

Testing for effects of modality and memory load on coordination ellipsis in German

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We present two experiments¹ investigating whether the acceptability of coordination ellipsis in German depends on memory limitations. To this end, we contrasted right node raising (RNR) (Ross, 1967; Postal, 1974) and gapping (Ross, 1970), see (1), in spoken and written modalities (exp. 1) and with additional memory load (exp. 2).

- (1) a. Ich habe vergessen, dass ich den Jan in die Schule bringen muss und den Lucas in die Kita bringen muss. (full form)
I have forgotten that I the.ACC Jan to the school bring must and the.ACC Lucas to the daycare bring must
- b. Ich habe vergessen, dass ich den Jan in die Schule bringen muss und den Lucas in die Kita. (gapping)
I have forgotten that I the.ACC Jan to the school bring must and the.ACC Lucas to the daycare
- c. Ich habe vergessen, dass ich den Jan in die Schule und den Lucas in die Kita bringen muss. (RNR)
I have forgotten that I the.ACC Jan to the school and the.ACC Lucas to the daycare bring must

Background. Harbusch (2011) observed that while gapping is about equally frequent in spoken and written German (1.13% of utterances vs. 1.35%), RNR is remarkably rarer in spoken language (0.03% vs. 0.8%). We hypothesize that this frequency difference stems from differences in memory load caused by (H1) the modality and (H2) the ellipsis type. (H1) Since in the written modality the addressee can reread an utterance (backtracking), whereas this is not possible in spoken modality, we expect that ellipsis is more difficult to process (and less acceptable) in spoken modality (as compared to written modality). (H2) We furthermore expect this effect to be more pronounced for RNR, since RNR requires keeping the incomplete first conjunct in memory in order to complete its structure after having parsed the second conjunct. We tested our predictions in two acceptability rating studies with 24 items like (1) and a 7-point Likert scale (7 = best), and analyzed our data with CLMMs (ordinal, Christensen, 2022).

Experiment 1 (N = 108) crossed FORM (full form/gapping/RNR) within-subjects and PRESENTATION (spoken/written/word-by-word) between-subjects. A third of the participants *heard* the stimuli exactly once, another third could *read* them for an unlimited time, the last third read them *word-by-word* for the fixed time of 400ms. We predicted that (i) ellipsis and specifically RNR is preferred more strongly in the written modality than in the spoken modality and (ii) it is the possibility of backtracking, rather than the written modality per se, that relieves working memory and improves ellipsis. Hence, in the word-by-word presentation ellipsis and RNR should be degraded to a similar extent as when presented auditorily. As results, we found that unexpectedly RNR was generally preferred over gapping and the full forms. Contrary to our memory load hypotheses, ellipses were preferred in the spoken modality compared to the written and word-by-word presentation and there were no effects of backtracking (see Table 1 and Figure 1).

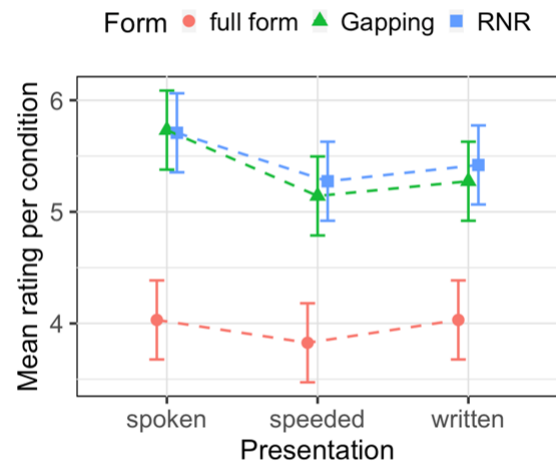


Figure 1: Mean ratings and 95% CIs per conditions for experiment 1.

¹Preregistered at https://osf.io/k4cgx/?view_only=123859e300534bb0b22c9c3ef5940980 (exp.1) and https://osf.io/xd4by/?view_only=4d521fd535074a3dad0c926517a47ff6 (exp. 2).

Effect	Est.	SE	χ^2	p
ELLIPSIS	2.36	0.10	623	< .001 ***
RNR	0.18	0.09	3.9	< .05 *
MODALITY	-0.75	0.38	3.7	> .05 .
POSITION	0.15	0.04	16.3	< .001 ***
ELLIPSIS:MODALITY	-1.15	0.19	34.6	< .001 ***
ELLIPSIS:POSITION	0.19	0.09	4.5	< .04 *
RNR:MODALITY	0.34	0.20	2.9	> .08 .
RNR:POSITION	-0.09	0.09	0.9	> .3
MODALITY:POSITION	0.07	0.08	0.9	> .3
RNR:MODALITY:POSITION	-0.43	0.18	6.1	< .001 ***

Table 1: Fixed effects in the final model of exp. 1 with symmetric thresholds. PRESENTATION and FORM were forward-coded.

Effect	Est.	SE	χ^2	p
ELLIPSIS	3.08	0.12	773	< .001 ***
POSITION	0.15	0.05	9.7	< .01 **
ELLIPSIS:POSITION	0.29	0.10	8.27	< .01 **

Table 2: Fixed effects in the final model of exp. 2 with symmetric thresholds: FORM was forward-coded, MEMORY LOAD sum-coded.

Experiment 2 (N = 33) was identical to the spoken conditions of experiment 1 but increased the participants' memory load. They had to solve mathematical calculations (e.g. $46 + 11$) between trials and memorize the result for 1 to 3 trials before entering it into a text field. We predicted that participants whose working memory is partially used for this additional task have greater difficulties in processing ellipsis and perceive it as more severely degraded than the full forms. However, in our joint analysis of the spoken conditions of experiments 1 and 2 we found neither an effect of memory load nor a difference between RNR and gapping (see Table 2 and Figure 2).

Summary. We found no support for our memory load hypothesis. Unlike expected, ellipsis was preferred in the spoken modality and neither backtracking nor higher memory load impacted coordination ellipses or RNR in particular. Additionally, the mean accuracy of 96.84% on the math task suggests that the participants' memory load might not have been sufficiently increased. This could be tackled in a follow-up with a more demanding task. In future research we will explore an alternative speaker-centric hypothesis to explain Harbusch's (2011) corpus results: It could be that gapping (omission in the 2nd conjunct) is easier to produce for speakers than RNR (1st conjunct).

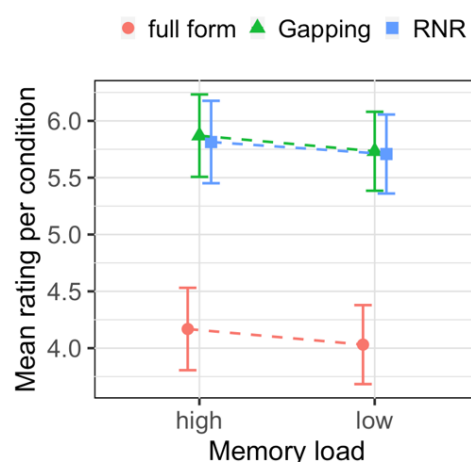


Figure 2: Mean ratings and 95% CIs per conditions for experiment 2.

References

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