

Spring 2017

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Recommended Citation

Dinsmore, Sarah; Shaw, Laura; Sylvester-Cross, Jazmyn; and Willette, Marissa, "Using a mini-artificial language to investigate question-formation: Does underlying production pressure affect surface form?" (2017). *Thinking Matters Symposium Archive*. 118.
https://digitalcommons.usm.maine.edu/thinking_matters/118

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Using a mini-artificial language to investigate question-formation: Does underlying production pressure affect surface form?

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Introduction



There are over 6,000 human languages, and the rules for forming wh-questions vary among them.

Is this variation due to underlying cognitive processes during production?

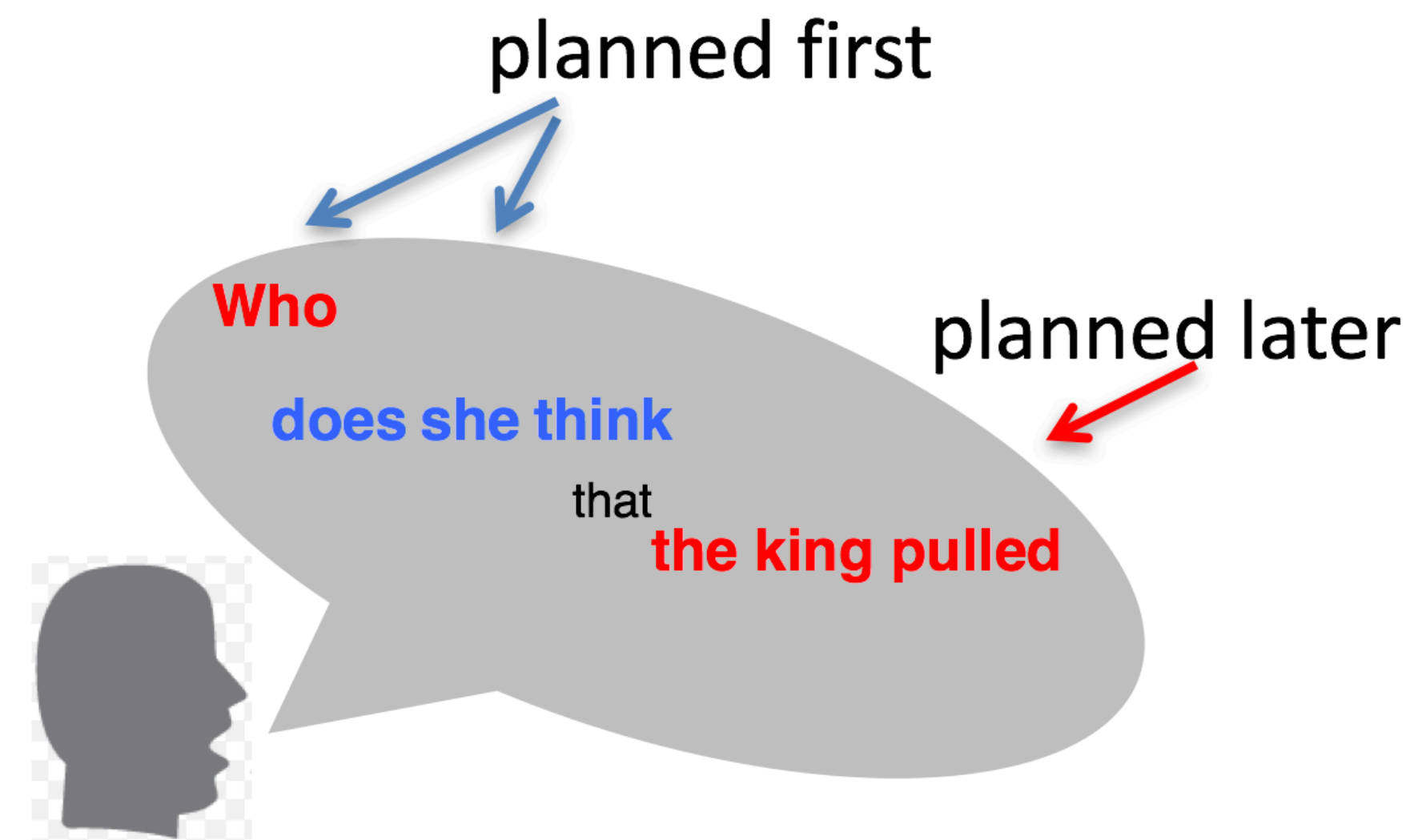
We invented a miniature language to investigate whether increased cognitive load could shape human grammars.

