

DOES TRAINING-INDUCED IMPROVEMENT OF NONCANONICAL SENTENCE PRODUCTION IN AGRAMMATIC APHASIA GENERALIZE TO COMPREHENSION? A MULTIPLE SINGLE CASE STUDY.



Astrid Schröder, Nicole Stadie,
Jenny Postler, Antje Lorenz, Maria Swoboda-Moll, Frank Burchert & Ria De Bleser
Department of Linguistics, University of Potsdam, Germany

INTRODUCTION

The observation of **cross-modal generalization effects** from **sentence production to comprehension** and vice versa may provide some insight into the **functional relationships** among the processing components that underly these two processes (Mitchum et al., 1995).

Intervention studies focusing on **noncanonical sentences** have provided inconsistent results:

- **improved production** after training of comprehension in one study (Jacobs & Thompson, 2000), but not in others (Mitchum et al., 1995; 2000),
- **no improvement of sentence comprehension** after treatment of sentence production (Jacobs & Thompson, 2000).

OBJECTIVE

of the study: to evaluate whether specific training-induced improvement in the **production of noncanonical sentence structures** leads to **improved comprehension** of the same sentence structures.

MATERIAL

Object relative clauses (**orc**), object derived **who** questions (**whq**), each **n= 40** (20 trained/ 20 untrained), derived from a set of **80 black and white line drawings**.

DESIGN OF TREATMENT STUDY (ABACA)

3 baselines,
2 treatment phases (**orc**, **whq**; counterbalanced), up to 12 training sessions à 45 min, twice a week, cut-off: 90% correct in two subsequent sessions

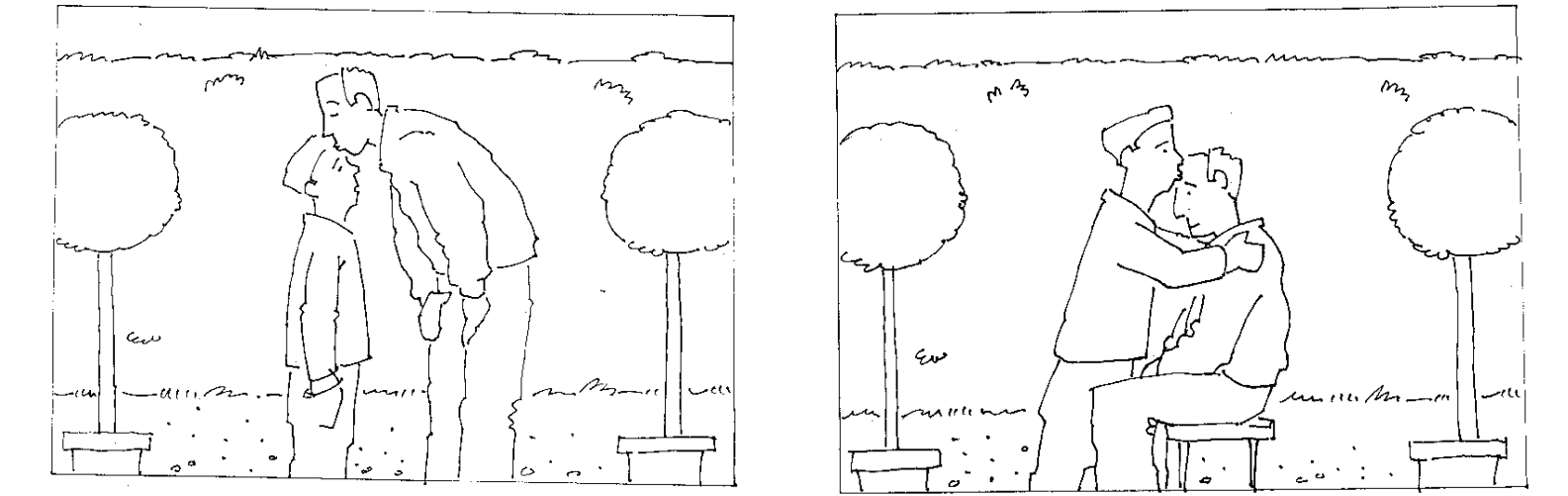
PARTICIPANTS

7 German participants with chronic agrammatic Broca's aphasia, mean age: 53 yrs (range 33-67 yrs); mean time post-onset 9 yrs, (range 3-15 yrs).

Cross-modal generalization effects from production to comprehension were analyzed for **participants showing associated deficits** in comprehension and production prior to intervention (**n= 7 participants for orc**, **n= 3 participants for whq**).

