

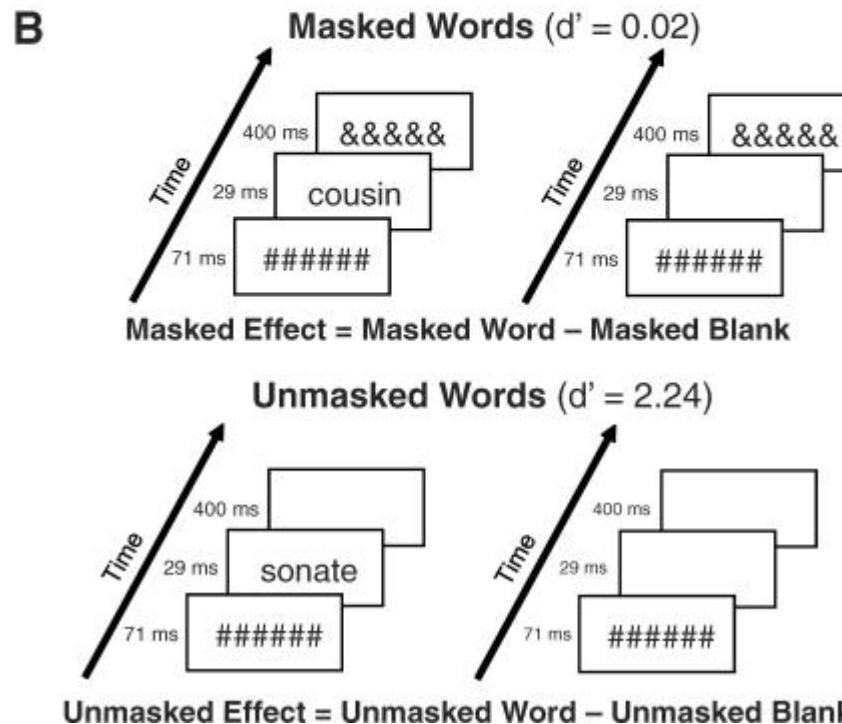
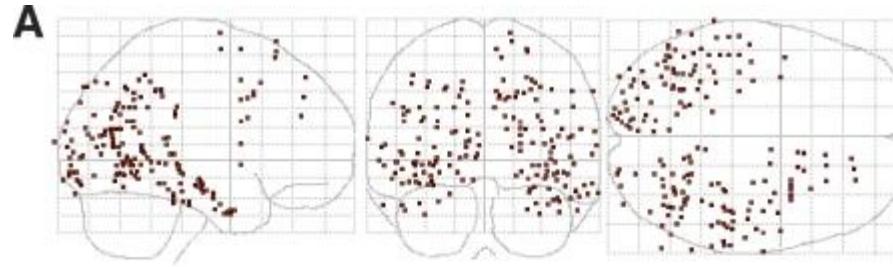
State structure and “mechanism” in general sensory processing

An Anthology

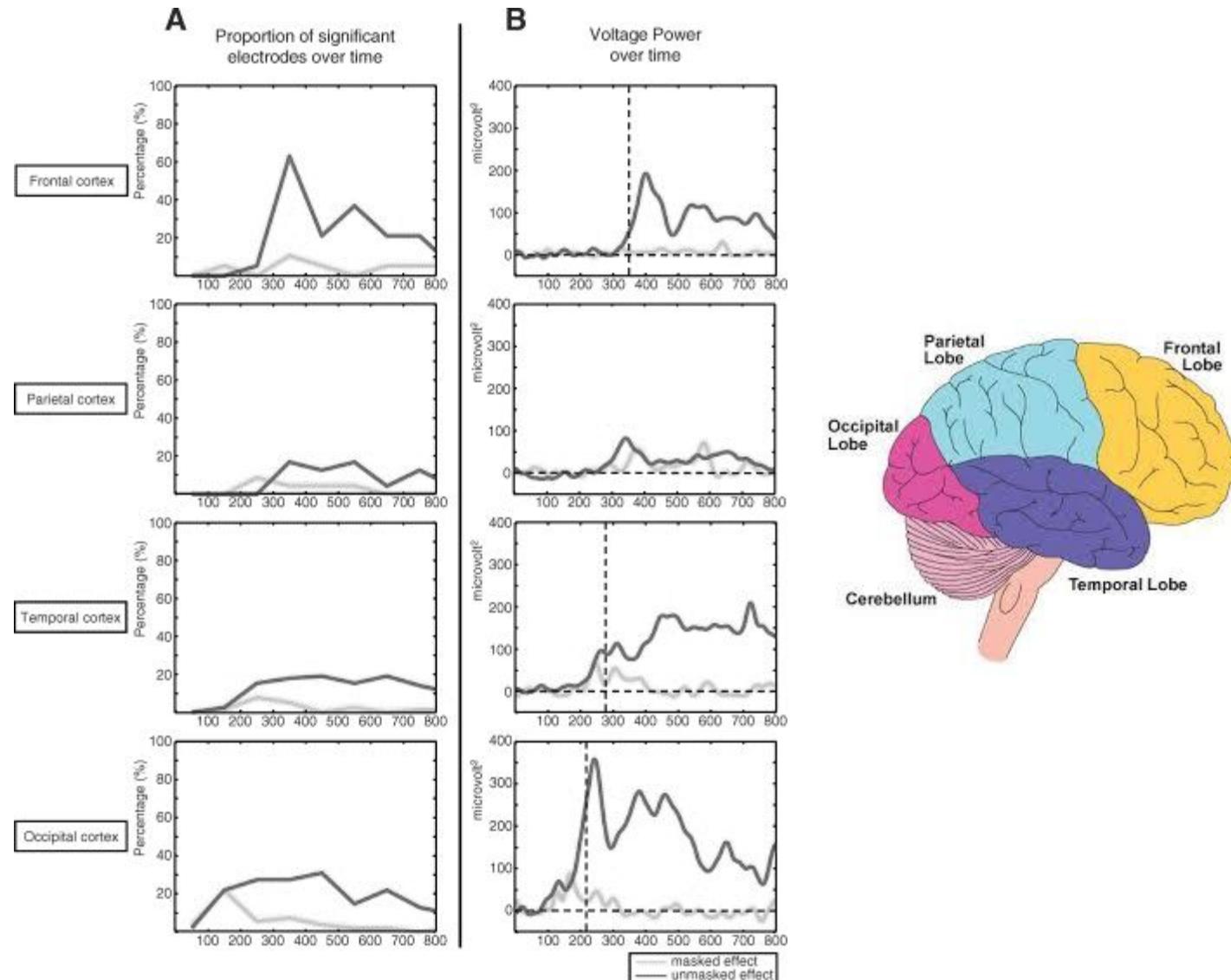
Sections:

1. Early state = (“targeted”) feedforward, middle-state = long-range (“broadcasting”) interactions.
2. A late (third) state is added when a behavioral output is required
3. Activity in early and middle states is (potentially) stimulus (extrinsically) driven

