Representing numbers in a sequential numerical comparison task

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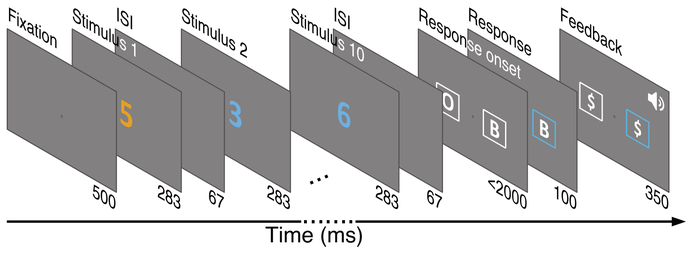
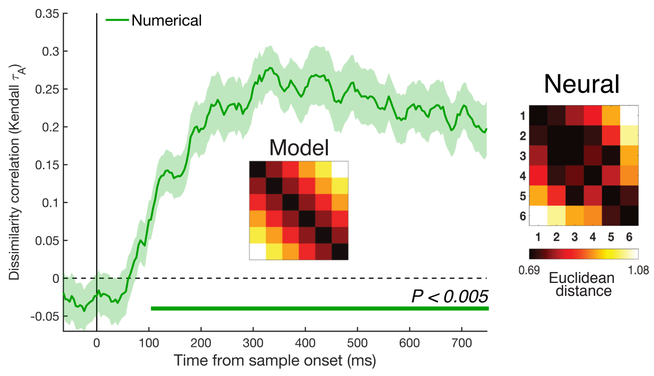
Background

Sequential integration

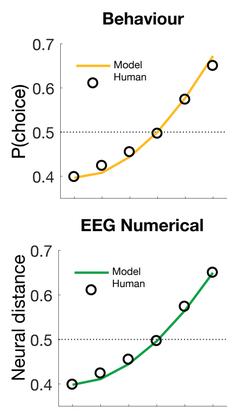


- 300 trials
- Ten numbers between **1 - 6**
- 50% blue, 50% orange
- "Find color with highest/ lowest mean."

Magnitude decoding (EEG)



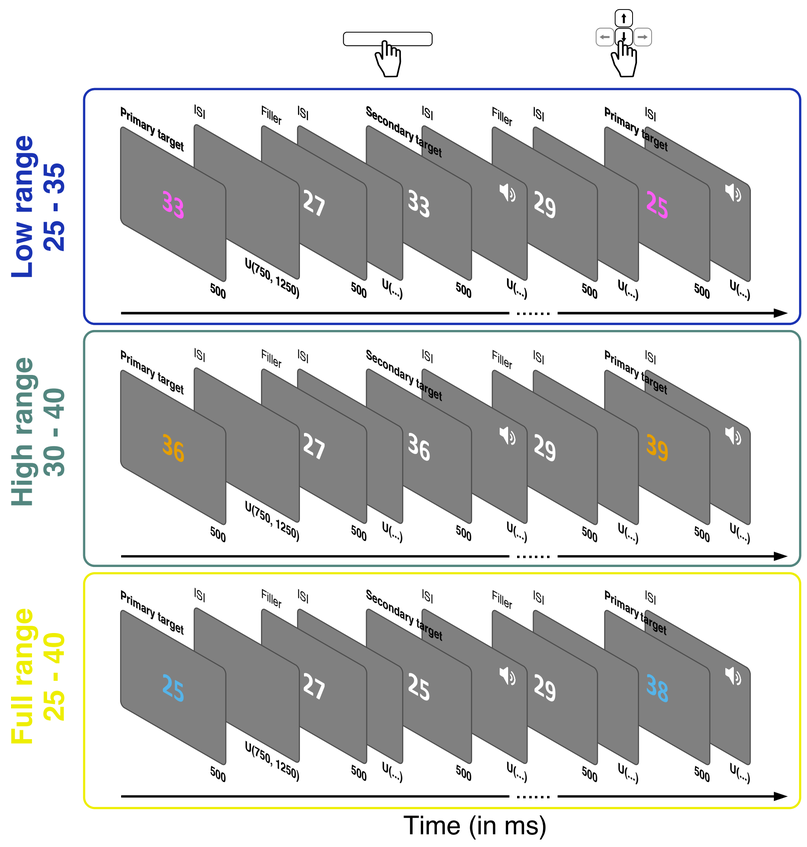
Shape of number line



Luyckx et al., eLife, 2019

Design

Sequential comparison



Information

- 2880 numbers over 24 blocks
- 3 conditions with different ranges for primary targets
- Full range (25 - 40) for filler numbers

Dual task:

- **Task A**: "Current primary target higher or lower than previous?"
- **Task B**: "White filler number same as last primary target?"