BASELINE ASSESSMENT

Two pictures, the target and its semantically reversible counterpart were presented.



Production: sentence elicitation

(**orc**, **whq**, **n= 40** each, e.g.):

Examiner (left picture): "I see the son who the father is kissing".

Patient (right picture): I see ... (the father who the son is kissing)

Comprehension: auditory sentence picture matching

(**orc**, **whq**, **n= 20** each, e.g.):

"Please *point to the picture* that matches the following sentence:
I see the father who the son is kissing."

Filler: subject relative clauses, subject who questions, n= 20 each.

TREATMENT PROCEDURE (3 Steps)

Orc and **whoq** were presented in their **underlying canonical form** (written word cards, picture). Participants were required to **identify the verb and thematic roles** and to carry out the **movement steps** involved in deriving the noncanonical sentence structure (Stadie et al., 2005; Thompson, 2001).

1. Assignment of thematic roles

Who is doing something?

Who receives something (does nothing)?

What is the action?

2. Replacement of [object] with *wen* (who)

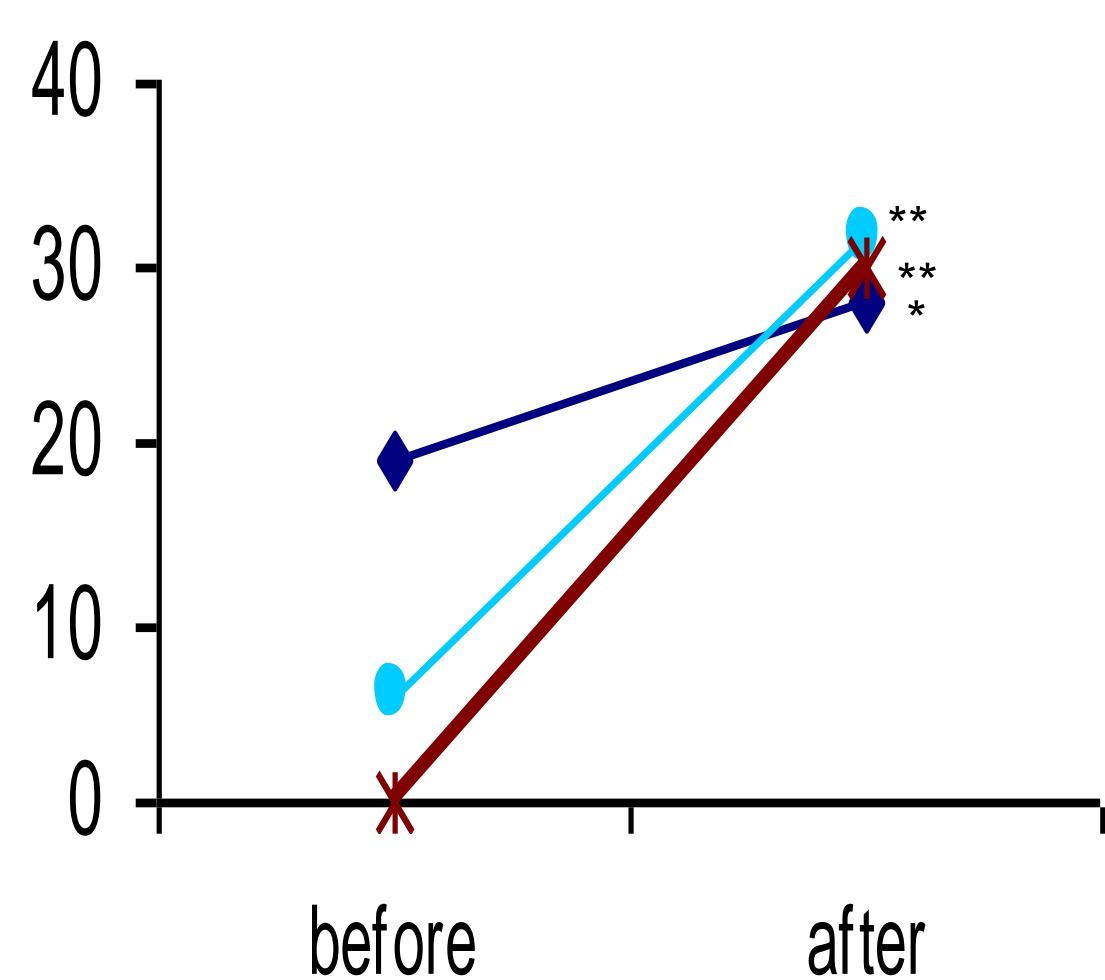
| | | | |
|----------------|---------------|-------------------|-------------------|
| der Sohn | küsst | den Vater | Wen ACC |
| <i>the son</i> | <i>kisses</i> | <i>the father</i> | <i>who(m) ACC</i> |

