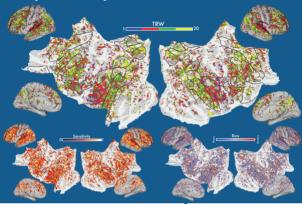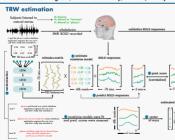# Attention During Story Listening Modulates Temporal Receptive Windows Across Cortex

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TRW estimation

Natural stories

- 6 naturally spoken narrative stories from *The Moth Radio Hour*
- 10-15 min in length, totally 75 minutes
- Narrators: 3 female, 3 male
- Each story was played once

Language model+LSTM [1]

- Co-ocurance of each word and 985 basis words
- 20M words corpus of text scrapped from Reddit
- LSTM: 3 layers, 985 hidden units, batch size 20
- LSTM trained to predict word embedding using 20 previous words

Sensitivity	Bias
$SI = 0.5(\frac{TRW_H - TRW_P}{|TRW_H - TRW_P|}) +$	$BI = \frac{TRW_H - TRW_P}{TRW_H + TRW_P}$

Background

- Natural speech is represented at various time scales across the brain, from phoemes to semantically complex setences [2]
- Temporal receptive window (TRW): the length of time before a response during which information is integrated [3]
- A hierarchy of increasing TRW from early auditory cortex to higher cognitive areas [4]
- Attention to spoken vs written stories modulates TRWs [5]

Question: How are TRWs modulated by category-based attention

Results

- TRW increases from early auditory cortex toward higher auditory, parietal, and prefrontal cortices
- Attentional modulation of TRW is relatively low in early auditory cortex
- TRW sensitivity increases from early auditory cortex toward higher cognitive areas
- TRW in pSTS and POS is biased toward "humans"
- TRW in IPS and TOS is biased toward

References

[1] Jaine, S. et al., NIPS 2018
[2] DeWitt, I., PNAS 2012
[3] Hasson, U., JNeuroscience 2008
[4] Lerner, Y., JNeuroscience 2011
[5] Regev, M., CerCortex 2018

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