Background

The speaker's brain plans the wording of sentences in clausal chunks rather than all at once (Ford 1978). A clause is a unit of structure that is a sentence or a smaller sentence within a larger one.

Because of this process, the structure of complex wh-questions ought to pose a cognitive challenge, according to McDaniel et. al. (2015). This is because the wh-word that begins a question is in a separate planning unit from the thing it refers to (Figure 1).

Figure 1



The **miniature artificial language** model is a relatively new method being used for experiments in psycholinguistics (Fedzechkina et. al., in press). They are small in scope and consist of only the grammatical structures relevant to the central research question. They are designed to be learned quickly. Another advantage of using an artificial language is that it decreases the likelihood that participants will use the familiar grammatical structures of their native language.

The miniature artificial language model is an effective, novel method of eliciting target structures, although it has so far only been used to study much simpler structures.

Hypothesis

Our general hypothesis is that the sentence planning process influences the kinds of structures languages allow. In particular, the type of wh-question structures in a language will be determined by the challenges involved in planning the structure.

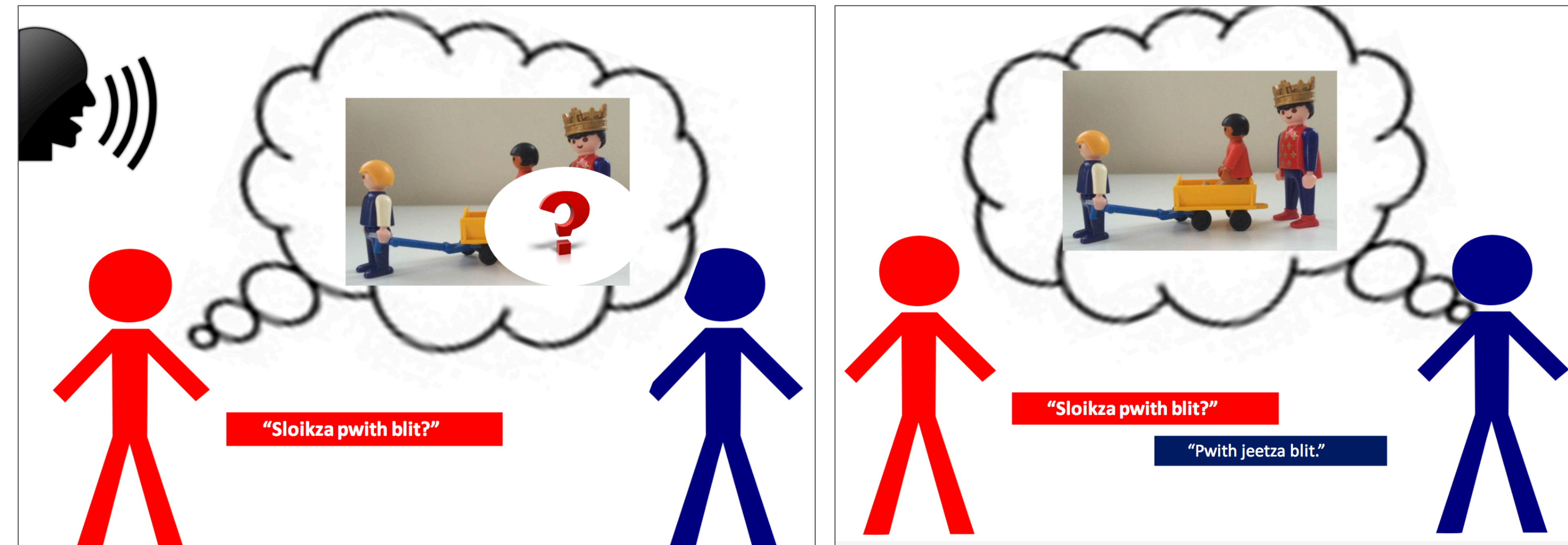


Figure 2. Sample slides Our initial task was to teach participants the structure of simple questions using who: *Who did the boy pull? The boy pulled the girl.*

