

How does a pictorial context in a naturalistic dialog task affect subsequent language comprehension, production planning, and composition?

Background

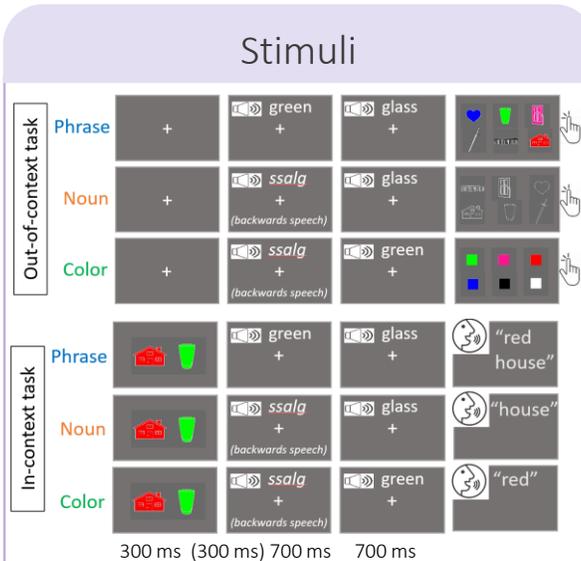
- Predictability of a lexical item decreases activation in comprehension [1,2] but this effect in speech planning is less clear
- Composition for phrases compared to single words [3,4], but unclear how this is affected by a given dialog context

Methods & design

- Blocked design: In-context, out-of-context, and naming (not shown)
- Noun & Phrase conditions had backwards-speech at the first word
- Temporal cluster permutation tests in 3 analysis time window & 4 ROIs x 2 hemi
- Continuous MEG recording from 24 adults

Research questions

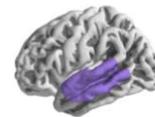
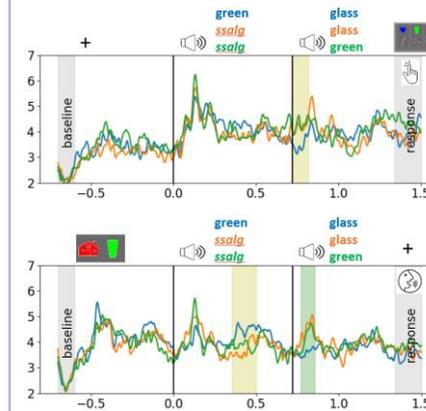
- (1) Does our in-context task replicate the effect of decreased activation for a more predictable stimulus in **comprehension**?
- (2) Does a decrease in activation during comprehension correspond to a decrease during **production planning**?
- (3) Does a pictorial context affect phrasal **composition** once the stimulus is heard?



- Fully-identical auditory stimulus in both tasks
- Key difference is whether there's a pictorial context preceding the speech
- In-context condition mirrors the back-and-forth of natural conversation
- The stimulus is *more* predictable on both word 1 and word 2 in the in-context task

This task was specifically designed for later use with child and patient populations

Lexical predictability

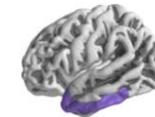
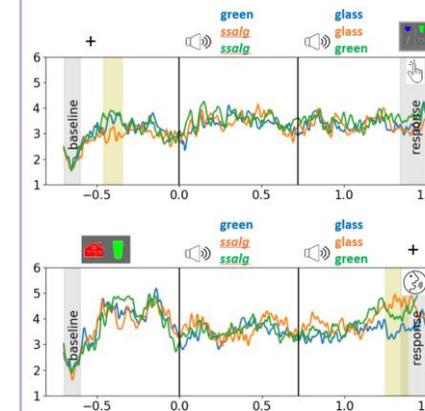


Sanity check predictability effects on word 2

Higher predictability of **Phrase** on word 2 corresponds with early decreased activation in **left STG** & primary auditory cortex; no task x condition interaction

- (1) Higher predictability in **comprehension** decreases activation, but not moreso when the space of possible items is 1

Production planning

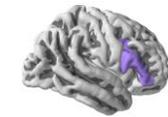
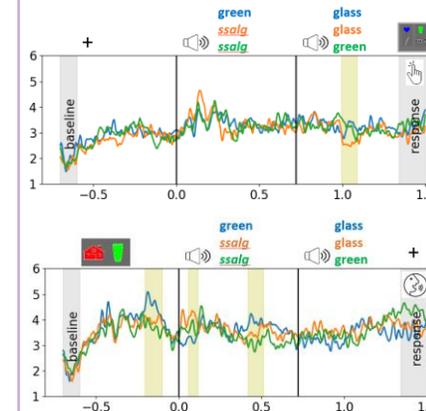


Extend predictability findings to production planning

Higher predictability of **Phrase** on word 2 corresponds with decreased activation in **left ATL** *only* in the in-context task; production may have been fully planned

- (2) Higher predictability decreases activation in **production planning**
- (3) Did not measure the expected **composition** effect

Working memory



Exploratory analysis: effect of WM maintenance

Right IFG early increase on word 1 for the more predictable **Noun** & **Color** in-context

May reflect working memory maintenance of two objects through the presentation of backwards speech

Discussion & future work

- Extended findings of lower activation for the more predictable stimulus from lexical comprehension into production planning
- The production planning effect is not straightforwardly explained by movement artifacts – the only significant difference in speech onset time was between Color and Noun
- Lack of expected composition effect in the Phrase condition is unexpected given prior work
- Ongoing work: predictability & composition effects in children
- Future work: is the increase in predictability of the stimulus responsible for the lack of composition effect for phrasal stimuli?

Greater lexical predictability leads to lower activation during **production planning**

References: [1] Lau et al. (2009) A lexical basis for N400 context effects: Evidence from MEG; [2] Kuperburg & Jaeger (2016) What do we mean by prediction in language comprehension; [3] Westurlund & Pykkänen (2014) The role of the left anterior temporal lobe in semantic composition vs. semantic memory; [4] Bemis & Pykkänen (2011) Simple composition

Funding acknowledgment: NYU Abu Dhabi grant G1001, NSF grant #1923144

Contact email: alicia.v.parrish@nyu.edu