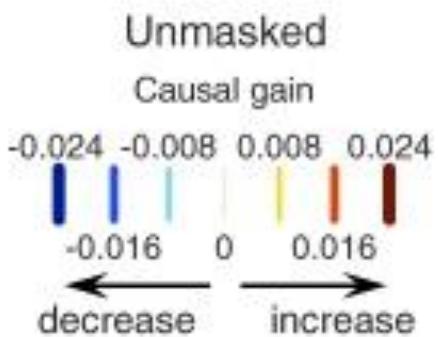
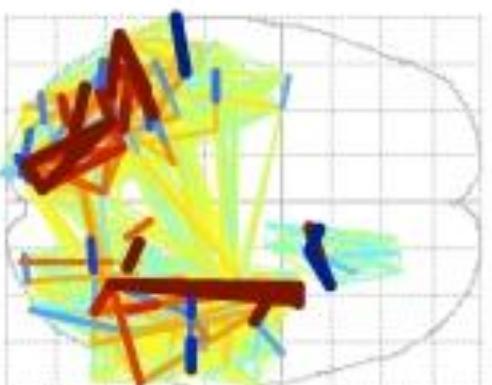
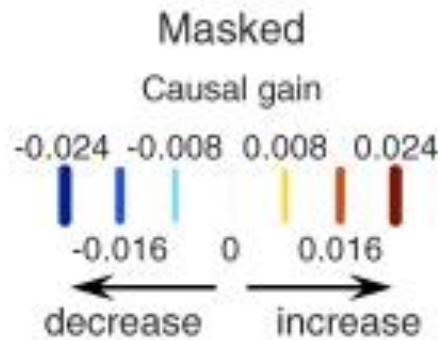
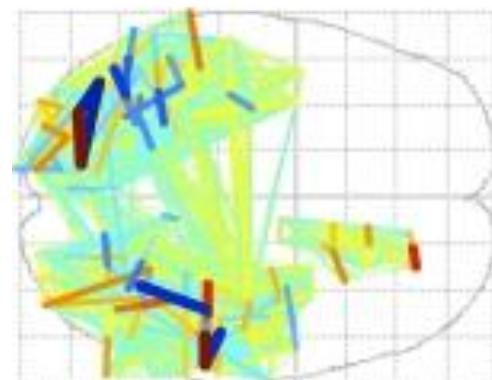
Section 1 : Gaillard 2009



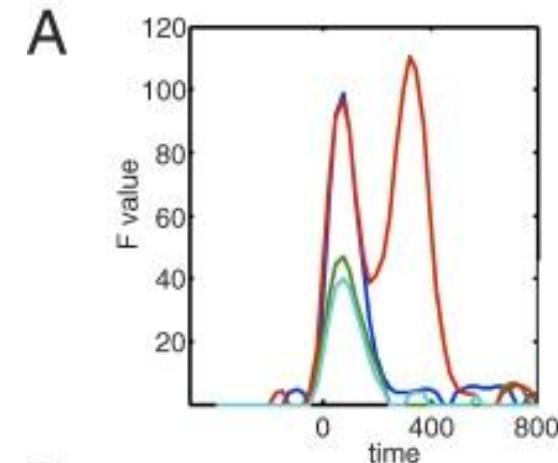
In order to maximize attentional engagement and word processing, participants were engaged in a forced-choice task of categorizing each word as threatening or nonthreatening, even on the masked trials. Subjects responded by manually pressing one of two response buttons with the left and right index fingers, and hand response instructions were inverted halfway through the experiment.



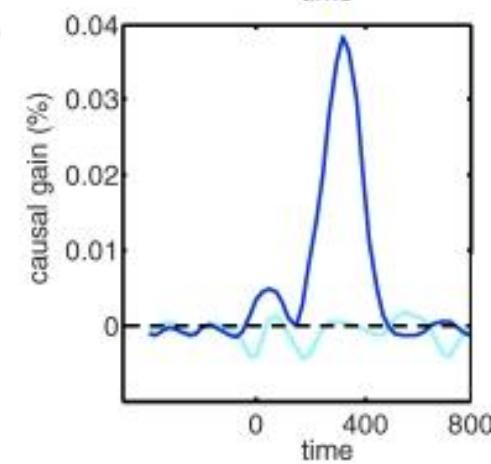
B Granger causal gain (300-500 ms)



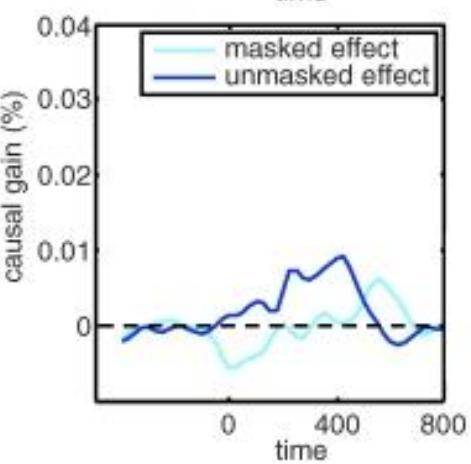
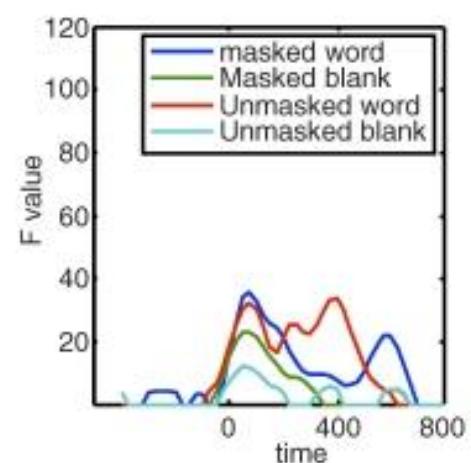
Occipital causes Frontal



