

## Successful dialogue requires syntactic alignment

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The alignment of situation models between speakers in dialogue is crucial to their success at carrying out a given task. According to the Interactive Alignment Model proposed by Pickering & Garrod (2004), such alignment depends on unconscious and resource-free linguistic priming effects. Thus, the model predicts a correlation of task success and linguistic priming. We will test this hypothesis using natural, task-oriented dialogue and structural priming.

Structural priming (Bock 1986, Branigan et al. 2000) occurs when a linguistic choice is facilitated if the same decision has been taken shortly beforehand (either in comprehension or production). Such effects have been shown in corpora for selected syntactic constructions (Gries 2005, Szmrecsanyi 2005, Jaeger 2006) and for general syntactic decisions (Reitter 2006). We will examine short- and long-term priming effects.

The HCRC Map Task corpus (Anderson et al 1991) contains 128 dialogues between subjects, who were given two slightly different maps depicting the same (imaginary) landscape. The “giver” was given a map with a predefined path to a destination, which the subject was asked to describe to the “follower”.

Task success in Map Task can be quantified as the deviation between subject's paths. The follower was asked to draw their route on their map. The deviation between the given path (*giver*) and the drawn path (*follower*) was then determined as the area covered in between the paths.

Short-term priming decays quickly. We thus define the strength of this kind of priming as the decay rate of decision repetition probability, from shortly after the prime to 15 seconds afterwards. Long-term adaptation does not decay rapidly. In a separate model, we define it as the probability to repeat syntactic decisions between two dialogue halves, conditioned on the fact that there was an opportunity for priming, that is, that the halves stem from the same as opposed to different dialogues.

In the syntactic context, syntactic rules such as VP → VP PP reflect syntactic decisions. Priming of a syntactic construction shows up in the tendency to repeat such rules even lexical realizations differ.

Logistic regressions with generalized linear mixed-effects models were performed. Short-term repetition (dependent) correlated negatively with the log-transformed distance (in seconds), hence it decayed over time, showing priming ( $\beta = -0.151$ ,  $p < 0.0001$ ). Long-term repetition (dependent) was more likely when priming was possible (same dialogue halves condition) ( $\beta = 3.303$ ,  $p < 0.0001$ ), i.e. we see long-term adaptation. This generalizes previous experimental priming results in long-term priming.

Path deviation did not have an influence on short-term-priming. There was no interaction ( $p = 0.91$ ) between repetition decay and path deviation. The long-term adaptation strength, however, interacted with the centered, log-transformed path deviation scores ( $\beta = -0.82$ ,  $p < 0.05$ ).

The more successful dialogues showed more adaptation of the speaker's syntactic models, confirming our hypothesis. The predictions of Interactive Alignment hold true: syntactic alignment may support successful dialogue. (Inverted causality is possible but unlikely, as participants had no real-time indication of task success.) This applies to long-term adaptation rather than short-term priming effects. The finding makes sense as dialogue progresses too slowly to be sensitive to short-lived priming.

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