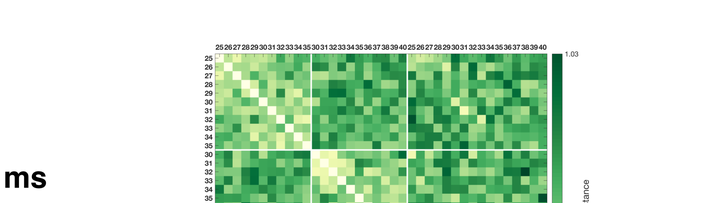
- N = 28 participants

Representational similarity analysis (RSA)

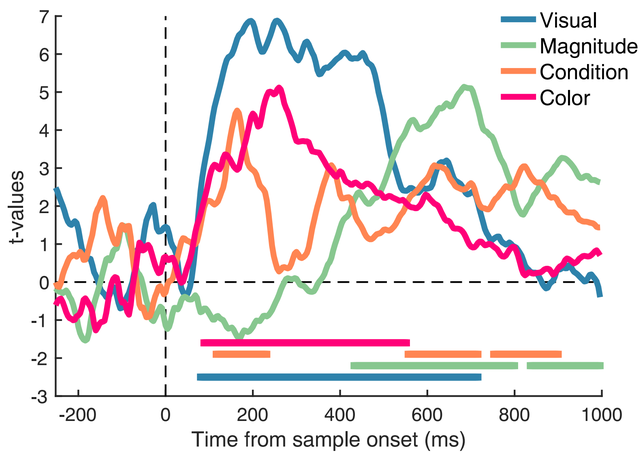
Primary targets

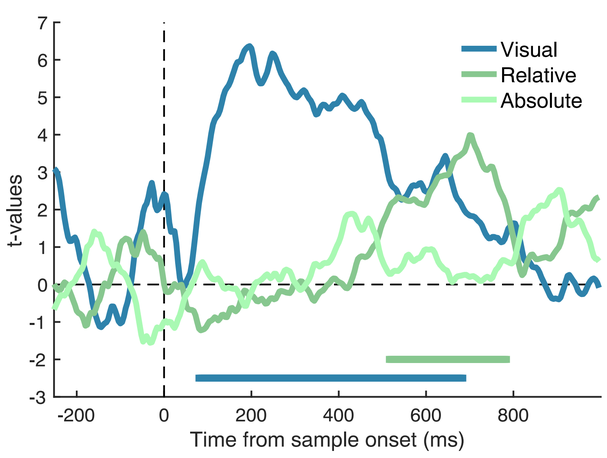
Filler numbers

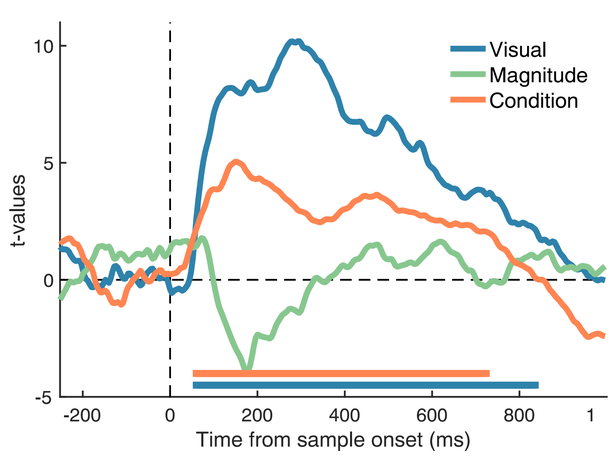
Models



Results

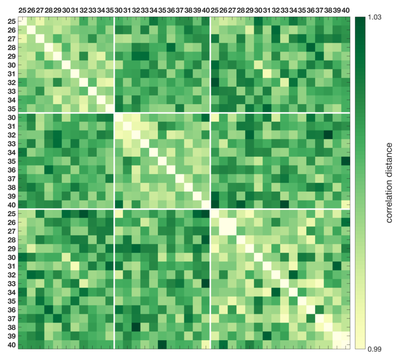






Neural RDM (500 - 800 ms)