B

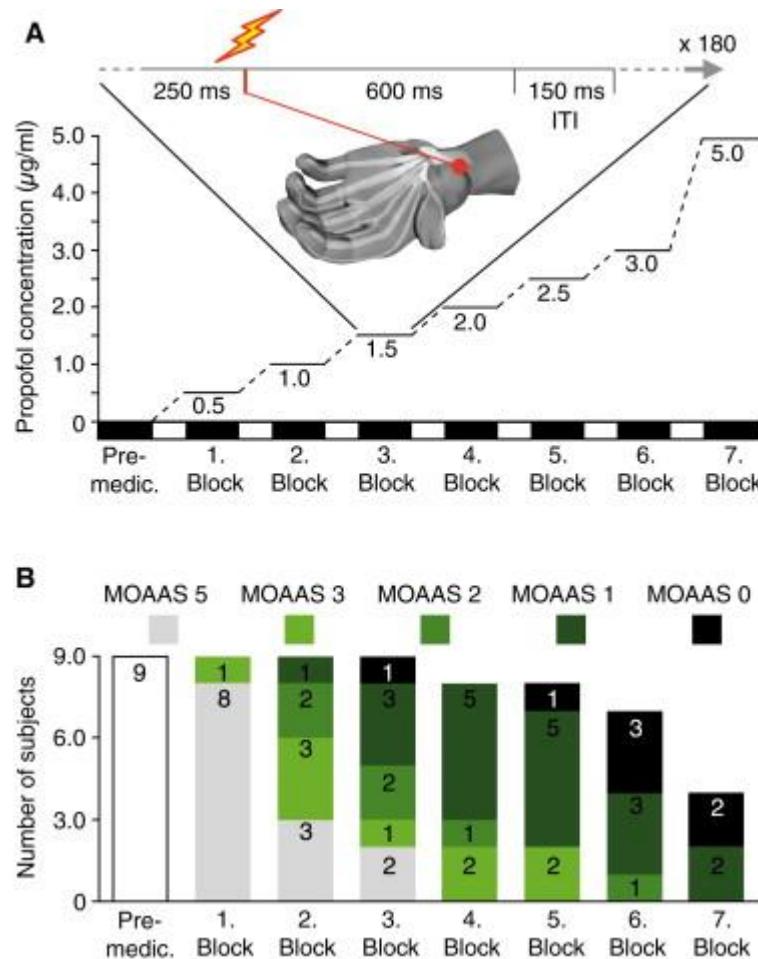


Frontal causes Occipital

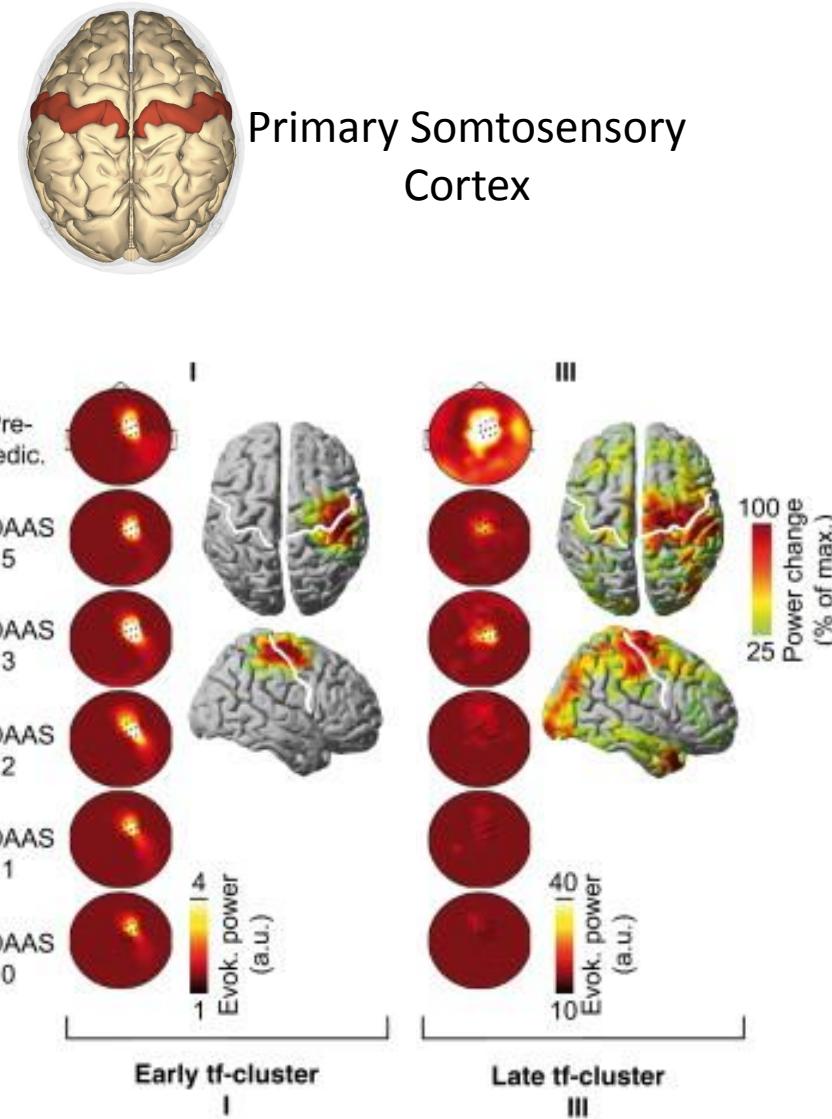
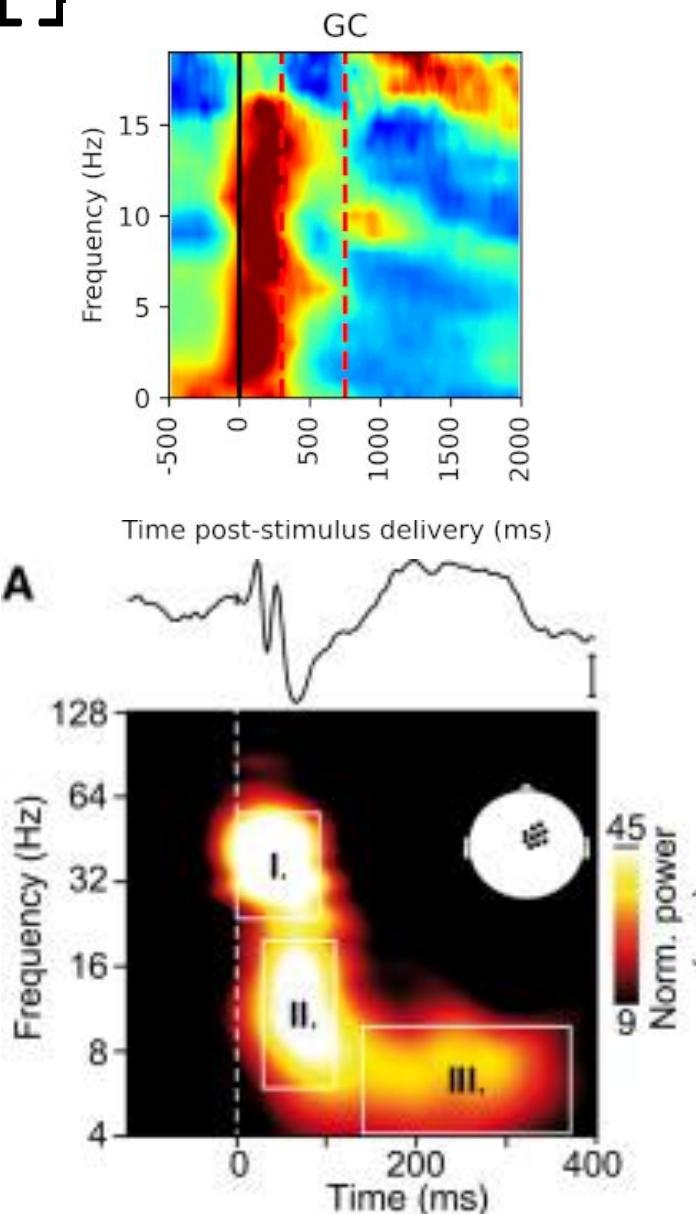


- Second stage is associated with “broadcasting” and bidirectional interactions.

Section 1: Supp 2011



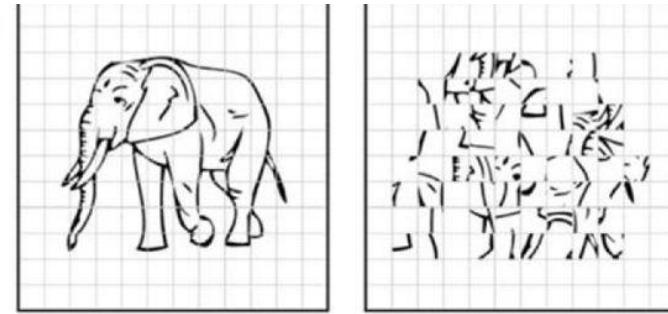
MOAAS 5 (fully conscious) to MOAAS 1 (only responsive after a painful physical stimulus), up to MOAAS 0 (unresponsive)



