an accompanying behavioural judgement task to measure on-line and off-line processing of possessives in two experiments: one targeting PossDet and one targeting PossPro. Both tasks follow a 2x2 design.

Both experiments use the same basic task. At the beginning of each task, the participant is introduced to the two protagonists of the tasks: A man representing the male possessor and a woman representing the female possessor. The investigator then explains that the man possesses only blue objects and that the woman's objects are always yellow. For each trial, the participants first see the man with two objects of different genders coloured in blue and the woman with the same objects coloured in yellow (e.g., *Schlüssel*$_{\text{MASC}}$ 'key' and *Feder*$_{\text{FEM}}$ 'feather'; see Fig. 1a). This visual presentation will be accompanied by a prerecorded sentence with the object names in plural (e.g., *Hier sind Schlüssel und Federn*. 'Here are keys and feathers.'). Subsequently, only the four objects are displayed on the screen (see Fig. 1b) and an auditory instruction is presented. In the PossPro task, participants hear sentences such as in (1) and in the PossDet task, participants hear similar sentences such as in (2) but where target objects yet not their colours are mentioned.

(1) PossPro trial target: Yellow feather / blue feather / blue key / yellow key (see Fig. 1b)
Drücken Sie auf: Das ist ihr-e / sein-e / sein-er / ihr-er.
Press: This is hers-fem / his-fem / his-masc / hers-masc.

(2) PossDet trial target: Yellow feather / blue feather / blue key / yellow key (see Fig. 1b)
Drücken Sie auf: Das ist ihr-e Lieblingsfeder / sein-e Lieblingsfeder / sein-Ø Lieblingsschlüssel / ihr-Ø Lieblingsschlüssel.
Press: This is her-fem favourite feather / his-fem favourite feather / his-masc favourite key / her-masc favourite key.

Only one of the four pictures, the target (e.g., the yellow feather: *ihre* 'hers' in the PossPro task), matches the gender as marked on the stem and the gender as marked on the suffix of

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the possessive used in the instruction. The other three pictures are distractors. One picture is a same colour possessor competitor (e.g., the yellow key: *ihrer* 'hers'), which matches the gender of the stem but not the suffix. A second distractor is a possessee competitor (e.g., the blue feather: *seine* 'his), which matches the gender of the suffix, but not the stem. The fourth object is a distractor matching neither the stem nor the suffix (e.g., the blue key: *seiner* 'his').

Analysis
We plan to look at effects of possessor and possessee marking. Therefore, we will analyse accuracy of answers as well as reaction times in the behavioural task and the fixation data from eye-tracking.

Results
This experiment is currently in preparation and data collection will start soon, with results presented at the conference.

Discussion
We expect unimpaired individuals to perform at ceiling in accuracy, while people with aphasia may display possessive processing difficulties, reflected in delayed fixation of the target and lower accuracy scores. The task is designed to enable detection of impairments of both gender comprehension on the stem and gender comprehension on the suffix. Overall, we expect people with aphasia to present with lower accuracy scores in the PossPro task than in the PossDet task since target identification relies on decoding the stem and the suffix in the PossPro task whereas decoding the suffix is not required in the PossDet task due to the presence of the possessee noun.

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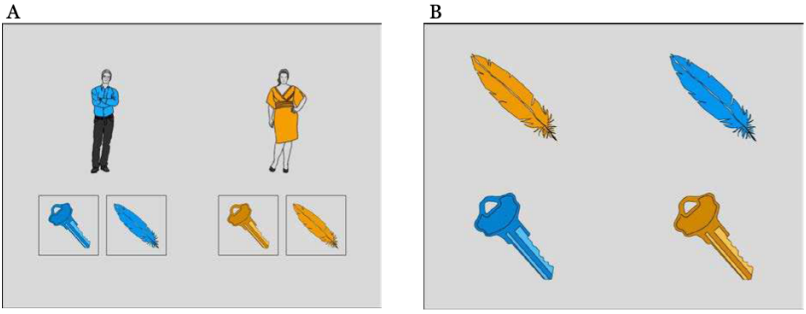
Figure 1

Sample experimental trial



Note. The visuals for the PossPro and the PossDet task are identical. All images are taken from MultiPic (Duñabeitia et al., 2018). Panel A: Introduction of the possessions of the trial together with their owners: blue objects belong to the man; yellow objects belong to the woman. Panel B: On-screen display during the comprehension tasks. Task instruction differs for the PossPro (see examples in (1)) and the PossDet task (see examples in (2)).