Attention to Action Categories Shifts Semantic Tuning Toward Targets Across the Brain

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Background

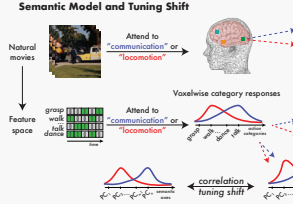
- Animate actions are represented in a network of areas in temporal, parietal, and frontal cortices [1]
- Attention modulates action representation in the motor cortex and inferior frontal cortex [2, 3]
- Attention causes broad shifts in voxel-wise semantic tuning for objects [4]

Here we investigated attentional effects in semantic representation of actions

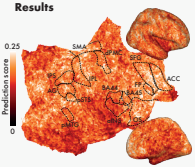
Natural Movie Stimulus

- 60 minutes of natural movies that contained 157 distinct animate action categories:
  - *Communication verbs (19):*
    "talk, smile, nod, shout..."
  - *Locomotion verbs (24):*
    "hike, crawl, walk, climb..."
  - *other verbs (114):*
    "bite, bend, catch, breathe..."
- No significant motion-energy differences between movie clips containing different types of actions ($p > 0.206$, Kruskal-Wallis test).

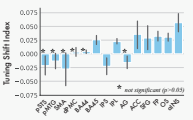
Semantic Model and Tuning Shift



Results



Most voxels in occipital, parietal, and prefrontal cortices are well predicted by the semantic model

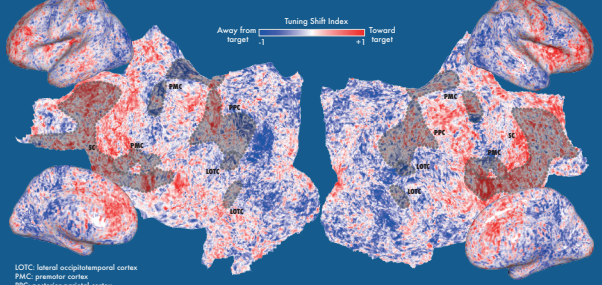


Tuning shift in early areas of the action observation network is not significant. Tuning shift is relatively high in areas that are activated during social cognition

References

1- Caspers et al., NeuroImage, 2010
2- Chong et al., NeuroImage, 2008
3- Schuch et al., Exp. Brain Research, 2010
4- Çukur et al., Nature Neuroscience, 2013

Attention modulates **semantic representation of actions** across many cortical areas, within and beyond the action-observation network



LOTC: lateral occipitotemporal cortex
PMC: premotor cortex
PPC: posterior parietal cortex
SC: social cognition

take a pic to download the abstract, poster and contact info

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