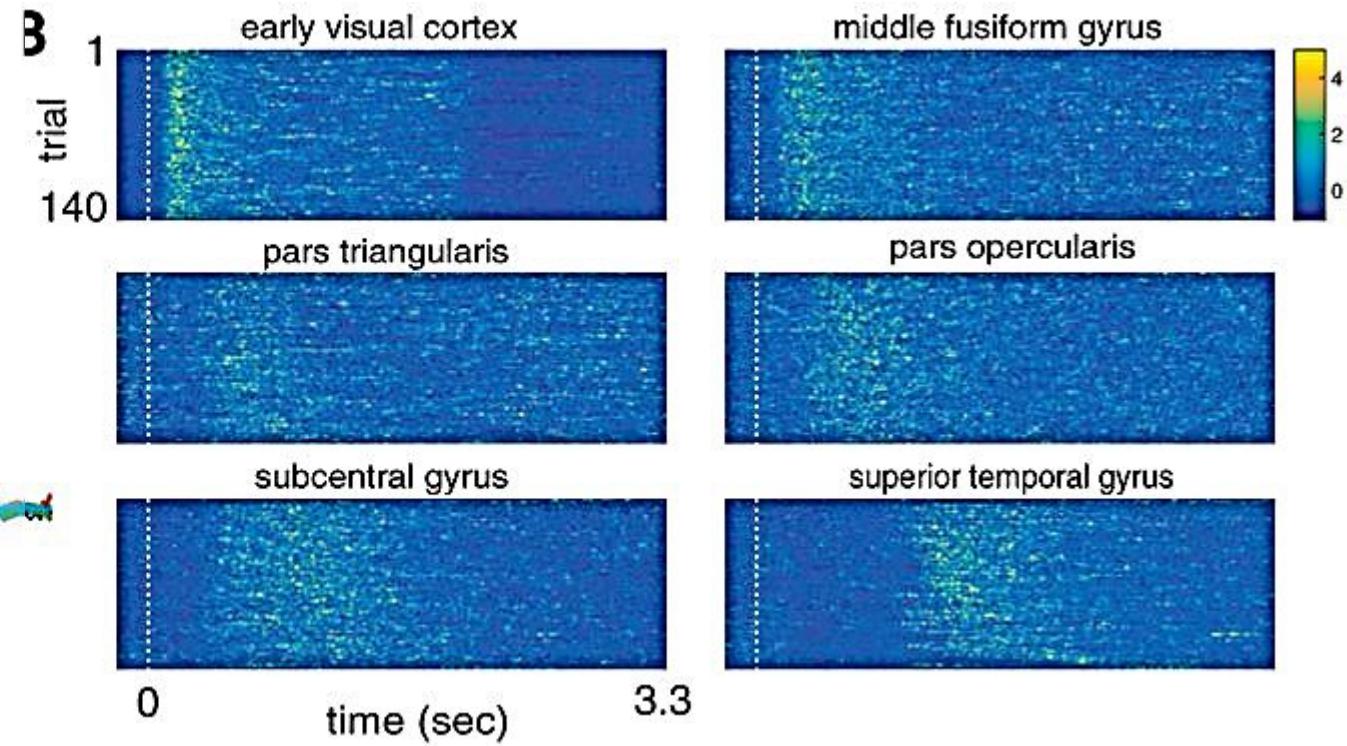
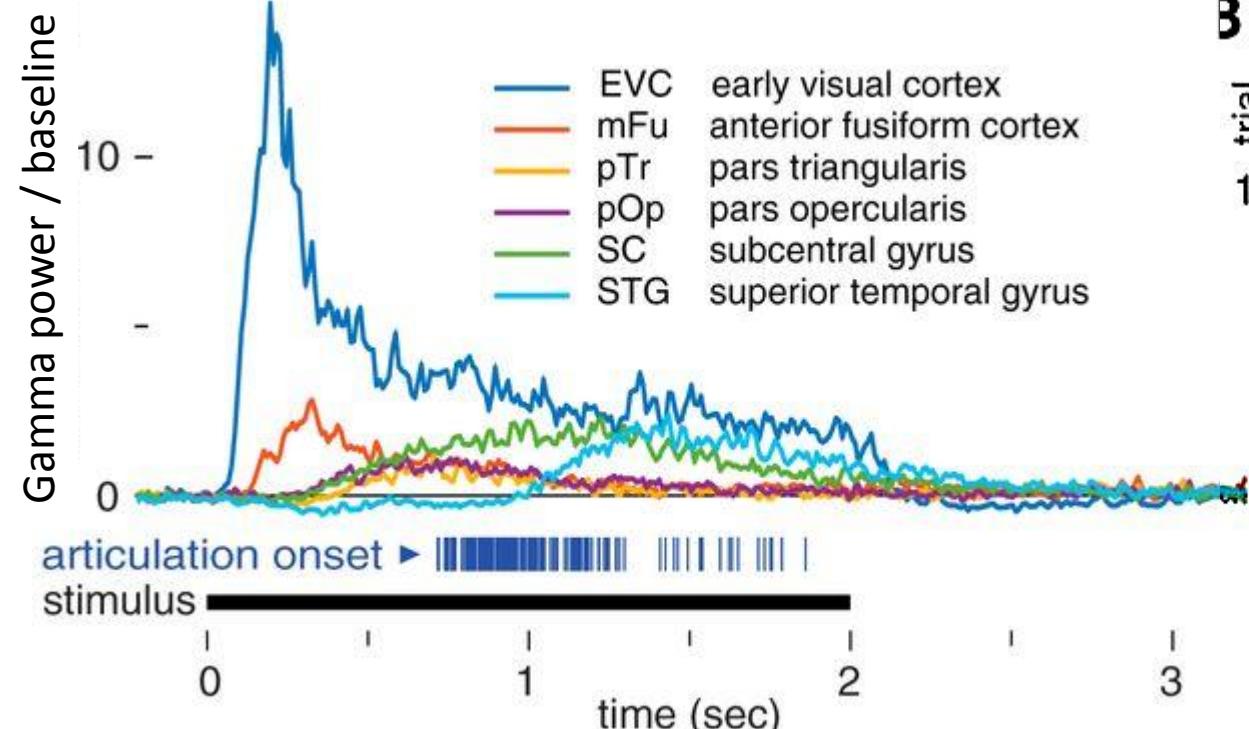
- Second stage is associated with “broadcasting”.

Note: Propofol acts by enhancing GABAergic inhibition throughout the brain and central nervous system.

