

Language Production Under Uncertainty: Advance Planning and Incrementality

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Language production researchers typically investigate the process of utterance planning in situations where producers know their message. Less is known about a common occurrence in conversation, where A's message will depend on B's ongoing utterances. Although A may not yet know how to reply, some advance planning might be possible, in order to manage turn taking efficiently [1,2]. Prior studies suggest that incrementality, the degree to which planning precedes execution, is under some strategic control [e.g., 3]. Here we investigate the degree of advance planning under message uncertainty in two picture naming studies, permitting precise control over the timing of when the message becomes certain.

In Experiment 1, 64 native English speakers viewed displays showing two pairs of objects (see Figure 1). To avoid screen position effects on naming, the two images in each pair rotated around each other throughout a trial. Displays appeared in one of two conditions: 1) Overlap (Figure 1A), where one image appeared in both the left pair (e.g., vest, stool) and the right pair (e.g., vest, pear); or 2) Different (Figure 1B), where the left pair (e.g., wig, stool) had no overlap with the right pair (e.g., vest, pear). After 2.2 seconds of exposure, a gray background appeared behind one side of the screen, indicating the target pair (vest, pear in Figure 1). Participants' task was to answer the question "Which are the target images?" in a conjoined noun phrase (e.g., "the vest and the pear"), and they were free to name the two images in either order. Participants were told to respond as soon as possible, and that their recordings would later be used for another participant who would have to identify the targets. Dependent measures were the order of images named and the initiation latencies of all words in the noun phrase (automatically extracted by FAVE [4]). If speakers plan ahead while uncertain of the targets and thus their message, they should prioritize planning of elements common to either message when possible (Figure 1A). Such planning should yield tendencies to name the overlapping image in the Overlap condition first, with shorter initiation latencies in this situation compared to other outcomes.

Results: Figure 2 shows that in the Overlap condition, participants were more likely to place the overlapping target first in their response, suggesting they had planned the overlapping target in advance. Moreover, Figure 3 shows that overlap-first utterances in the Overlap condition had shorter initiation latencies than when the overlapping image was uttered last and all utterances in the Different condition, for which advanced planning was not possible. Exp. 2 replicated these results in an online experiment using typed responses (N= 84), indicating similar planning strategies in both spoken and typed productions (Figures 4-5).

These results show evidence of early planning and utterance initiation in the face of message uncertainty. Specifically, producers who are uncertain of their message tend to plan and produce portions of their utterance that are guaranteed to be useful, and they continue planning the rest incrementally. Initiation latencies in both studies (Figures 3 & 5) show that advance planning (overlap-first utterances) yields an initiation latency advantage throughout the entire utterance, emphasizing the benefits of early planning. More generally, these results suggest that including situations of production under uncertainty not only addresses a common conversational situation that is under-studied in the lab, but it could also inform theories of incremental planning during language production.

References

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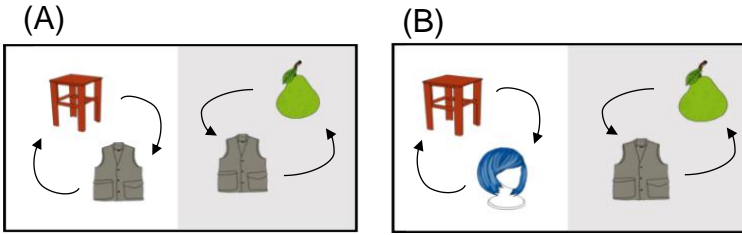


Fig. 1. Examples of visual displays in the (A) Overlap condition, (B) Different condition. Every two images rotated around each other as illustrated by the arrows (arrows did not appear during the experiment). The gray background appeared after 2.2 seconds of exposure, indicating the target images.

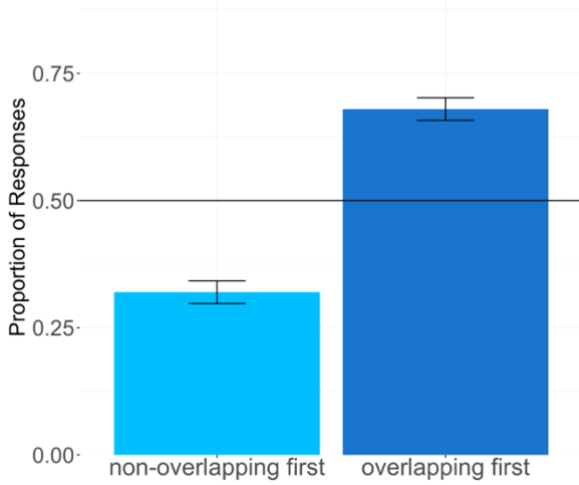


Fig. 2. Order choice in the Overlap condition in Exp 1.