3. Movement

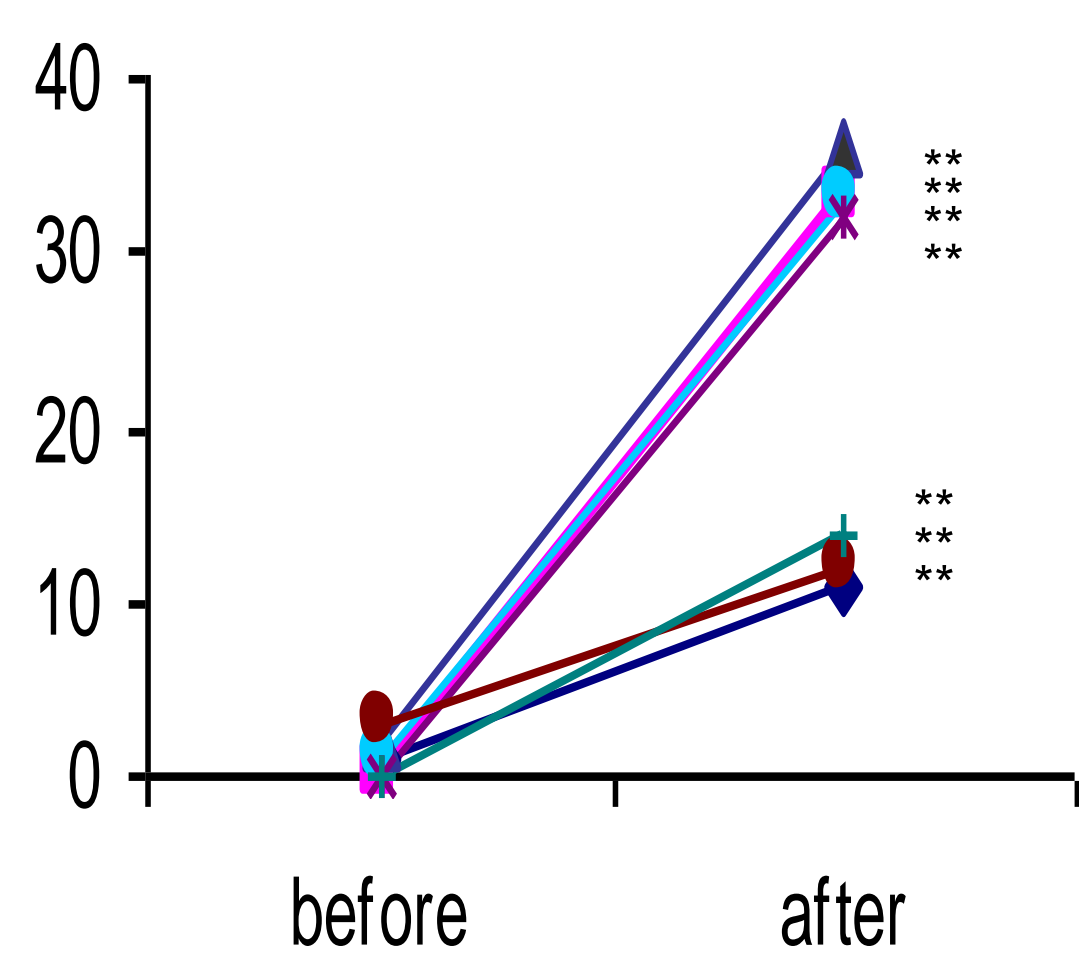
| | | | | |
|-------------------|---------------|----------------|----------------|---|
| wen ACC i | küsst | der Sohn | t _i | ? |
| <i>who(m) ACC</i> | <i>kisses</i> | <i>the son</i> | | |