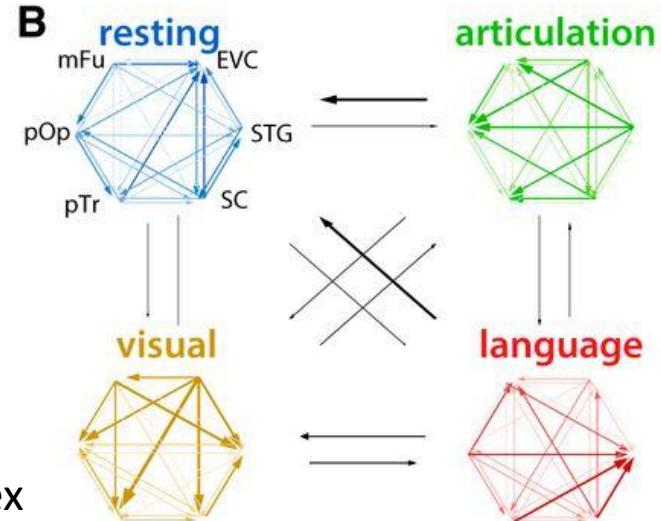
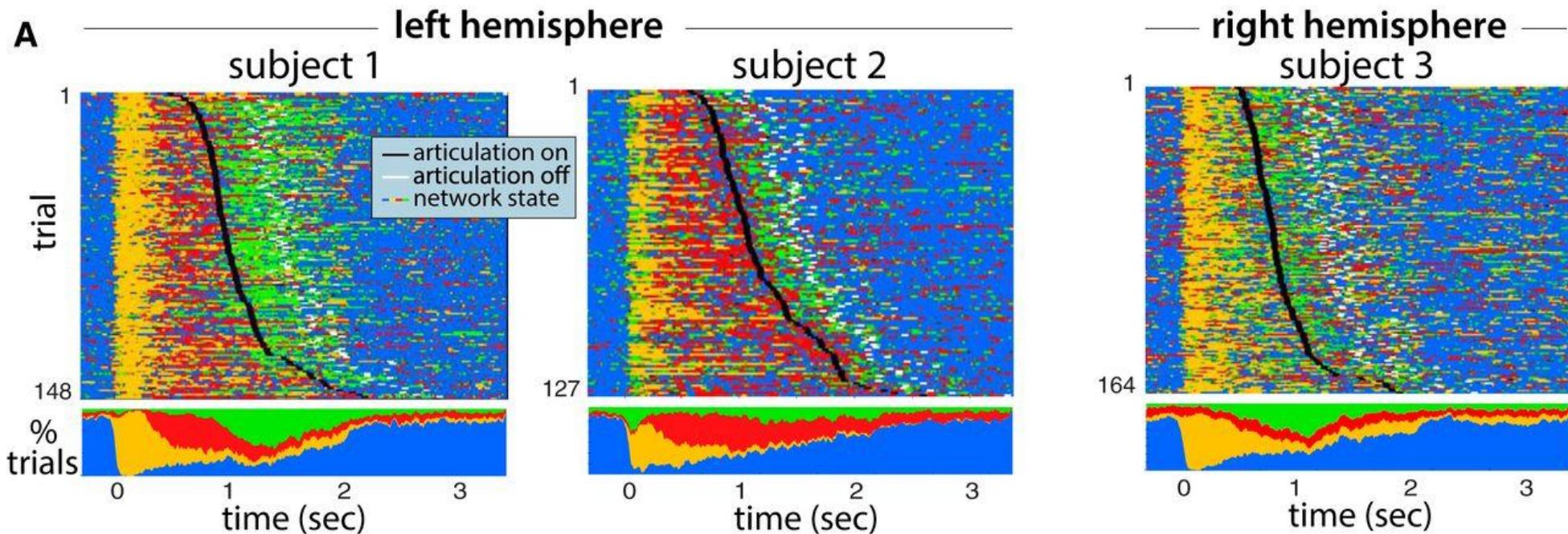
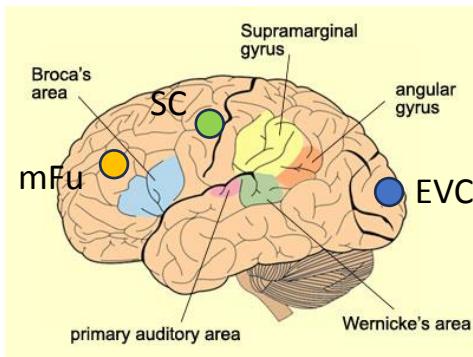
Section 2: Saravani 2019



- articulate the name for common objects depicted by line drawings
- Subjects were instructed to report “scrambled” for control images in which we randomly rotated pixel blocks demarcated by an overlaid grid
- Each visual stimulus was displayed on a 15-inch LCD screen positioned at eye level for 2 s with an interstimulus interval of 3 s. A minimum of 240 images and 60 scrambled stimuli were presented to each patient using presentation software



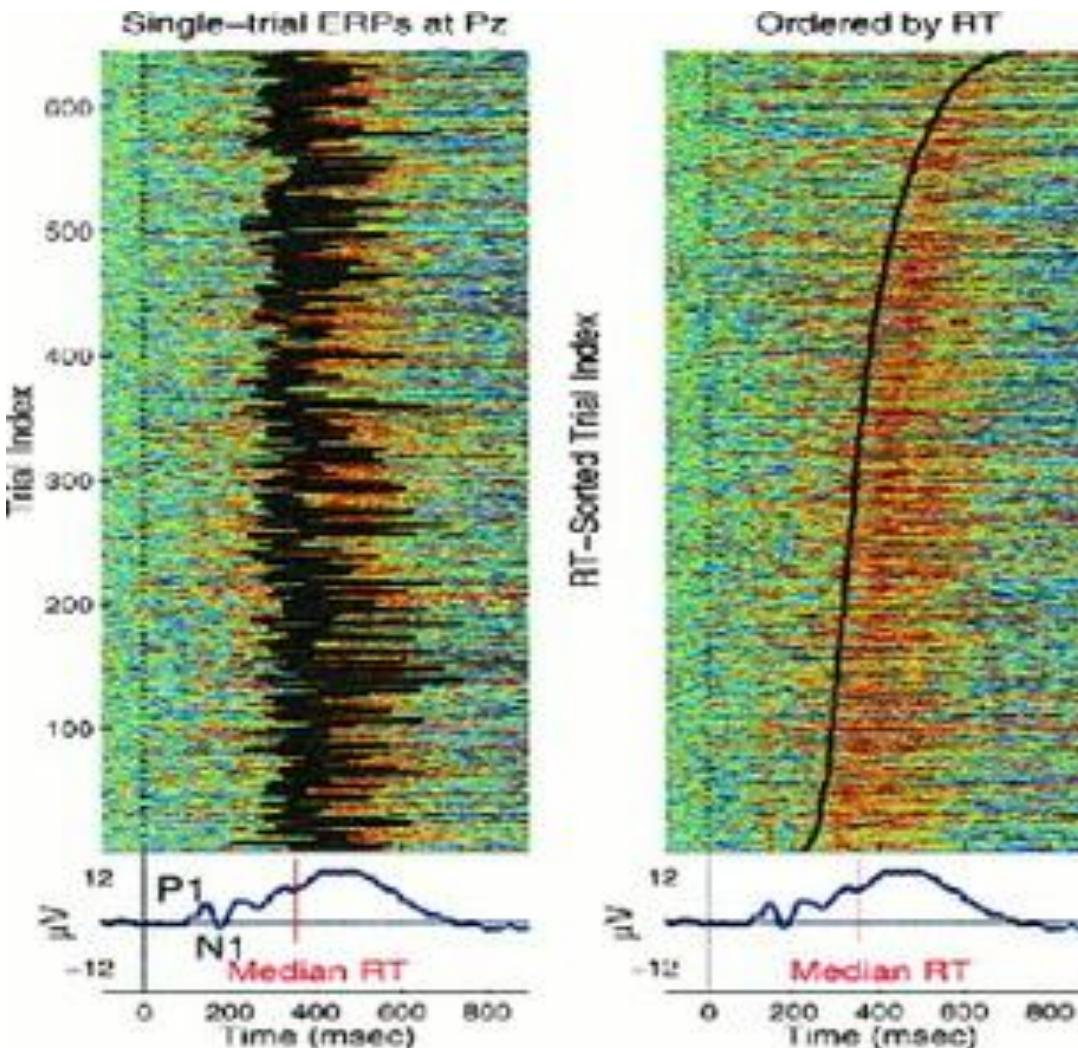
Section 2: Saravani 2019



- First stage = feedforward, second stage = broadcast, third stage = response
- Multiple regions involved from onset, even though they were not “active” yet...Activity in region associated with them activating other brain regions?

