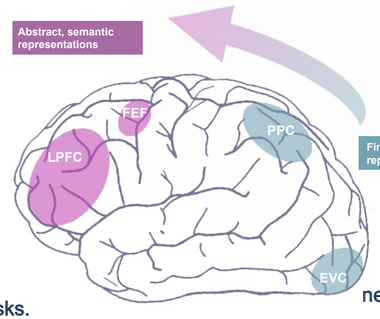
Categorical Biases Emulate Verbal Coding in Visual Working Memory

Joana Pereira Seabra[1,2] Vivien Chopurian[1,2] Andreea-Maria Gui[1,2] Thomas B. Christophel[1,2]

[1]Department of Psychology, Humboldt Universität zu Berlin, Berlin, [2]Bernstein Center for Computational Neuroscience, Charité Universitätsmedizin, Berlin,

Are categorical biases a result of verbal coding?

Categorical biases are present when recalling orientations and locations: cardinal stimuli are reported more accurately.[1,2,3,4]



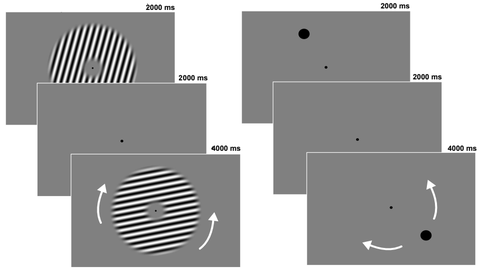
The usage of **verbal labels** provides a benefit when recalling visual stimuli.[5]

Subjects frequently report using verbal labels in memory tasks.

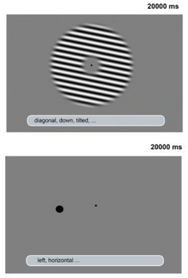
We believe one item can have multiple neural representations, different in nature.[6]

How did we study this?

Memory Task



Stimulus Naming

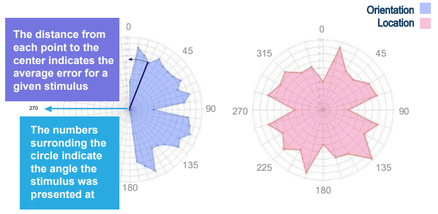


N=40

Online Data Collection, 24 Orientation Stimuli, 24 Location Stimuli

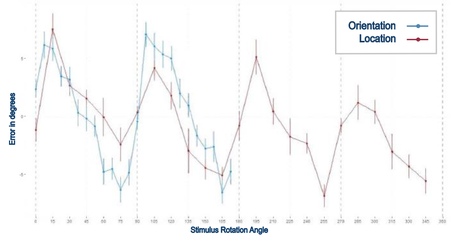
Does recall error differ for cardinal and non-cardinal stimuli?

Absolute Error for Orientation and Location



Increased accuracy for **cardinal** stimuli

Relative Error for Orientation and Location

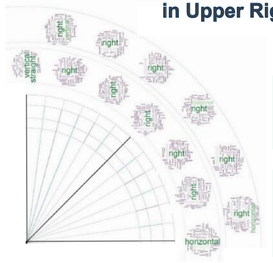


Direction of error **away** from cardinals

Error distribution **similar** in both stimulus types

Are sematic strategies involved in the recall of visual stimuli?

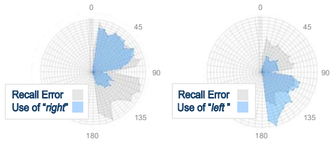
Word Usage for Orientations in Upper Right Quadrant



Words for *cardinal stimuli* are used sparsely

Words for *non-cardinal stimuli* are used indiscriminately

Usage of "right" and "left" for Orientations

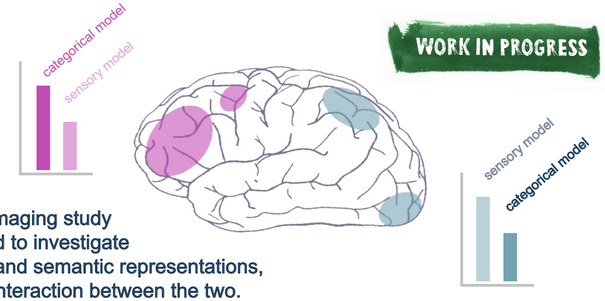


Participants tend to focus on the upper half of mirrored stimuli

Word Usage in Relation to Recall Error

The use of *cardinal* words predicts **less error**

We found behavioural evidence that verbal coding drives categorical biases during working memory.



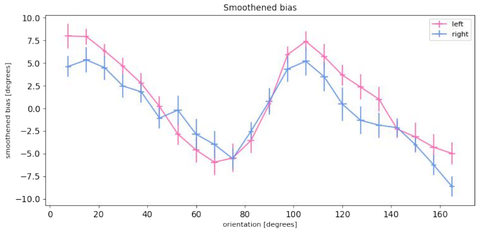
A neuroimaging study is needed to investigate detailed and semantic representations, and the interaction between the two.

If verbal coding drives categorical biases, can verbal distractors impair recall accuracy?

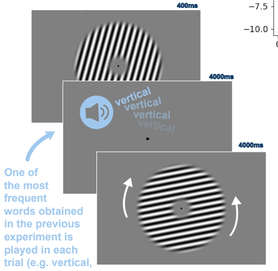
Andreea-Maria Gui

WORK IN PROGRESS

Recall Error After Presentation of the Distractors "left" and "right"



Memory Task with Semantic Distractor



One of the most frequent words obtained in the previous experiment is played in each trial (e.g. vertical, diagonal or horizontal)

References

1. Bae, NeuroImage, 2021
2. Balikou et al., Experimental Brain Research, 2015
3. Bae et al., Journal of Experimental Psychology, 2015
4. Yan et al., In prep.
5. Souza et al., Journal of Memory and Language, 2021
6. Christophel et al., Trends in Cognitive Sciences, 2017