

Abstract Submission

Authors

Demetrio Ferro^{a,b}, Anna Rifé Mata^{a,b}, Tyler Cash-Padgett^c, Maya Zhe Wang^c, Benjamin Hayden^c, Rubén Moreno Bote^{a,b}

^aCenter for Brain and Cognition, Universitat Pompeu Fabra, 08002 Barcelona, Spain;

^bDepartment of Information and Communication Technologies, Universitat Pompeu Fabra, 08002 Barcelona, Spain;

^cDepartment of Neuroscience, Center for Magnetic Resonance Research, Center for Neuroengineering, University of Minnesota, Minneapolis, MN55455, USA;

Title

Is your gaze your aim? Eye position in reward gambling and the role of OFC in encoding the value of visually cued offers.

Abstract

Neural cells in frontal brain areas have been widely shown to be involved in high level cognitive control functions. Crucial to the understanding of their function is the investigation of how the neural spiking relates to the processing of sensory features of external stimuli bound in abstract entities of goal-directed relevance. At the cognitive level, the stimuli information coding, processing and maintenance is supposed to be achieved through working memory mechanisms, largely associated to the integration of cognitive variables for the selection and achievement of alternative goals. For decision making tasks with reward gambling and sequential reward offer cues presentation, neurons in the orbito-frontal cortex (OFC) have been associated with the coding and maintenance of the estimated value of a firstly presented offer expected value (EV) so that it could be compared with the estimated value of a later presented one. Importantly, it is yet to be assessed what is the role of sensory offer cues and their features, such as the spatial location and temporal order of offer cues presentation in neural firing. Our research aim is to combine the analyses of the role of task variables such as gambling probability and reward sizes with eye movement behavior and neural spiking activity simultaneously recorded in OFC during the execution of a two-alternative gambling task with sequential visual offer cues presentation. Interestingly, we report that eye movements consistently fell within the visual screen side with best offer expected value, thus showing how eye position is possibly providing a fine readout of actual best guess. Surprisingly, we find strongest evidence for this behavior after offers presentation, despite the subjects were left with blank screen and free to direct gaze at their will. The subjects most frequently reached the side of best offer consistently soon after the first offer presentation and, more remarked, soon after the second offer presentation. Lastly, we investigated the role of cells in OFC, revealing how a significant portion of cells shows linear tuning in their firing rate with respect to offer features. In particular, we report that cells showed spatial selectivity to the side of offers presentation, to the order of offers with different values, and to the value of rewards achieved in previous trials.