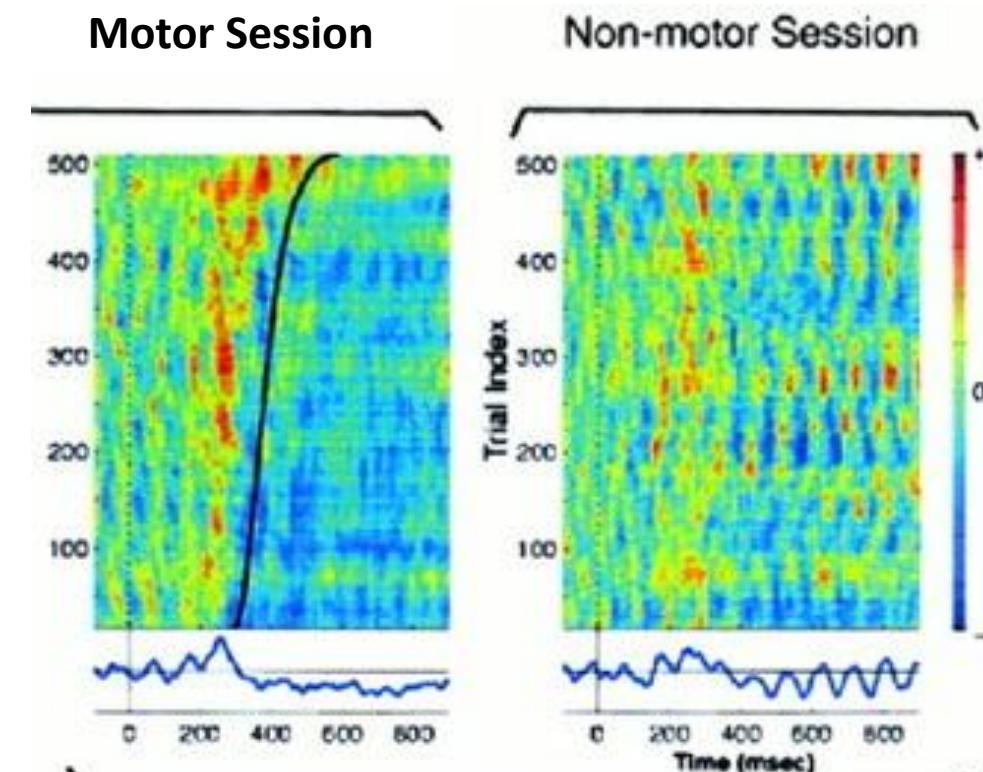
Primary Auditory Cortex and Wernicke's Area
STG superior temporal gyrus

Section 2: Jung 2001

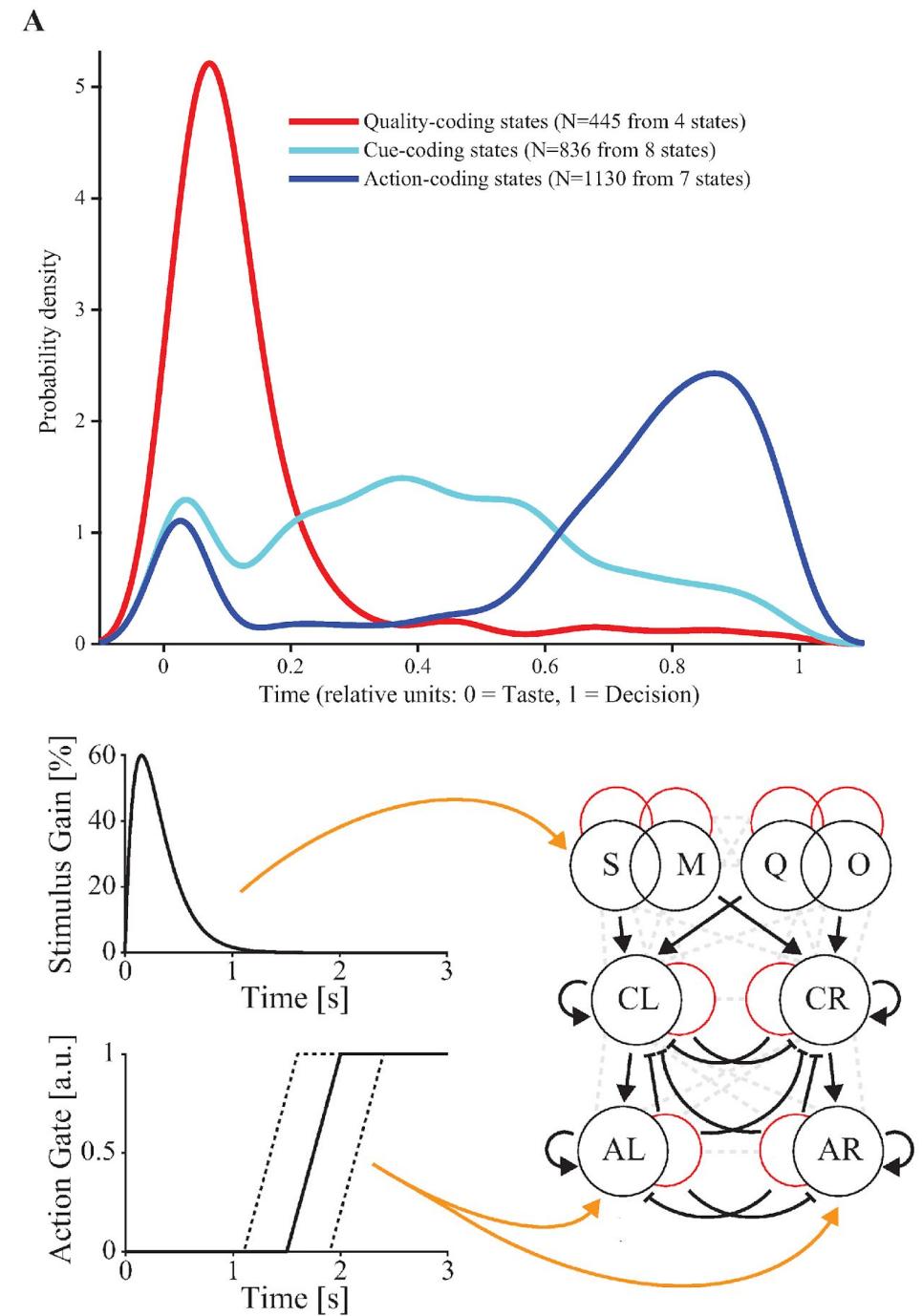
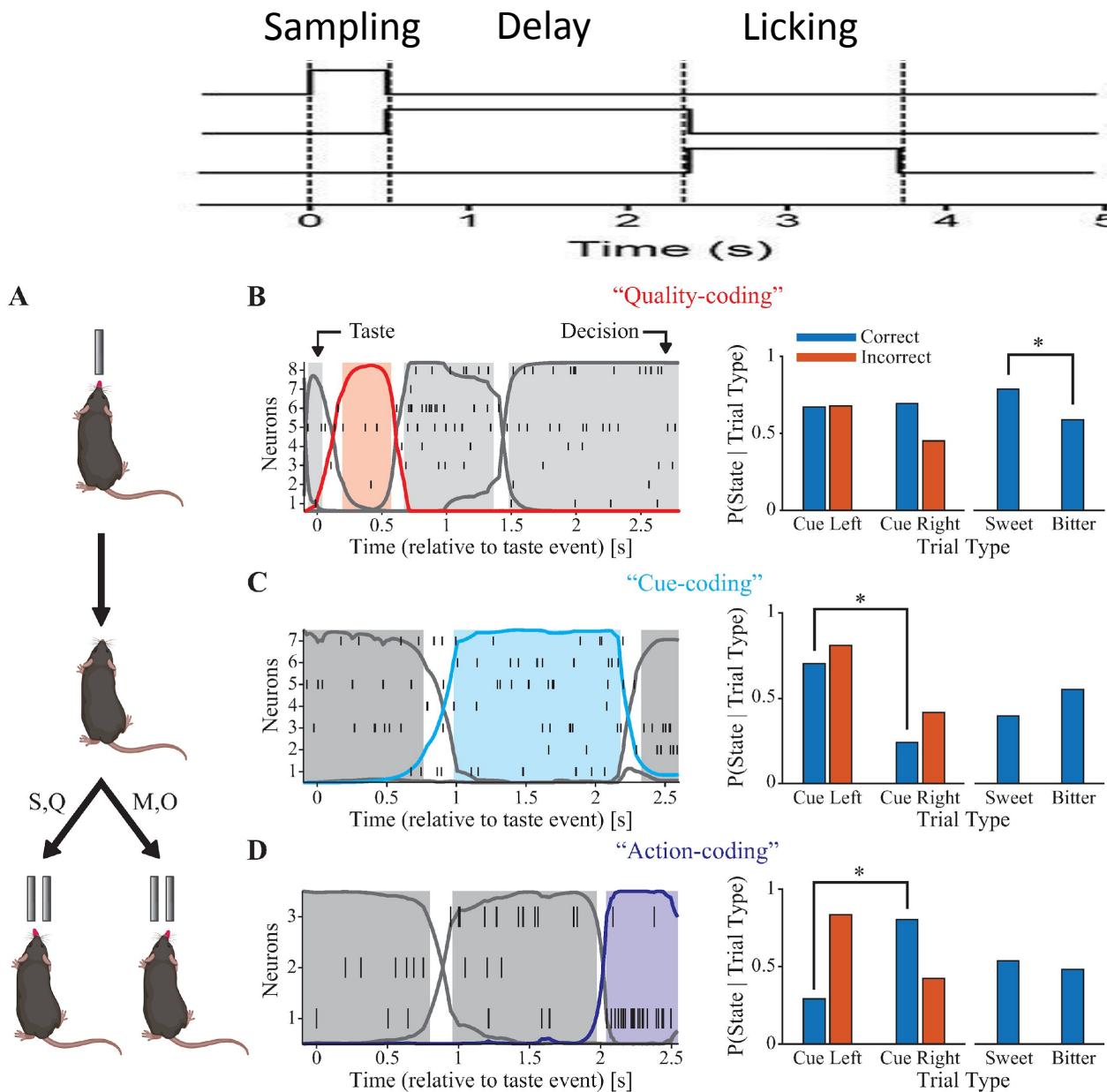


