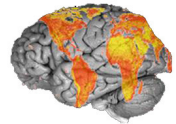




Neural basis of social perception of a human versus virtual human



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Introduction

- Virtual humans, or animated, interactive agents, are becoming ever prevalent in business, education, and research settings.
- While all of these domains rely on a social component between the virtual human and the person with which it is corresponding, there is still limited evidence as to how humans socially relate to virtual humans.

- Previous fMRI studies comparing neural responses to real and virtual humans during passive viewing showed heightened activation in STS and MPFC only in the human conditions, suggesting increased neural processing in social cognition regions for real relative to virtual humans (Han et al., 2004; Mar et al., 2007).

- However, it remains unknown to what extent social interaction with a virtual human affects neural responses to real and virtual humans.

Questions

- How does social interaction with a virtual human affect neural responses to a real and virtual human?

Hypothesis

We predicted that social interaction with a virtual human would result in increased neural response to both a real and virtual human during emotion attribution.

References

Han, S., Jiang, Y., Humphreys, G. W., Zhou, T., & Cai, P. (2004). Distinct neural substrates for the perception of real and virtual visual worlds. *NeuroImage* 24(3): 928-935.

Mar, R. A., Kelley, W. M., Heatherton, T. F., & Macrae, C. N. (2007). Detecting agency from the biological motion of veridical vs animated agents. *Social Cognitive and Affective Neuroscience* 2: 199-205.

Methods


Participants

- No social interaction condition: 14 participants (9 female; mean age = 25.9, SD = 7.0)
- Social interaction condition: 14 participants (8 female; mean age = 25.9, SD = 4.4)

2 x 2 design 2 conditions:

No social interaction	Social interaction
Standard instructions given by a human experimenter	Virtual human acts as experimenter, asking questions, explaining task, and reviewing MRI safety information.

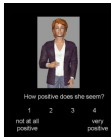
2 stimuli:




Images of human and virtual human, matched for affect, position, and luminosity.

fMRI task

- Images of human and virtual stimuli
- Rated from 1-4 on positivity
- Same task for social interaction and no social interaction conditions




Block design

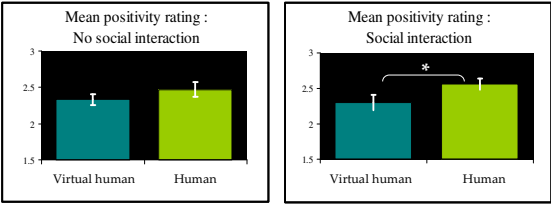


fMRI parameters

- 3T Siemens Trio
- TR = 2000ms
- TE = 25ms
- 34 slices
- 3mm slice thickness (no gap)
- FOV = 20mm
- P < 0.005, 5 voxel extent threshold
- Preprocessing and analysis in SPM2



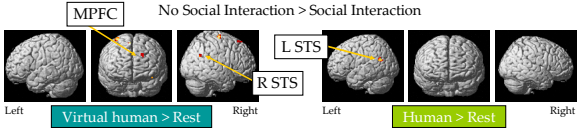
Behavioral Results



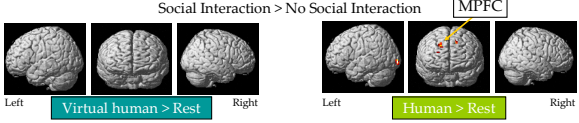
*paired t-test, $p = .0061$

fMRI Results

No Social Interaction > Social Interaction



Social Interaction > No Social Interaction



Discussion

- People perceive emotions in virtual humans and humans with equal ease prior to a social interaction, largely relying on the same network of STS and MPFC.
- After social interaction, people perceive humans as more positive relative to virtual humans.
- Social interaction with a virtual human led to increased activation within MPFC when attributing emotions in a real, but not virtual, human.

Acknowledgments

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