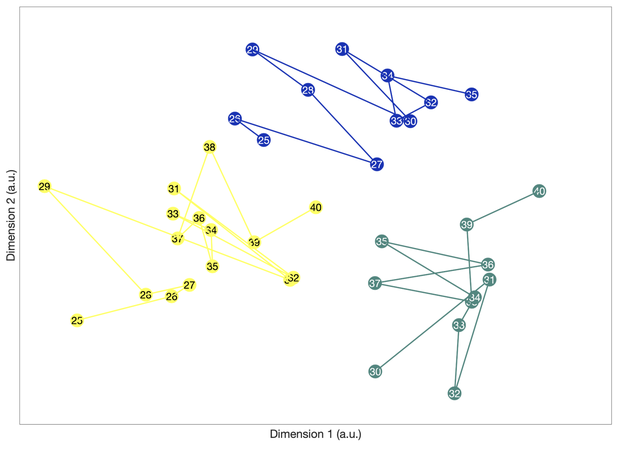
500 - 800 ms



Multidimensional scaling (MDS)

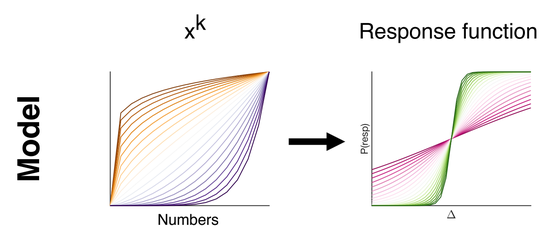
Primary targets

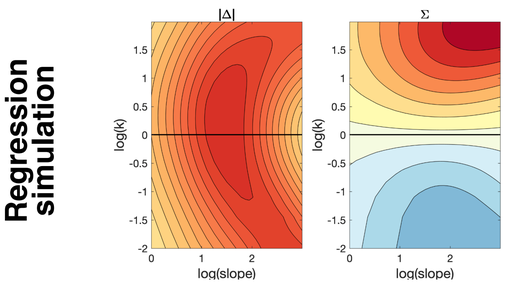
- Separation by:
  - Magnitude
  - Condition

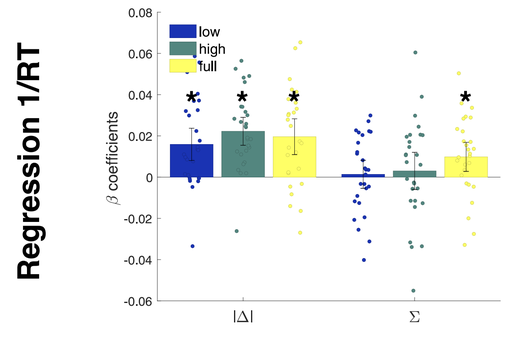


Behaviour

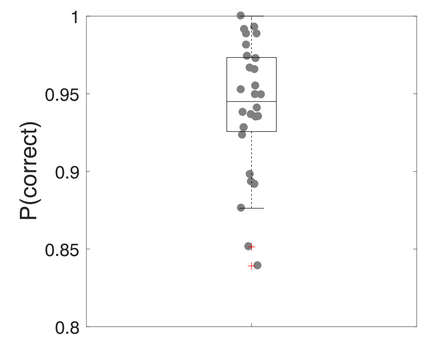
Model simulation







Accuracy



Conclusion

- Magnitude decoding only when numerical value is important for the task
- Range adaptation within condition
- No indication of logarithmic number line

Future directions:

- Explore shape of number line both in EEG and behaviour
- Measure alignment of number lines between conditions