Does ellipsis interpretation involve the anticipation of errors in the signal? – Testing a noisy channel account of ellipsis processing

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Background In the syntactic literature, the (un)acceptability of ellipses is often being used as a diagnostic for their grammaticality. However, this reasoning has been challenged by Bergen and Goodman (2015); Molimpakis (2019), who propose a noisy channel account, according to which some relatively acceptable ellipses are instances of acceptable ungramamticality: Listeners interpret them using a repair mechanism required to process input corrupted by noise. Speakers who exploit this produce elliptical utterances to communicate more efficiently. While this reasoning seems plausible, it has not been shown that processing ellipsis does rely on such a repair mechanism. The current study tests this explicitly by modulating the error rate in the fillers. Since (Ryskin et al., 2018) showed that comprehenders anticipate particular types of errors (e.g., deletions or insertions) in the signal, a higher error rate in the overall input should make it easier to process these errors because they are expected. If processing ellipsis involves resolving such errors in the input, a higher error rate in the fillers presented in an experiment should result in ungrammatical ellipses being easier to process and more acceptable.

(1) Kevin hat mit jemandem telefoniert, aber ich weiß nicht, (mit wem / wem / wer).
Kevin has with somebody talked.on.phone but I know not with who.DAT who.DAT who.NOM
'Kevin has talked to somebody on the phone, but I don't know (with) who(m)'.

Experiments Like Molimpakis (2019), I investigate this at preposition omission under sluicing in German by comparing **three ellipsis conditions** (1). While sluicing a PP (*mit wem*) should be grammatical, syntactic approaches like Merchant (2001) predict prepositional case-marked NP sluices (*wem*) to be ungrammatical, while nominative sluices (*wer*) are expected to be more acceptable because they can be derived without preposition omission from a source like *who it was*. These conditions are presented across **three presentation conditons** (between subjects): (i) a baseline (no errors), (ii) 50% of the fillers containing ungrammatical function word deletions, (iii) a speeded version of (ii), where the stimuli were presented word-by-word with a fixed presentation time of 400ms/word (more incremental paradigm). The noisy channel account predicts that ungrammatical/marked NP sluices improve with a higher error rate, in dative prepositional case NPs, which requires less string edits (1 deletion vs. 2 deletions and 1 insertion) than the nominative. This effect might be stronger in the speeded conditions where errors need to be processed as subjects read and are not so visually salient. In each of the three studies conducted online on PCIbex, 48 subjects (Prolific) rated 24 items and 72 fillers in pseudorandomized order on a 7pt Likert scale (7= fully natural). In the non-speeded versions, the items were displayed as a whole.

Results The data (See Fig. 1) were analyzed with Cumulative Link Mixed Models (Christensen, 2023) in R. The two ternary variables were forward-coded to distinguish betwen effects of P-OMISSION and CASE-MARKING as well as between effects of ERRORS and SPEEDED presentation (See Tab. 1). The model contained fixed effects for all predictors and their interactions, the scaled and centered POSITION of the trial in the experiment, by-subjects and by-item random intercepts and by-item random slopes for P-OMISSION and CASE-MARKING. The analysis shows that P-omission is degraded ($z=19.92$, $p<0.001$) and that prepositional case-marking is preferred over nominative ($z=5.79$, $p<0.001$). Two-way interactions indicate that for the noise conditions that (i) the preference for PPs is stronger, while (ii) the preference for prepositional over nominative case is reduced (possible floor effect).

Interpretation The data do not confirm the prediction of the noisy channel account that a higher deletion rate improves ungrammatical ellipsis. Subjects reject ungrammatical ellipsis across all noise conditions

and reject P-omission even more strongly in the noise conditions. Interestingly, the speeded presentation increases the acceptability of ungrammatical fillers (see Fig. 1), but not to the same extent the acceptability of P-omission. This might indicate that subjects are adapting to noise, but that P-omission is different from the unsystematic deletions of function words in the fillers. This calls for a different processing-based or syntactic approach to P-omission under sluicing.

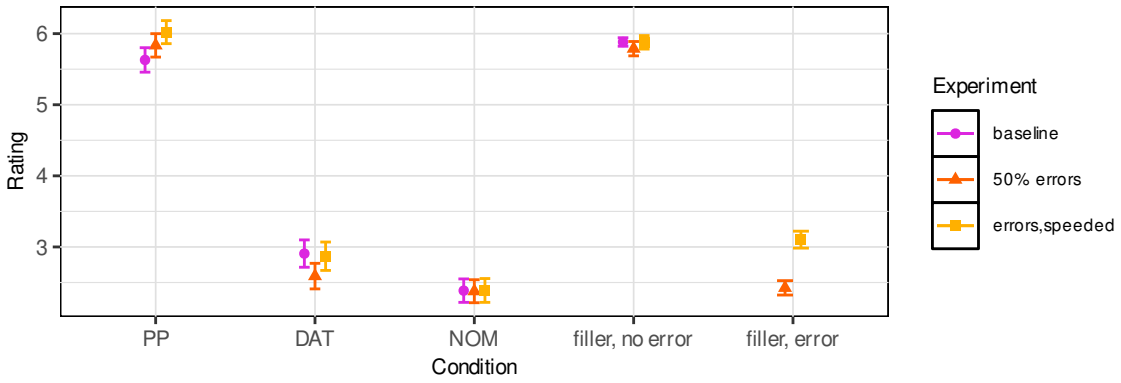

Figure 1 Mean rating + 95% confidence intervals across experiments and conditions as well as fillers (with)out ungrammatical deletions

Level	P-OMISSION	CASE-MARKING
PP	2/3	1/3
NP, DAT	-1/3	1/3
NP, NOM	-1/3	-2/3

Level	ERRORS	SPEEDED
Baseline	-2/3	-1/3
50% errors	1/3	-1/3
Errors, speeded	1/3	2/3

Table 1 Forward coding of the two ternary independent variables

	Estimate	Std. Error	z-value	Pr(>|z|)	
Errors	0.07	0.26	0.26	>0.7	
Speeded	0.24	0.26	0.90	>0.3	
P-omission	3.72	0.19	19.92	<0.001	***
Case-marking	0.44	0.08	5.79	<0.001	***
Position	-0.17	0.03	-5.06	<0.001	***
Errors:P-omission	0.91	0.21	4.52	<0.001	***
Speeded:P-omission	0.15	0.21	0.72	>0.4	
Errors:Case-marking	-0.45	0.19	-2.41	<0.05	*
Speeded:Case-marking	0.34	0.19	1.84	0.06	.

Table 2 Fixed effects in the CLMM predicting acceptability

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