Method

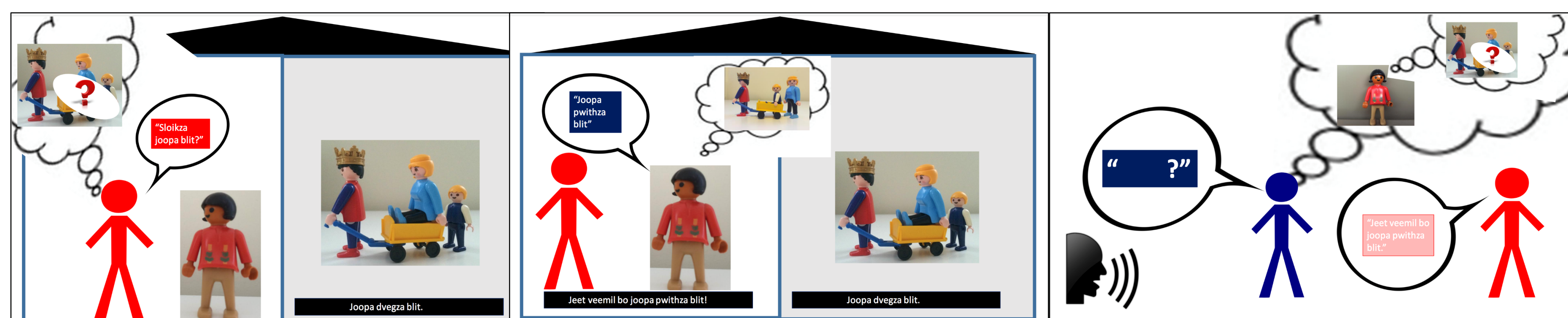
Participants were 75 adults. This experiment was conducted at the Linguistics Laboratory of Dr. Dana McDaniel and took approximately one hour. During that time participants were shown a **series of slides** (Figure 2) designed by the research team to teach the vocabulary and structure of the miniature language, which consisted only of six nouns, four verbs, a word for *that*, and a word for *who*. The language used one suffix, *-za*.

The **experimental group** (38 participants) learned a target language that required that the object of the verb have the suffix *-za*. If the wh-word (*sloik*) was the object, it had the suffix as well (*sloikza*).

The **control group** (37 participants) learned a version of the same language that did not mark the object. Participants were not required to choose the correct form of *sloik*. This version used *-za* instead to mark gender agreement on the verb. The verb had the suffix *-za* if the subject was a masculine noun

who does the girl think that the king pulled?

Figure 4. Target structure A complex wh-question and the series of three slides for eliciting it



Participants were instructed to proceed through the slides at their own pace, and advised that there would be an opportunity for a short break between each of the five sections. The examiner remained in the room, but wore headphones to avoid monitoring participants' performance. Parts three through five were recorded.

Parts one through three presented vocabulary and syntax by means of slides, embedded video clips, and audio examples of the language spoken aloud.

Part four was designed to assess participants' progress, and part five presented six attempts to elicit the target structure – a complex wh-question in the form shown in Figure 4.

Predictions

We predicted that participants would have more difficulty forming wh-questions in the object-marking language than in the control language, because the second clause would not yet have been planned at the time of planning the wh-word.

