
Interactions between motor and emotional resonance investigated with a humanoid robot

Thierry Chaminade^{*†1}

¹CNRS UMR 7289 Aix Marseille University (INT) – CNRS : UMR7289 – Campus Santé Timone 27,
Boulevard Jean Moulin 13385 Marseille cedex 05, France

Abstract

Humanoid robots, because they have a generic anthropomorphic form but lack human fine-grained details, are useful tools to investigate the neural bases of human social cognition. Here we describe an fMRI experiment in which behavioural and neural responses to a humanoid upper torso displaying expressions of happiness, anger and disgust or the emotionally neutral condition speech, were compared to human expressions of the same emotions while participants were required to judge either the emotional or the motion content of the videos. Increased response for robot stimuli in the occipital and posterior temporal cortex suggests increased visual processing when perceiving a mechanical anthropomorphic agent. In contrast activity in areas involved in emotional or motor resonance specific to the perceived action, as the insula for disgust or left Broca's area for speech, is reduced when actions are depicted with the humanoid robot. Finally, activity in regions generally involved in motor resonance in the ventral premotor and inferior frontal gyrus display different effects of the agent used to display the action and of the characteristic of the stimulus being judged. While activity in the ventral premotor is not affected by the task or the agent, activity in the more anterior Brodmann areas 44 and 45 is influenced by both experimental factors, supporting complex interactions between visual information and the object of attention in motor resonance. Altogether, these results are informative as to the features influencing the different areas involved in action perception.

^{*}Speaker

[†]Corresponding author: tchamina@gmail.com