- Another example of stimulus and response locked components in a visual task

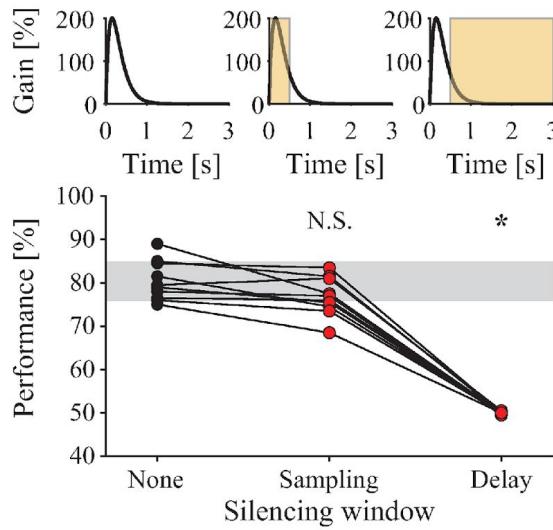
- 2-hour visual spatial selective attention task
- instructed to attend to filled circles flashed in random order in five locations
- An attended location was marked by a green square throughout each 72-sec experimental block
- Subjects were instructed to maintain fixation on the central cross and press a button as quickly as possible each time they saw a filled circle appear in the attended location.



