



Neuroscience 2015

[Print this Page for Your Records](#)

[Close Window](#)

Control/Tracking Number: 2015-S-15681-SfN

Activity: Scientific Abstract

Current Date/Time: 7/7/2015 8:32:07 AM

Mirror neurons respond to the observation of intransitive actions

AUTHOR BLOCK: *V. PAPADOURAKIS^{1,2}, V. RAOS^{1,2};

¹Univ. of Crete Med. Sch., Iraklion, Greece; ²Inst. of Applied and Computat. Mathematics, Fndn. for Res. and Technol. - Hellas, Iraklion, Greece

Abstract:

According to the original description by Rizzolatti and colleagues, the prerequisite of triggering the discharge of mirror neurons (MNs) is the interaction of the hand with an object. On the other hand, several studies reported that the MN system in humans can be activated also by non object-directed (intransitive) movements. This difference between human and monkey MN systems has been considered to reflect an evolutionary step. A recent study reported that 73% of MNs recorded were responding to the observation of a pantomimed action, but no other data were provided. Moreover, neuroimaging studies in monkeys revealed that observation of intransitive actions activates the ventral premotor area F5.

To resolve this discrepancy MNs were recorded from ventral premotor area F5 while the monkeys observed transitive and intransitive actions. Initially, the monkeys were trained to reach for and grasp 3D objects with the appropriate grips. At the beginning of each trial, a LED above the selected object turned on and the monkey had to fixate it and press a key. Following a fixation period, a dimming of the LED signaled the onset of the reach-to-grasp movement. The monkey had to reach for, grasp, pull and hold the object while fixating it until the extinction of the LED cuing its release. Then, the monkeys were trained to observe the experimenter employing the same object-directed reaching-to-grasp actions, as well as an out-reaching non-goal-directed movement with extended wrist and fingers towards the location where the object was placed during the transitive actions, while maintaining its gaze straight ahead. During observation, no cuing LED was visible to the monkey and the experimenter was getting instructions on a screen out of the monkey's view. The experimenter was standing next to the animal on its right side, and both reaching and grasping components of his movement were visible to the monkey.

Out of the 216 MNs recorded, 197 responded to the observation of both transitive and intransitive actions. The discharge to both transitive and intransitive actions initiates with movement onset. The response peak occurs around 70% and 50% of the movement duration for transitive and intransitive actions, respectively. Furthermore, discharge rate for the intransitive actions is 30% and 10% lower than the response to the preferred and not-preferred transitive action, respectively. Finally, responses elicited by intransitive movements, last 60% less than those evoked by transitive ones.

These results resolve the long lasting discrepancy on the stimuli triggering the monkey and human MN systems and dictate a reevaluation of the mechanism through which their functions are sub-served.

:

Presentation Preference (Complete): No Preference

Linking Group (Complete): None selected

Theme and Topic (Complete): D.05.d. Sensorimotor transformation: Neurophysiology ; D.17.j. Cortical planning and execution: Neurophysiology

Keyword (Complete): action observation ; ventral premotor cortex ; single neuron recording

Support (Complete):

Support: Yes

Grant/Other Support: : ITET 14TUR OBSERVENEMO

Grant/Other Support: : BIOSYS (KPHΓΙΣ)

Grant/Other Support: : METR (ΑΡΙΣΤΕΙΑ II)

Grant/Other Support: : LATSIS FOUNDATION

Finalized Abstracts : Finalized

Status: Finalized

[Oasis Helpdesk](#)

Powered by [OASIS](#), The Online Abstract Submission and Invitation SystemSM

© 1996 - 2015 [Coe-Truman Technologies, Inc.](#) All rights reserved.

