

# Persistence of structure and its effect on sentence planning



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## BACKGROUND

### SENTENCE PRODUCTION

Sentence production involves various steps (Levitt, 1989):

1. planning a conceptual message (pre-linguistic, conceptual information of what the speaker wants to say)
2. retrieving the necessary words and assembling a grammatical structure.

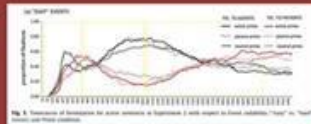
Speakers prepare small **increments of the message/sentence** before speech onset, and continue planning the rest while speaking. The size of these increments may differ: speakers may encode the whole structure of an event prior to speech onset, or just the sentence-initial words (reflecting different planning strategies).

### REPETITION OF STRUCTURE CHANGES PLANNING STRATEGIES

- Speakers tend to repeat syntactic structures that they heard/produced previously (Bock, 1986).
- Repetition reflects a form of **implicit learning**: previous experience with a given syntactic structure fine-tunes the language processing system, and thus makes the assembly of that structure easier.
- When assembly of a syntactic structure is made easier through previous exposure, subsequent use of that structure can **change the time-course of sentence formulation**.

Participants described a series of pictures while being eye-tracked.

When speakers used a repeated structure in their descriptions, they tended to encode the event as a whole in early stages of formulation before 400 ms instead of encoding only one character (Konopka & Meyer, 2014).



### CURRENT STUDY: PERSISTENT CHANGES IN PLANNING STRATEGIES?

Is this change in early planning strategies:

- (a) a long-term effect?
- (b) only a transient benefit?

Repetition of structure is a robust effect that persists across several intervening sentences (Bock et al., 2007). We test if the effect of previous exposure on planning processes is similarly robust and persistent.

### RESEARCH QUESTIONS

Does structural priming change the scope of planning in sentence production? (replication of Konopka & Meyer, 2014)

Is this change in planning a long-term effect or a short-term benefit?

## METHOD –event description task with structural priming

Participants describe pictures depicting simple events.

PRIME – Listen and repeat



"The man is being arrested by the cop!"  
"The cop is arresting the man!"

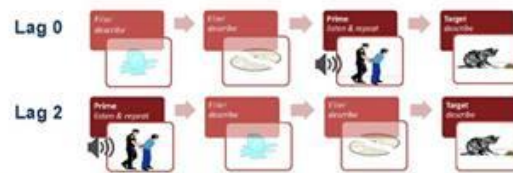
TARGET – Describe



Structural priming is the increase in the likelihood of participants repeating the structure of prime sentences on target trials.

Increases the likelihood of participants using "The mouse is being caught by the cat!"  
Increases the likelihood of participants using "The cat is catching the mouse!"

Target trials will be presented after the prime trials (Lag 0) or after two intervening filler sentences (Lag 2).



### DESIGN

IV structure of the prime sentence (active/passive), lag (lag 0/lag 2)

DV **Testing repetition**: proportion of target sentences produced with the primed structure

**Testing planning**: proportion of fixations on agent/patient as a function of time

### Stimuli

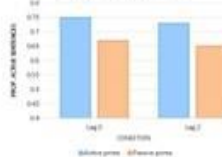
- 40 prime-target pairs (two-character transitive events eliciting active or passive structures)
- 200 fillers (intransitive events)

Participants will be eye-tracked during the experiment

## EXPECTED RESULTS

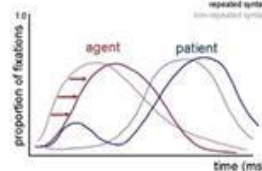
### REPETITION OF STRUCTURE

Rate of active sentences produced following active and passive primes



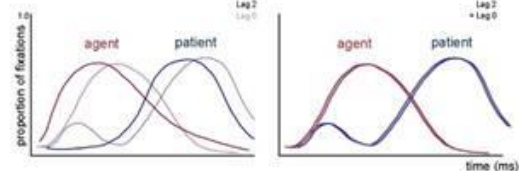
1. More active sentences produced after active primes than passive primes.
2. No decline in priming effect from Lag 0 to Lag 2 (replicating Bock et al., 2007).

### FIXATIONS – LAG 0



- Replicating previous findings:** a shift in planning priorities for descriptions with **repeated syntax** compared to sentences with non-repeated syntax.
- **Non-repeated syntax:** priority encoding of agent shortly after stimulus onset, followed by increased fixations to patient (reflecting character-by-character encoding).
  - **Repeated syntax:** convergence of early fixations to agents and patients, i.e., no priority encoding of either character (reflecting initial conceptual encoding of the whole event).

### FIXATIONS - LAG 2



#### Outcome A - transient benefit

Clear differences in planning strategies between Lag 0 and Lag 2.

- At Lag 0: Early convergence of fixations to agent and patient
- At Lag 2: Early fixations prioritise agent (priming effect on planning disappears)

#### Outcome B - persistent benefit

No clear difference in planning strategies between Lag 0 and Lag 2 (patterns overlap).

- At both Lag 0 & 2: Early convergence of fixations to agent and patient (priming effect persists across 2 intervening filler sentences).

\*graphs show predictions for Lag 0 and 2 only for trials where repeated (primed) syntax is used

## IMPLICATIONS

This study tests whether the effect of structural priming on sentence planning is a **long-term change** or just a **short-lived benefit**. Previous research showed persistence of structure across as many as 10 unrelated sentences (Bock et al., 2007), providing strong evidence of implicit learning of structure (i.e., long-term adjustments in the language processor or strengthening of specific sentence building procedures; e.g., Chang et al., 2000). In addition to assessing effects of structural primes on *structure choice* we extend this discussion to *planning processes*:

- If priming in message and sentence planning is persistent (**Outcome B**), this study will provide the first evidence that linguistic experience can have long-term effects on both structure choice and planning strategies
- Otherwise (**Outcome A**), if structural repetition persists in the language output but not in underlying planning strategies, then implicit learning of structure is limited to changing rates of structure choice and not to the temporal coordination of structure building procedures, and a persistent change in planning strategies is not necessary for persistent changes in syntactic choices.

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