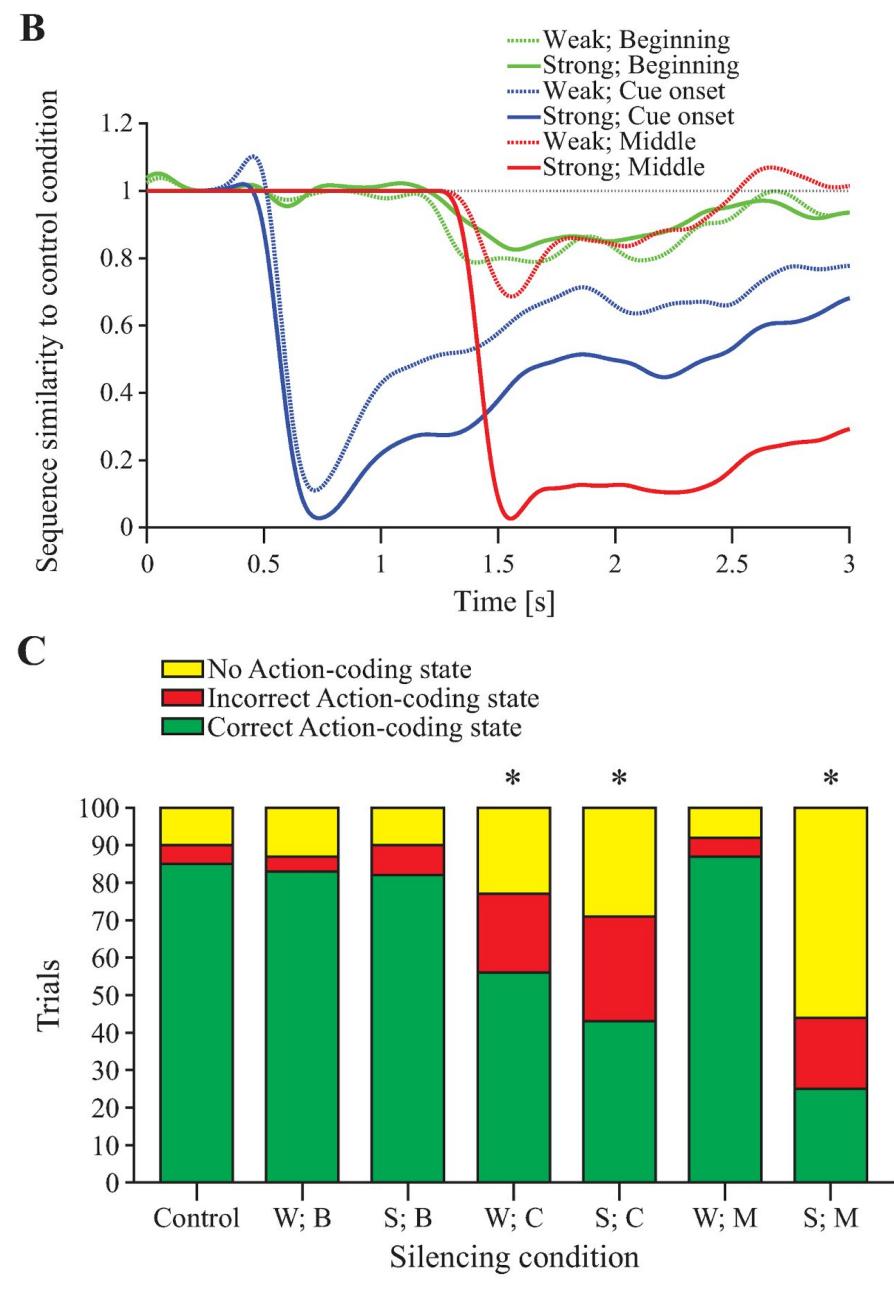
Section 3: Lang 2023



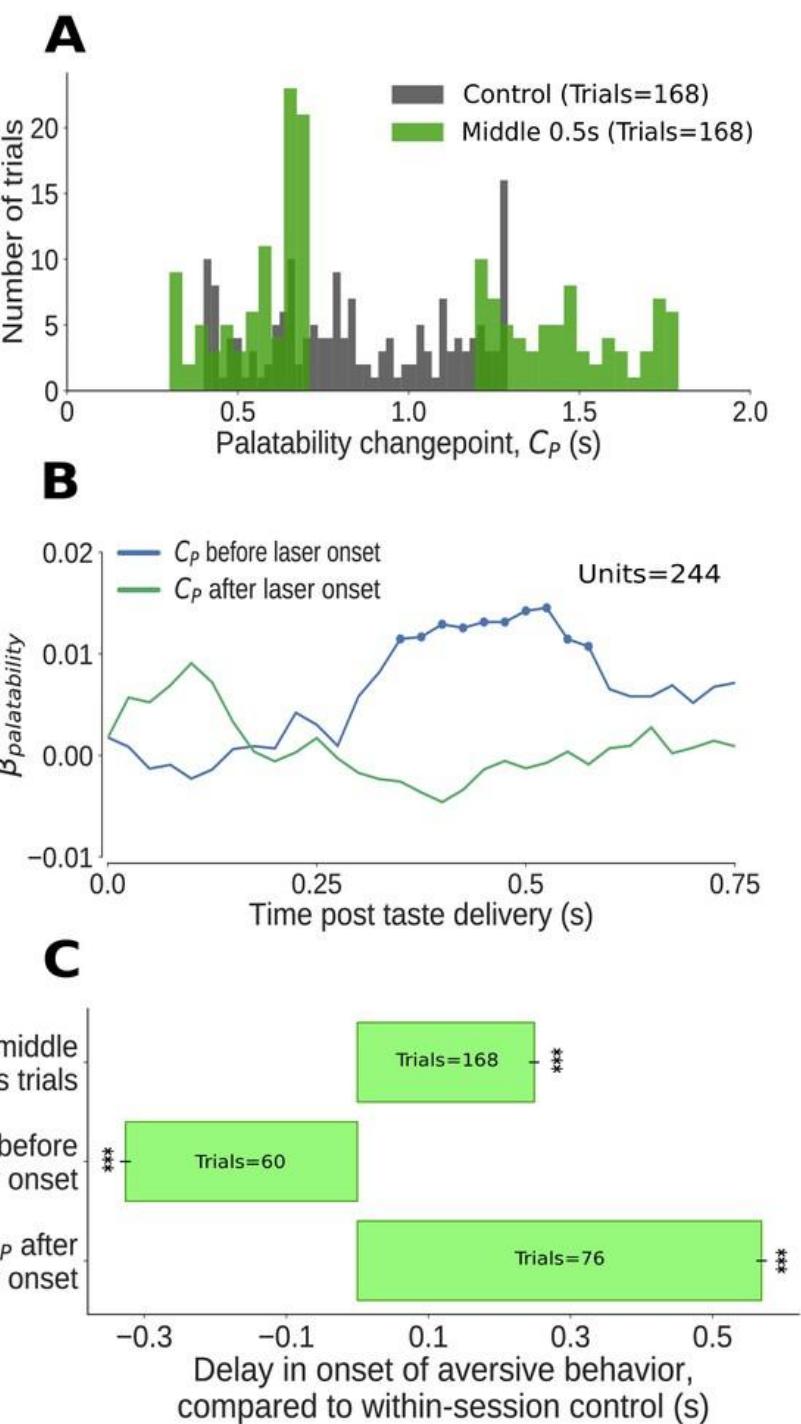
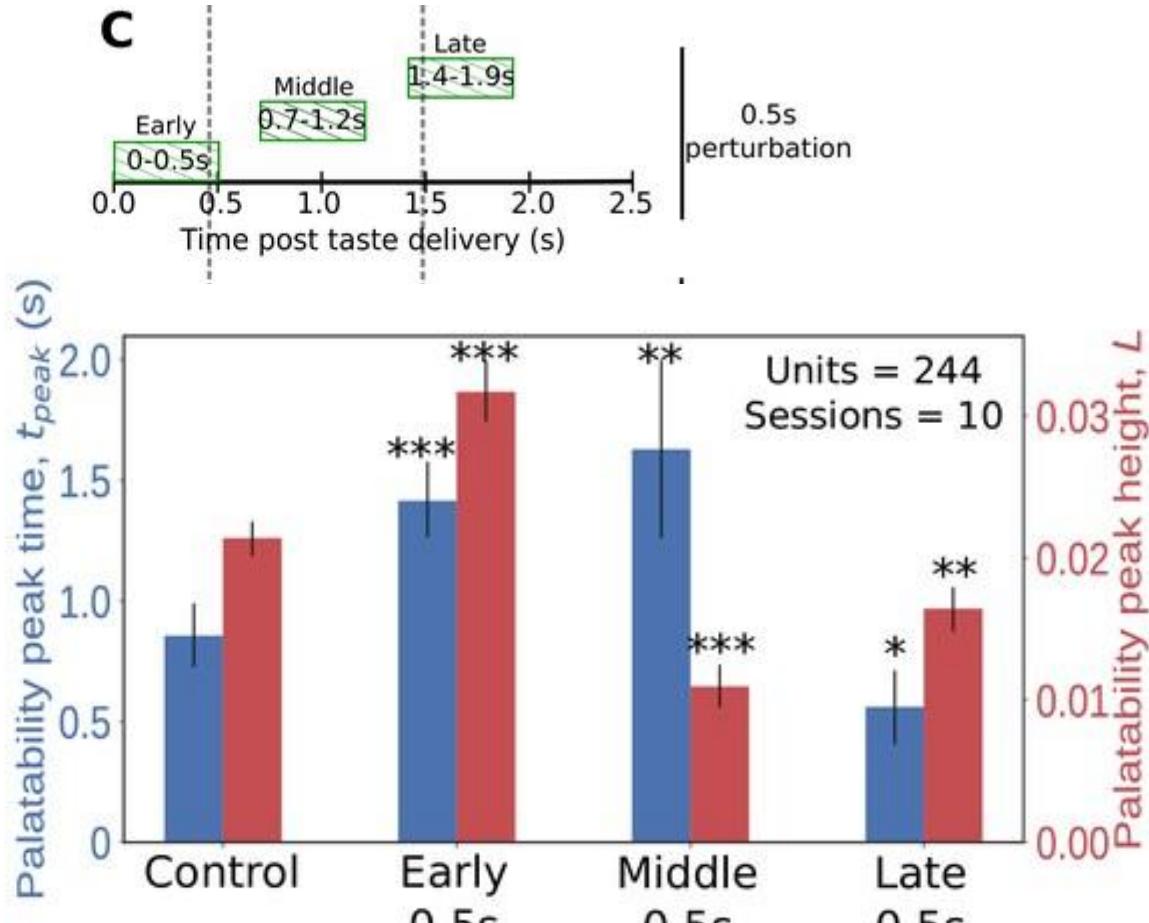
Section 3: Lang 2023



- Left: Only a small bit of stimulus is needed to rescue performance in the model
- Right: The model is most perturbable when stimulus input has ended, and ongoing activity is “intrinsically” driven.



Section 3: Mukherjee 2019



- Early perturbation did not show decrement in processing because system is still stimulus-driven.
- Perhaps the middle perturbation has a stronger effect on transitions further away from stimulus (such that more of the intrinsically driven dynamics are perturbed).

References:

- Section 1:

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- Section 2:

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- Section 3:

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- Lang L, Camera GL, Fontanini A. Temporal progression along discrete coding states during decision-making in the mouse gustatory cortex. PLOS Computational Biology. 2023 Feb 7;19(2):e1010865.