Accounting for Taste: Temporal Dynamics of Decision-Making for Oneself vs. Others

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Introduction

- **We often must take into account the preferences of others**
  - Preparing a meal for a child or buying a gift for a friend
- ***How* do we construct representations of others' preferences?**
  - Especially when others differ from us?
- ***When* does social cognition influence neural value signals?**
  - Do our own preferences emerge earlier?
  - Do we use the same neural system to assign value for others as for ourselves?

Methods

- **Food decisions for self and two partners**
  - **Different**: Self-identified healthy eater

...I don't eat anything with added sugars...I generally don't eat things that come in plastic...I try to eat a lot of fruits and vegetables, and I eat a lot of peanut butter and almond butter.

  - **Similar**: No dietary restrictions

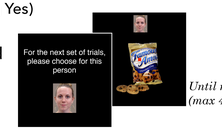
...I would say for me, taste is my number one consideration when I'm eating...If it tastes good but it's not healthy, I'll just eat less of it, but for me eating food is all about it tasting good.

- **N = 36**
  - No dietary restrictions
  - Fasted for 3 hours before experiment

I. Set-Up	II. EEG Recording	III. Clean-Up

• *Photo taken*
• *Partner videos*
• *Taste/Health ratings*
	• *Decision task (6 runs) for:*
	  • *Self*
	  • *Similar partner*
	  • *Different partner*
		• *Implementation of randomly selected trial for each recipient*

- **Experiment procedure**
  - 128-channel EEG
  - 600 trials (200 per recipient) in 10-trial blocks
    - Block order randomized by subject
    - Current recipient displayed during block
    - 4AFC (Strong No to Strong Yes)
  - Randomly selected trial for each recipient implemented at end of experiment



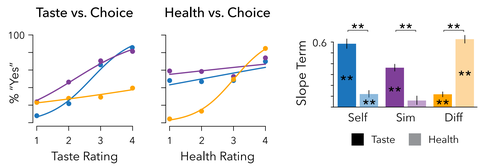
Until response (max 4 s)

- **Event-related potentials (ERP)**
  - Data time-locked to stimulus onset
  - Subject-level linear regression:

$$y_{sensor,time} = \beta_0 + \beta_1 StimulusValue + \beta_2 SelfOther + \beta_3 SV{*}SelfOther + \varepsilon$$

  - Distributed source reconstruction in SPM8 (group inversion)

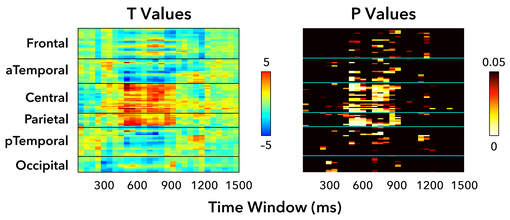
Behavioral Results



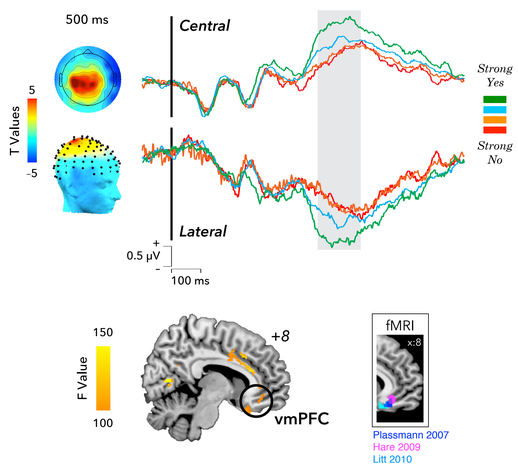
- **Relative weighting of taste and health depends on recipient**
  - *Self*: Greater weighting on taste
  - *Different*: Greater weighting on health
- RT significantly longer (~120 ms) for Similar partner ($p = 10^{-9}$)
  - Greater uncertainty about preferences?