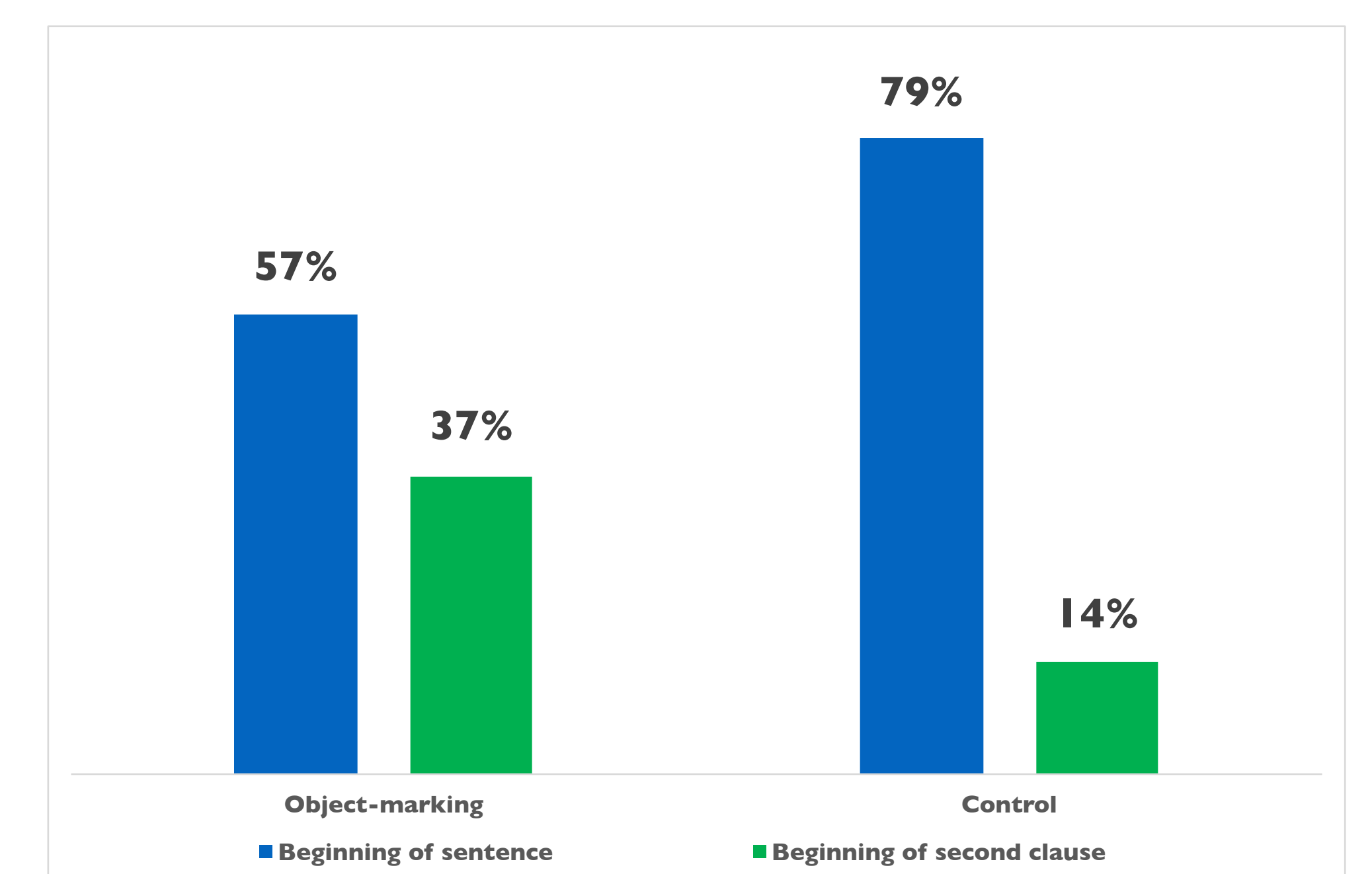
Speakers will avoid the structure, using the alternatives found in the world's languages.

In particular, we thought it likely that some participants might employ a structure that occurs in some languages: placing the wh-word at the beginning of the second clause.

This structure is used in some languages, such as German (McDaniel & Sylvester-Cross 2016).

Results

The trend is in the predicted direction.



Conclusions

The artificial language method can be used to study complex structures.

The preliminary findings suggest that production pressures affect grammatical structure.

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Acknowledgements

This research was supported by a CCD RSCA grant from the Provost's Office. We thank our participants.