The anthropocentric brain: the human mirror system identifies the meaning of an action, and responds both to the sight of humans and robots performing complex actions

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In humans and monkeys the mirror system transforms seen actions into our inner representation of actions. Here we asked if this system responds also if we see an industrial robot perform similar actions. We localised the motor areas involved in the execution of hand actions, and then presented movies of humans or robots performing either impoverished actions (repeatedly grasping a cylinder), or complex actions (e.g. opening a bottle). We contrasted these movies against the sight of a static effector (hand or pincer) or this effector moving in the absence of an object. We found the mirror system (inferior parietal lobule and ventral premotor cortex) to be activated both by the sight of humans and robots performing the complex but not the impoverished, stereotyped actions. This data suggests that the mirror system is representing the *meaning* of the actions. If this meaning is too impoverished , and stereotyped, the mirror system seizes to interpret this meaning, resulting in minimal activations. This might explain why some studies, using stereotyped actions, fail to find evidence for a premotor involvement in the perception of actions.
The vision of a robot performing complex actions produced strong activations suggesting that if the actions performed by a robot have a rich meaning, these actions are interpreted in terms of our own, human actions.
The sight of a static human hand activated mirror areas. This suggests that a static hand is interpreted in terms of its potential actions, emphasising the importance of a careful choice of control stimuli.

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