PREDICTION USING PRODUCTION OR PRODUCTION ENGAGING PREDICTION?

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Prominent theories of predictive language processing assume that language production processes are used to anticipate upcoming linguistic input during comprehension (Dell & Chang, 2014; Pickering & Garrod, 2013). Here, we explore the converse case: Does a task set including production in addition to comprehension encourage prediction, compared to a task only including comprehension? To test this hypothesis, we conducted a cross-modal naming experiment (Experiment 1) including an object naming task and a self-paced reading experiment (Experiment 2) that did not include overt production. We used the same predictable (N = 40) and non-predictable (N = 40) sentences in both experiments. The sentences consisted of a fixed agent, a transitive verb and a predictable or non-predictable target word (The man drinks a beer vs. The man buys a beer). Most of the empirical work on prediction used sentences in which the target words were highly predictable (often with a mean cloze probability > .8) and thus it is little surprising that participants engaged in predictive language processing very easily. In the current sentences, the mean cloze probability in the predictable sentences was .39 (ranging from .06 to .8; zero in the non-predictable sentences). If comprehenders are more likely to engage in predictive processing when the task set involves production, we should observe more pronounced effects of prediction in Experiment 1 as compared to Experiment 2. If production does not enhance prediction, we should observe similar effects of prediction in both experiments.

In Experiment 1, participants (N = 54) listened to recordings of the sentences which ended right before the spoken target word. Coinciding with the end of the playback, a picture of the target word was shown which the participants were asked to name as fast as possible. Analyses of their naming latencies revealed a statistically significant naming advantage of 106 ms on predictable over non-predictable trials. Moreover, we found that the objects' naming advantage was predicted by the target words' cloze probability in the sentences ($r = .411$, $p = .016$). In Experiment 2, the same sentences were used in a self-paced reading experiment. To allow for testing of potential spill-over effects, we added a neutral prepositional phrase (buys a beer *from the bar keeper*/drinks a beer *from the shop*) to each sentence. Participants (N = 54) read the sentences word-by-word, advancing by pushing the space bar. On 30% of the trials, comprehension questions were used to keep up participants' focus on comprehending the sentences. Analyses of participants' target and post-target reading times revealed numerical advantages of 6 ms and 20 ms, respectively, in the predictable as compared to the non-predictable condition. However, in both cases, this difference was not statistically reliable ($t = .757$, $t = 1.43$) and the significant positive correlation between an item's naming advantage and its cloze probability as seen in Experiment 1 was absent ($r = .037$, $p = .822$). Importantly, the analysis of participants' responses to the comprehension questions, showed that they understood the sentences (mean accuracy = 93%).

To conclude, although both experiments used the same sentences, we observed effects of prediction only when the task included production. In Experiment 2, no evidence for anticipation was found although participants clearly understood the sentences and the method has previously been shown to be sensitive to measure prediction effects (Van Berkum et al., 2005). Our results fit with a recent study by Gollan et al. (2011) who found only a small processing advantage of predictive over non-predictive sentences in reading (using highly predictable sentences with a cloze probability > . 87) but a strong prediction effect when participants read the same sentences and carried out an additional object naming task (see also Griffin & Bock, 1998). Taken together, the studies suggest that the comprehenders' task set exerts a powerful influence on the likelihood and magnitude of predictive language processing. When the task set involves language production, as is often the case in natural conversation, comprehenders might engage in prediction to a stronger degree than in pure comprehension tasks. Being able to predict words another person is about to say might optimize the comprehension process and enable smooth turn-taking.