Testing a rational account of fragment usage with pseudo-interactive experiments

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Fragments (Morgan 1973) like (1a) can often be used to perform the same speech act as complete sentences (1b).

(1) [Passenger to conductor before entering the train:]

a. To Paris?

b. Does this train go to Paris?

I present an experiment investigating the underexplored question of when speakers prefer fragments over complete sentences. I hypothesize that speakers trade-off the reduced production cost for fragments with a higher risk of being misunderstood (for instance, (1a)) could also be interpreted as (2)), which is formalized in a game-theoretic framework (Franke 2009).

(2) How long does it take to travel to Paris?

The speaker chooses an utterance $u_i \in U$ to get a message $m_j \in M$ across, and the listener has to infer the meaning of u_i by going for the most likely interpretation in context (maximize $p(m_j|u_i)$). Longer utterances (sentences) are unambiguous, but have a higher production cost and fragments are preferred due to their low cost when $p(m_j|u_i)$ is relatively high.

The experiment investigates speakers' production preferences with an pseudo-interactive utterance selection task (similar to Rohde et al., 2012). Participants ($n = 60$) read a context story ($n = 15$) and select one out of six utterances to communicate a message determined by the experiment (Fig. 1). The listener is simulated by a computer behaving according to model predictions and subjects receive feedback on the interpretation after sending each utterance.

The materials are based on a corpus of production data by Lemke (2021), from which *M*, *U* and the likelihood of each message were estimated to generate model predictions. The critical utterance is a fragment ambiguous between two messages: the *target* having a higher $p(m|u)$ than the *competitor*. Sending utterances cost virtual coins, sentences (100) being more expensive than fragments (30) and successful communication is rewarded 120 coins. E.g., a fragment with a likelihood of .75 of success, pays off $120 \times 0.75 - 30 = 60$, while an unambiguous sentence yields $120 \times 1 - 100 = 20$. Therefore, subjects should use fragments most frequently in the *unambiguous* control condition (where fragments are not ambiguous) and more often in the target than in the competitor condition.

The analysis of the data (Fig. 2) with mixed effects logistic regressions in R shows that fragment ratio increases with the likelihood of communicative success ($z = 5.16, p < .05$), but this is driven by the unambiguous condition, because there is no such effect in the data for the target and competitor conditions alone ($z = -.03, p > .9$). Currently, a follow-up investigates whether this might be due to the overall low fragments rate, which payoffs more favorable to fragments might boost.

References

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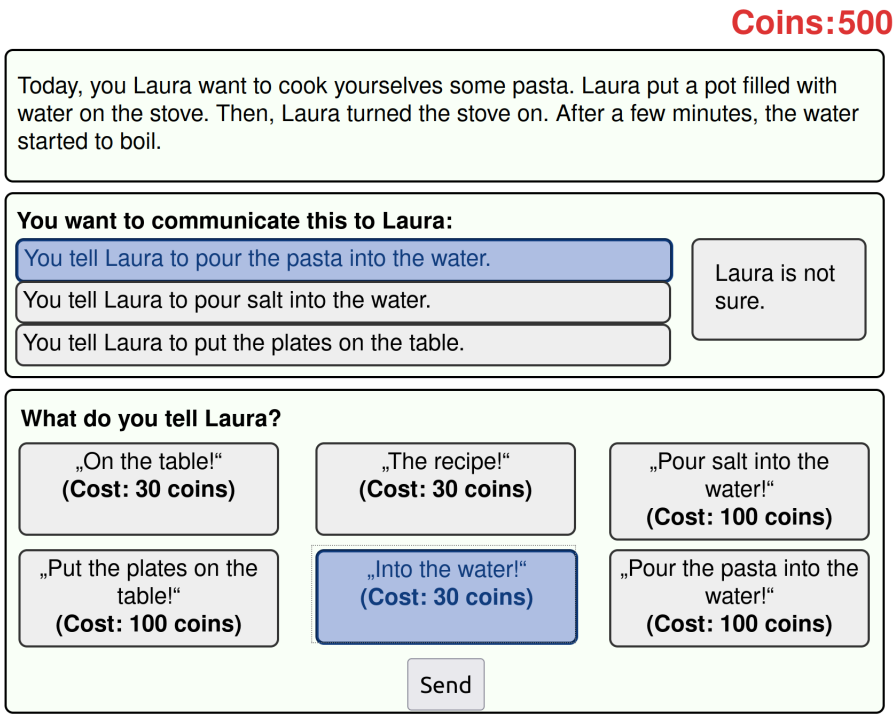

Figure 1 Screenshot of the experiment, translated to English for convenience.

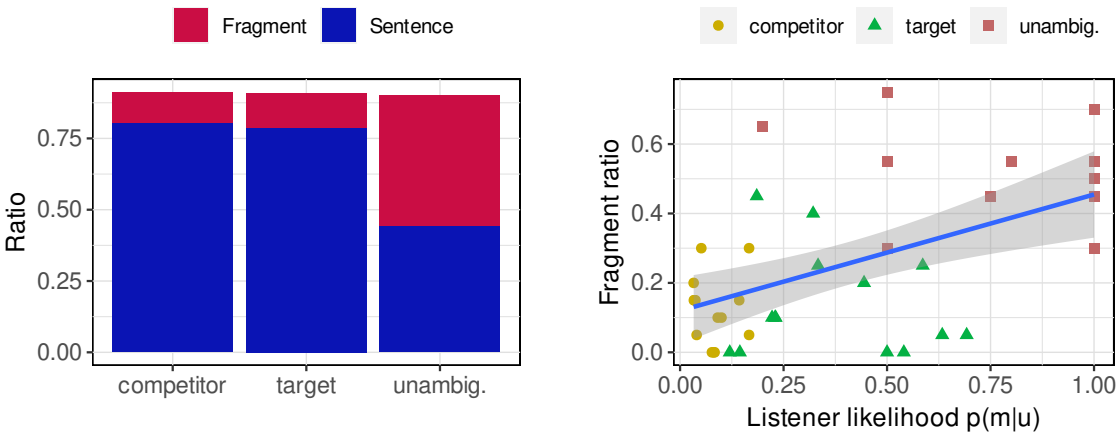

Figure 2 Left panel: Ratio of fragments and sentences (errors excluded) across the experimental conditions. Right panel: Fragment ratio as a function of the predicted listener behavior.