Communication and uncertainty reduction: The influence of interlocutor feedback on morphological choice

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Psycholinguistic evidence suggests that considerations of balancing effort against robust communication influence speakers' morphological choices in production [1]. Speakers of languages with optional case marking, for instance, preferentially use it when the actor and patient are more likely to be mistaken for each other [2]. Work in miniature artificial languages has connected this preference to patterns in cross-linguistic diversity: Learners of miniature languages with optional case marking change them to use more case when uncertainty about grammatical role assignment is high (e.g., where constituent order is less informative), mirroring a long observed cross-linguistic trade-off between case and constituent order freedom [3, 4]. While these findings are consistent with predictions of efficient communication accounts [5], these studies have not explicitly employed a communicative task with interlocutor feedback (which has long been known to play an important communicative role in dialogue [6, 7, 8, 9]), leaving open the possibility that the observed effects might be better explained by non-communicative factors (e.g., attentional/memory demands during linguistic encoding [10]). Here we investigate the role of communication in morphological choice by incorporating interlocutor feedback in a miniature language learning paradigm. We present learners with miniature languages, the grammars of which allow choices that either lead to higher or lower uncertainty about grammatical role assignment. We manipulate the feedback participants receive on their linguistic choices: positive, negative, or no feedback.

Prediction. If learners' preferences are driven by a communicative bias to balance meaning uncertainty against production effort, we expect the presence of negative feedback (i.e., signals that the intended meaning was misinterpreted by the interlocutor) to lead to greater uncertainty reduction in the output language than either 100% positive feedback or no interlocutor feedback.

Participants. 60 participants (20 successful learners per condition, following prior work [11]) are recruited online via Prolific Academic to participate in a 2-session experiment. Data collection has begun and is currently ongoing. **Input language.** SOV and OSV orders occur with equal frequency and object case is marked 50% of the time for each word order (subject case is never marked, maximizing uncertainty about grammatical roles). **Procedure.** On the first session participants learn the language by watching short videos accompanied by their descriptions in the novel language and, at the end of the session, produce sentences in it in response to video cues in a non-communicative setting. On the second session, participants are told they will play a communication game with another participant who learned the same language. In the game, the participant is shown two videos, one of them highlighted by a star, and must write a sentence to communicate which video is highlighted. They are told their interlocutor sees the same videos, with neither highlighted, and must pick which one is being communicated. In reality, to control for partner behavior, participants interact only with the server. Following earlier work in natural-language tasks [12], response times are varied to appear realistic. There are three **conditions:** in the positive feedback condition, the "interlocutor" always picks the correct video; in the negative feedback condition, the interlocutor picks the wrong video 10% of the time (mostly in the first third of trials); in the no-feedback condition, participants are not told which video was chosen (Fig. 1). **Analysis.** For each participant, we calculate the conditional entropy (i.e., the amount of uncertainty) in the output language they produced and use linear regression to compare it across the feedback conditions. **Theoretical import.** This experiment makes a theoretical contribution to the study of morphological choices in production by teasing apart communicative and non-communicative influences on these choices. On a methodological level, it introduces into a miniature language learning paradigm a crucial new component (namely interlocutor feedback) that has long been studied in other lines of research.
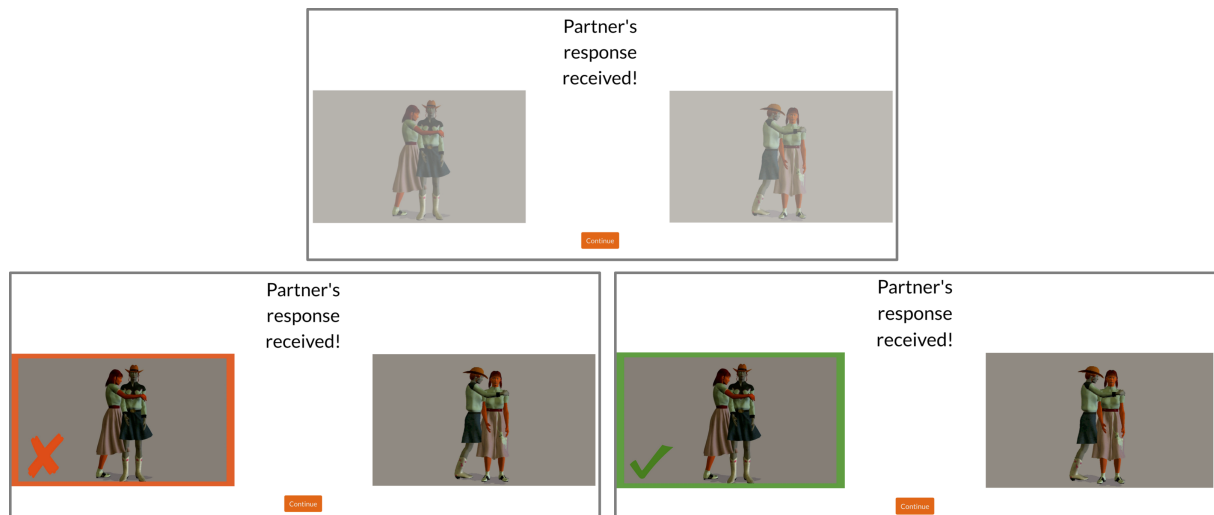
Figure 1: Illustration of feedback conditions. In the no feedback condition (top), participants are not told what videos their "interlocutor" chose. In 10% of trials in the negative feedback condition (bottom left), the "interlocutor" chooses the wrong video. In the positive feedback condition (bottom right), the "interlocutor" always picks the right video.

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