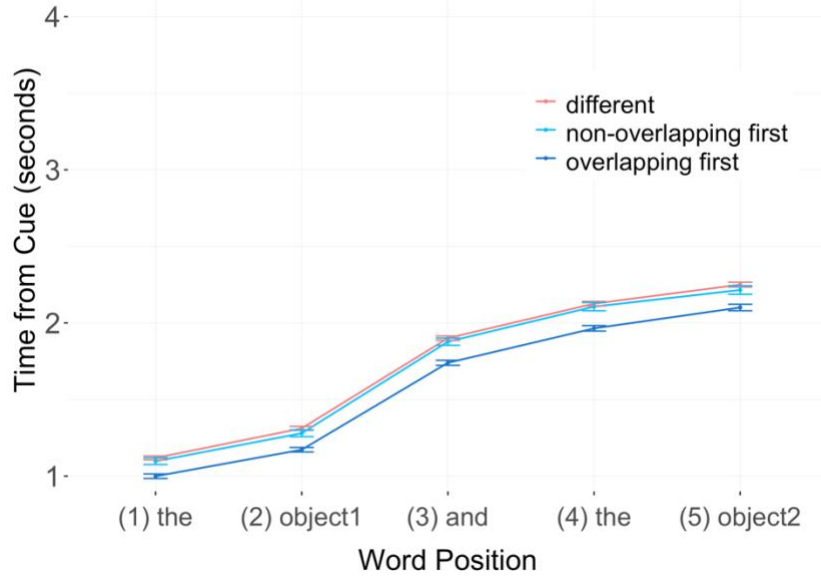


Fig 3. Initiation latencies in Exp 1. Data from the Overlap condition are divided into trials where participants placed the overlapping target first (dark blue line) or the non-overlapping target first (light blue line).

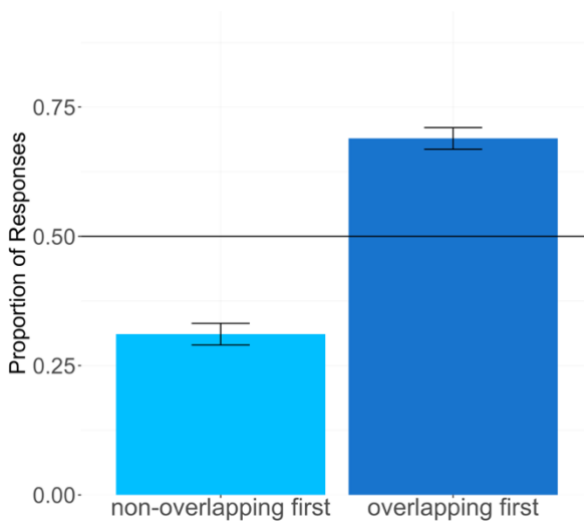


Fig. 4. Order choice in the Overlap condition in Exp 2.

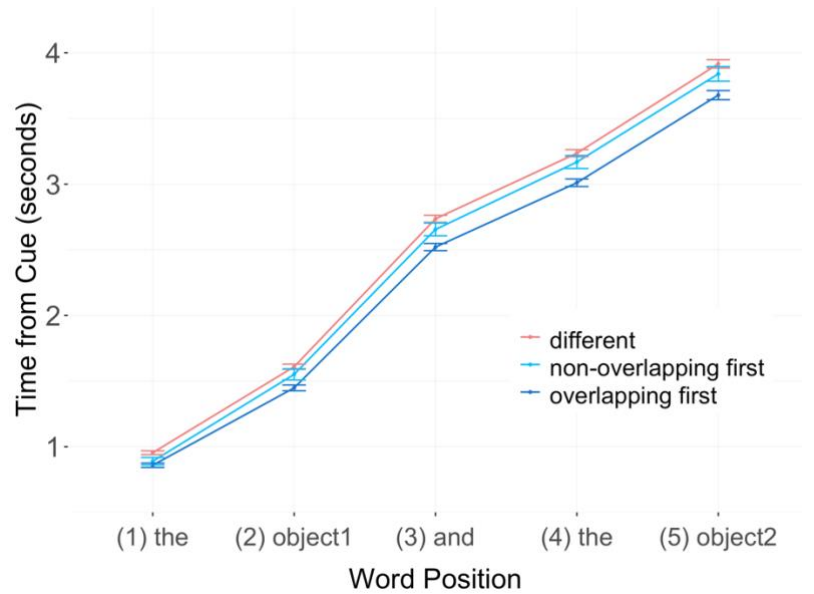


Fig 5. Initiation latencies in Exp 2.