

View-Based Encoding of Actions in Mirror Neurons of Area F5 in Macaque Premotor Cortex

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* Mirror Neurons:

A mirror neuron is a neuron that fires both when an animal acts and when the animal observes the same action performed by another. Thus, the neuron "mirrors" the behaviour of the other, as though the observer were itself acting

* Macaque Premotor Cortex:

An area of brain in Macaque monkeys where mirror neurons are found

The Experiments

- * Naturalistic vs. Filmed actions

It explored the similarity between neuron activity when the action was done in front of the monkey vs. when a movie was shown.

- * Tuning with respect to Point of view

It explored the view dependence of the neuron activity when a movie stimuli was shown

Results: Naturalistic vs. Filmed actions

Motor execution

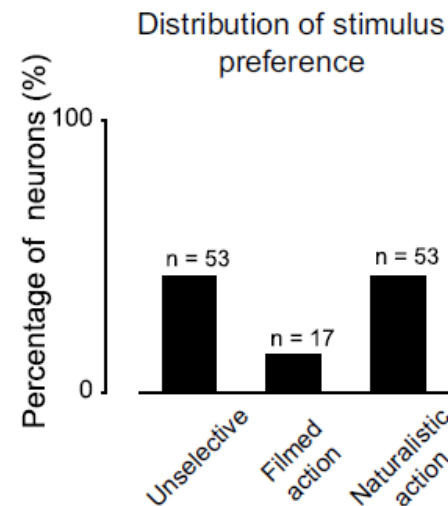
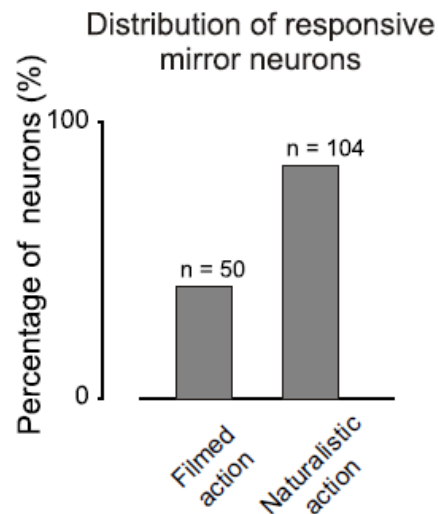
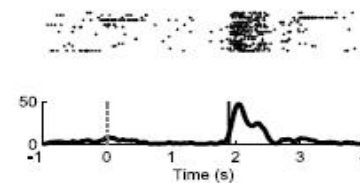
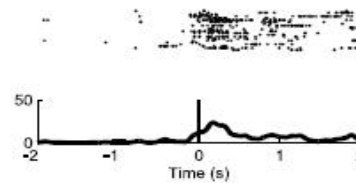
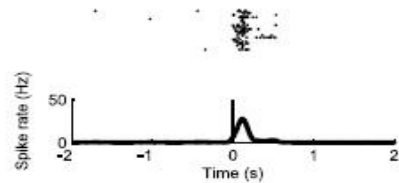
Observation

Naturalistic action

Filmed action



Neuron 1



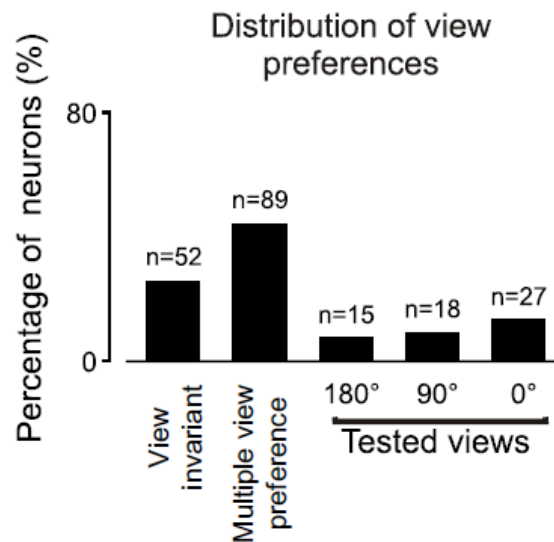
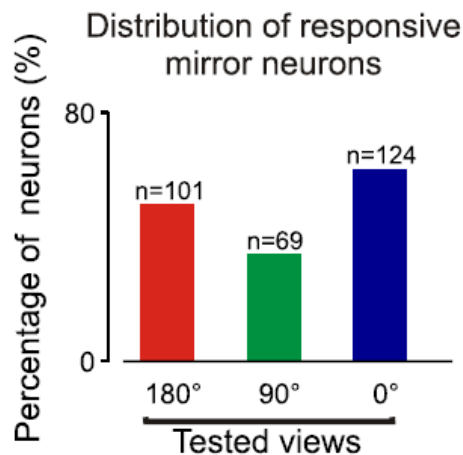
Response
Pattern :

Results: Tuning with respect to Point of view

Frontal View
180°

Side View
90°

Subjective View
0°



Inferences

- * Majority of the mirror neurons were modulated by the view from which acts were observed.
- * Some models assume a hierarchy in perception which is consistent with view invariant mirror neurons.
- * To interpret view dependent mirror neurons, there are two main theories.

Inferences

- * First theory suggests that view invariance is established not only by higher order areas but also has contribution from F5 area by pooling responses.
- * Alternatively, these areas may be helping in visual perception of observed actions by back projections to higher order areas.

References

- * View-Based Encoding of Actions in Mirror Neurons of Area F5 in Macaque Premotor Cortex

by Vittorio Caggiano, Leonardo Fogassi, Giacomo Rizzolatti, Joern K. Pomper, Peter Thier, Martin A. Giese and Antonino Casile

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Thank You