RESULTS

Production: whq

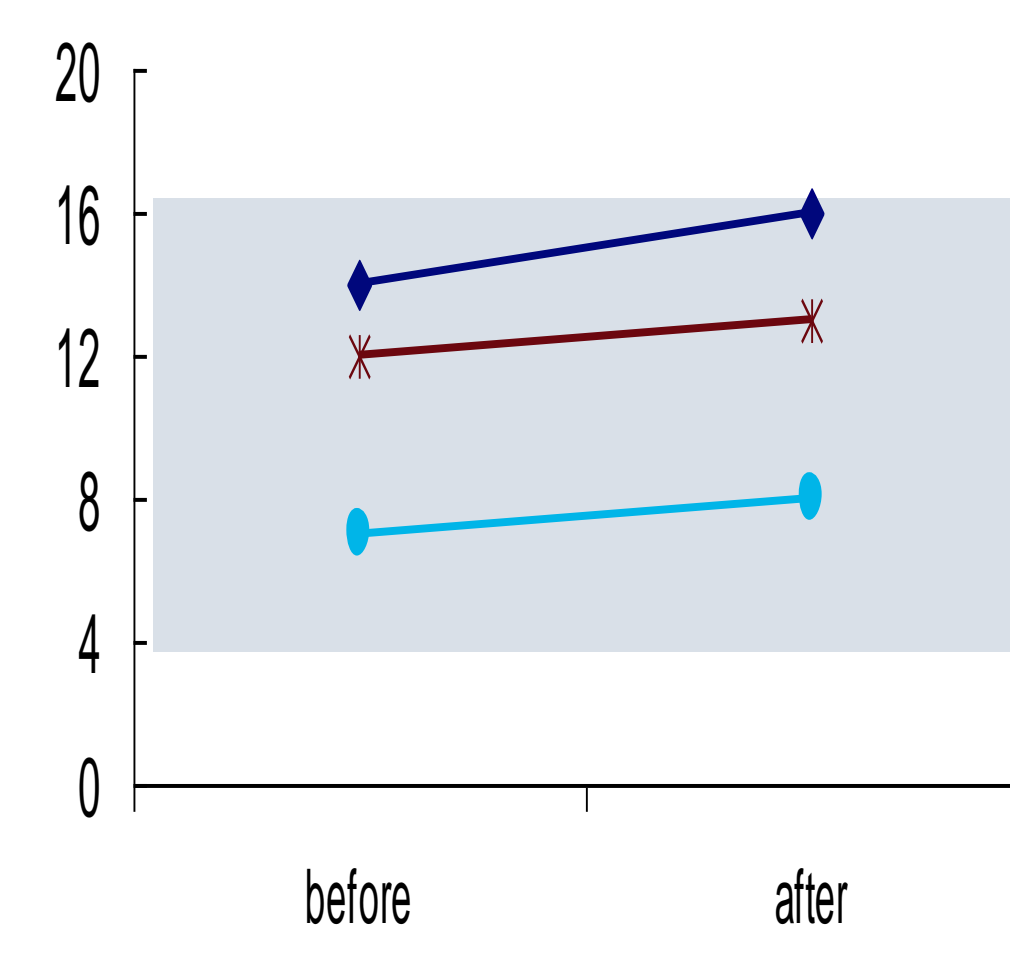


orc

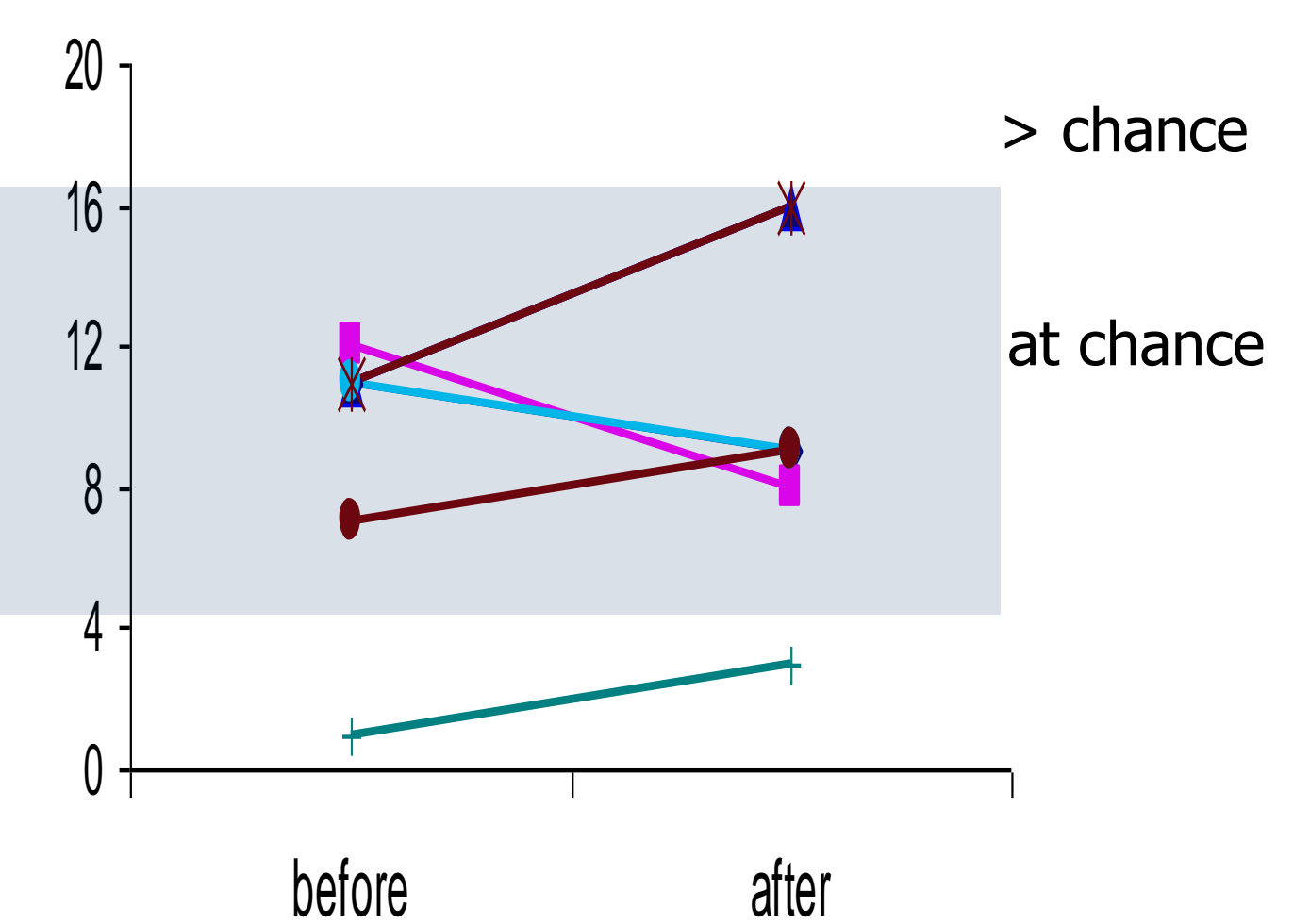


JK
UW
JR
AF
MP
RK
WE

Comprehension: whq



orc



No. of items correct in production and comprehension of orc and whq before and after production treatment. McNemar: **= $p < .001$, * = $p < .05$. Range of comprehension performance not differing from chance: 4-16 items (.20-.80) correct (Fisher's Exact, 2-sided).

SUMMARY OF THE RESULTS

After production treatment, **all participants** showed **unique structure specific learning effects** with highly significant improvements in the **production** of the trained sentence structure (Stadie et al., 2005).

Despite this, **none of the participants showed any improvements in comprehension** of the same sentence structure. After production treatment, each participant performed within the individual pre-treatment **chance level** in comprehension.

DISCUSSION

The finding that **none** of the participants improved in comprehension of sentences successfully trained in production **adds to the evidence from a previous study** in which **training of noncanonical sentence production did not generalize to comprehension** (Jacobs & Thompson, 2000).

