Common Ground and Joint Utterance Production: Evidence from the Word Chain Task

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Abstract

Instances in which one interlocutor continues an utterance initiated by another are not infrequent in conversation. Yet, the factors influencing their occurrence are not fully understood. Employing a novel experimental paradigm, this study investigated whether it is easier to jointly produce an utterance that refers to something in the common ground. We found that participants interacting via a text chat-tool had a higher typing speed for non-ambiguous than ambiguous words. This result shows that lack of shared knowledge negatively affects joint language production.

1 Introduction

Cross-person completions are considered evidence for the collaborative and incremental nature of dialogue and have attracted considerable attention amongst researchers over the last two decades (Clark, 1996; Hayashi, 1999; Helasvuo, 2004; Poesio & Rieser, 2010; Howes, Purver, Healey, Mills, & Gregoromichelaki, 2011). Despite their importance for understanding the mechanisms governing conversation, there are very few experimental studies looking into the factors facilitating joint utterance production. One valuable exception is a study by Howes, Healey, Purver & Eshghi (2012). Among other things, these authors found that participants were more likely to continue an artificially truncated turn when it was about the current conversation topic than when it introduced a new topic.

Interestingly, it is possible that the reported preference is related to interlocutors finding it easier to predict one another's utterances when these utterances are about something in common ground (see Pickering & Garrod, 2013). The aim of our study was to directly test the hypothesis that joint production would proceed more smoothly when interlocutors are talking about something in common ground.

2 Design

In our study, participants were asked to jointly produce definitions of English words. We manipulated experimentally whether the meaning of the word was in common ground, or not, by varying whether the to-be-defined word was unambiguous (i.e., had only one meaning) or ambiguous (i.e., had at least two meanings). Specifically, we used 20 ambiguous ($M_{CELEXfrequency}$ = 1107 p.m.; M_{length} = 1.4 syllables) and 20 non-ambiguous words ($M_{CELEXfrequency}$ = 1211 p.m.; M_{length} = 1.4 syllables; p's > .2), that were closely matched for frequency and length in number of syllables. The ambiguous words were balanced (dominant meaning frequency ≤ .65 and ≥ .41). We hypothesised that joint production would proceed more smoothly if participants were able to assume shared meanings with their partner (as should be the case with non-ambiguous words), because this would constrain their predictions about what will be uttered next.

3 Methods

Eighteen pairs of participants were tested. Participants were seated in separate booths and interacted via a text-based chat environment. The task was implemented using DiET chat-tool (http://cogsci.eecs.qmul.ac.uk/diet/; Mills & Healey, submitted), allowing to log key presses and typing times with great precision. The participants were presented with one word at a time and had to jointly construct a definition for

each word. Instructions emphasised speed, but also that the definition had to provide sufficient information to allow a third party to guess the word. As in the American TV game Chain Reaction, the participants could contribute only one word per turn, and had to continuously switch turns with their partner (see 1, produced as a definition of BAT). Although natural joint production lacks such a constraint, it similarly requires incremental interpretation and tight yoking of comprehension and production processes.

(1) **A**: Baseball - **B**: tool - **A**: that - **B**: is - **A**: used - **B**: to - **A**: hit - **B**: the - **A**: ball

As a control, 26 participants provided definitions for the same words in a solo version of our task. Similarly to those working together, solo participants could type only one word per turn, but were working entirely on their own.

4 Results

We measured the total time spent typing and the number of words produced per definition, and computed typing speed as number of words per second. Data were analysed using linear mixed effects models (Baar, Levy, Scheepers, & Tily, 2013), as implemented in the lme4 package (Bates, Maechler, & Dai, 2008). Significance of the fixed effects was assessed by means of likelihood ratio tests.

Typing speed was higher for non-ambiguous than ambiguous words when participants were interacting with another ($M_{non\text{-}amb}$ = .50, M_{amb} = .46), but not in the solo task ($M_{non\text{-}amb}$ = .71, M_{amb} = .71; Ambiguity X Task interaction: $\chi 2$ (1) = 4.21, $p < .05$; maximal random effects structure). This suggests that lack of shared knowledge negatively affects the joint performance at the task.

5 Discussion

We showed that jointly producing an utterance is more difficult when common ground cannot be assumed but needs to be established. Note that our dependent variable (typing speed) should primarily index ease of language production. Therefore our study provides further insight into mechanisms governing dialogue, and adds to the existing evidence for the role of common ground in comprehension (e.g., Brown-Schmidt, 2009).

Additional analyses should investigate whether typing speed is affected predominantly at the beginning of definitions for both ambiguous and non-ambiguous items. This would confirm that the observed difference in typing speed reflects the cost of establishing common ground. It would also provide further support for the hypothesis that the information about what is shared between speakers influences the prediction of the upcoming turn of the interlocutor.

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