

# THE EFFECTS OF INTERACTION ON ESTABLISHING COMMON GROUND IN COMMUNICATION

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*Common ground* and *perspective-taking* feature in most explanations of human communication. However, the relative importance of each varies across different accounts: while mentalistic approaches (e.g. Clark, 1996; Sperber & Wilson, 1986) argue that perspective taking and common ground underlie all human communication, more minimalistic accounts (e.g. Keysar et al. 2004, Pickering & Garrod, 2004) see common ground and perspective-taking as optional, controlled processes, employed only once communication has failed. In a novel signalling task Sulik & Lupyan (2018) showed that while perspective-taking alone is not sufficient for successful communication, this is partially resolved via contextual constraint. Our study extends these results to explore the circumstances under which common ground is employed in the process of communicative interaction.

## Methods

Participants were recruited via Amazon Mechanical Turk in two separate experiments: 40 participants in Experiment 1, and 160 in Experiment 2.

**Experiment 1:** Pairs of participants took part in an interactive signalling task, in a modification of Sulik & Lupyan (2018). With participants alternating between sender and receiver roles, senders were presented with a *target* word and prompted to send any valid single English word (except the target) as a *signal* for the receiver, where the receiver then attempted to guess the original target. The sender then provided feedback to the receiver as a 1-10 rating, 10 signifying a successful guess. Each participant was allocated a subset of 6 target words randomly selected from the total set of 12, which were used across all pairs. In each round, the sender was presented with a randomly selected word from their subset; words were removed from the subset after 6 unsuccessful guesses or one successful one. The 12 English target words in the experiment were selected from published association norm corpora (Nelson et al. 2004, De Deyne, 2019) and varied in their

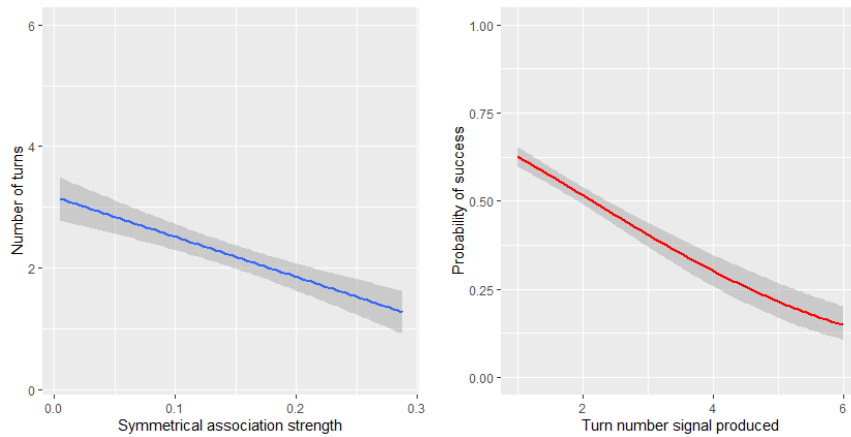


Figure 1. On the left, Exp 1: the mean number of turns to success taken for target words with different symmetrical association strengths. On the right, Exp 2: the probability of a signal which was successful in a given round in Experiment 1 being successfully mapped back to the target word.

*symmetric associativity*, the summed products of the targets' association strengths to other words and those words' associations strengths back to the targets.

**Experiment 2:** In order to test whether the participants in Experiment 1 were providing better clues over time or relying on common ground established over the interaction, naive participants were presented with the successful clues from the dyads of Experiment 1 and asked to guess the original target.

## Results and discussion

*Experiment 1:* in a linear mixed effects regression with participant as a random effect, the number of turns to success decreased as the symmetrical association strength (SAS) increased ( $\beta = 6.6$ ,  $SE = 1.06$ ,  $t = -6.2$ , see Fig.1 left).

*Experiment 2:* in a linear mixed effects logistic regression with participant as a random effect, the chance of an individual successfully guessing the target increased with target difficulty ( $\beta = 3.3$ ,  $SE = 0.7$ ,  $p \ll 0.001$ ) and the signal's backwards association strength ( $\beta = 2.3$ ,  $SE = 0.2$ ,  $p \ll 0.001$ ), but decreased with turns to success ( $\beta = -0.25$ ,  $SE = 0.05$ ,  $p \ll 0.001$ , see Fig.1 right).

The results of experiment 1 are in line with expectations: target words which are objectively more difficult to produce signals for take more turns to be guessed. In Experiment 2, the chance of an individual successfully guessing the target is lower for signals which were successful in later rounds, even controlling for the difficulty of the target and the backwards association strength of the signal. This suggests that, rather than a gradual optimisation process where senders improve their perspective-taking and produce more informative signals, communicative success is driven by the construction of a shared context.

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