Further research needs to clarify whether this also holds for the reverse direction (from comprehension to production). The results suggest that **production and comprehension** of noncanonical sentences rely at least partly on **modality-specific processing mechanisms**.

REFERENCES

- Jacobs, B.J., & Thompson, C.K. (2000). Cross-modal generalization effects of training noncanonical sentence comprehension and production in agrammatic aphasia. *Journal of Speech, Language, and Hearing Research*, 43, 5-20.
- Mitchum, C.C., Haendiges, A.M., & Berndt, R.S. (1995). Treatment of thematic mapping in sentence comprehension: implications for normal processing. *Cognitive Neuropsychology*, 12, 503-547.
- Mitchum, C.C., Greenwald, M.L., & Berndt, R.S. (2000). Cognitive treatments of sentence processing disorders: What have we learned? *Neuropsychological Rehabilitation*, 10, 311-336.
- Stadie, N., Schröder, A., Postler, J., Lorenz, A., Swoboda, M., Burchert, F., & De Bleser, R. (2005). Treatment of sentence production in German agrammatism: a multiple single case study. In *35th Clinical Aphasiology Conference*, Sanibel Island, <http://aphasiology.pitt.edu/archive/00001582/>.
- Thompson, C.K. (2001). Treatment of underlying forms: A linguistic specific approach for sentence production deficits in agrammatic aphasia. In R. Chapey (Ed.), *Language intervention strategies in aphasia and related neurogenic communication disorders* (pp.605-628). Baltimore: Lippincott Williams & Wilkins.