ERP Results: Stimulus Value

- **Prediction: Neural correlates of stimulus value**
  - From ~450 ms after stimulus onset (Harris et al., 2011, 2013)
  - Localized to **ventromedial prefrontal cortex** (vmPFC)



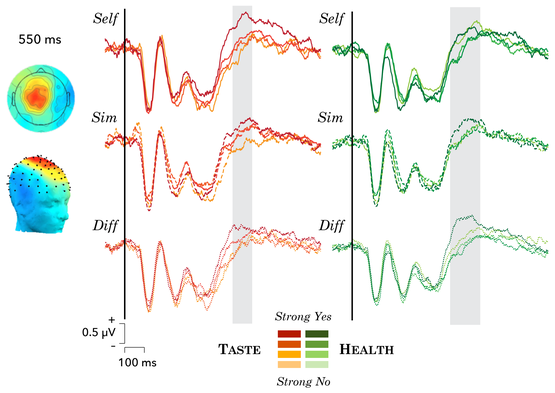
Stimulus Value, 500 to 650 ms post-stimulus



ERP Results: Attribute Coding

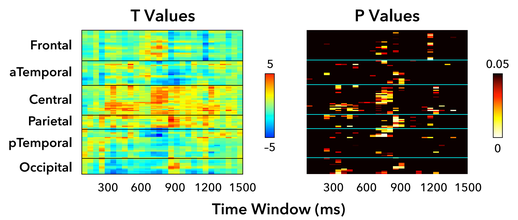
- **Prediction: Differential neural weighting on taste and health**
  - *Self*: Greater weighting on taste
  - *Different*: Greater weighting on health
  - During stimulus value computation window (Harris et al., 2013)

Taste & Health by Self/Other, 550 to 650 ms post-stimulus

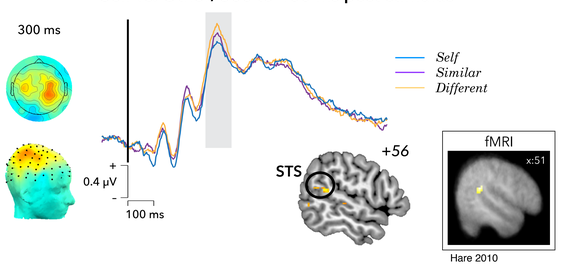


ERP Results: Self vs. Other

- When does the brain differentiate choices for others?
- **Prediction: Social representation *before* value signals**
  - Theory of Mind regions: e.g., **superior temporal sulcus** (STS)

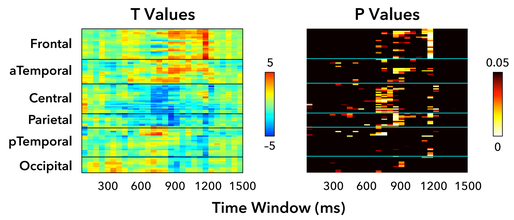


Self vs. Other, 300 to 400 ms post-stimulus

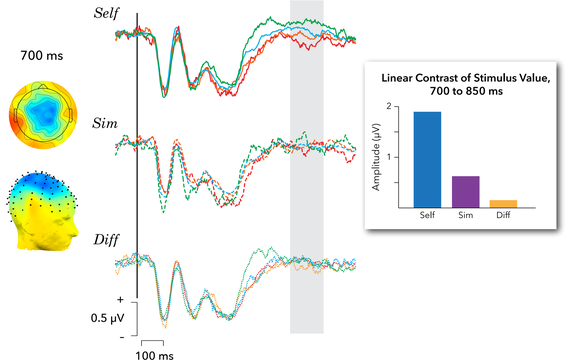


Self/Other x Stimulus Value

- **How does social representation interact with stimulus value?**
  - Late value signal (700-850 ms) strongest for Self
  - May reflect sustained attention or arousal for own choices



Stimulus Value by Self/Other 700 to 850 ms post-stimulus



Conclusions

- **Neural value signals incorporate preference of recipient**
  - From ~500 ms after stimulus onset
  - Localized to vmPFC
  - Differential weighting of taste and health attributes
- **Brain activity differentiates recipients *before* valuation**
  - From ~300-400 ms after stimulus onset
  - Localized to Theory of Mind regions including STS
- **Interaction of stimulus value and social cognition**
  - Late value signal (700-850 ms) largest for Self
  - May reflect greater attention to own choices

➡ ***Social info represented relatively early in decision process***

➡ ***Similar neural regions involved in assigning values for others***

- Even when they have very different preferences from our own