

Similar behavior between POMDP and humans, and failure of the model-free method based on previous rewards suggests a mechanism of action selection based on reasoning about others' intention instead of solely looking at the resultant reward of each action in complex social decision making tasks among humans.

[POSTER # 75]

ENCODING AND DECODING OBTAINED AND FORGONE OUTCOMES IN THE MEDIAL PREFRONTAL CORTEX

Doris Pischedda ^{a,b}, Giorgio Coricelli ^{a,c}, Stefano Palminteri ^{d,e}

^a Center for Mind/Brain Sciences - CIMEC, University of Trento, 38123 Mattarello, Italy

^b NeuroMI - Milan Center for Neuroscience, 20126 Milan, Italy

^c Department of Economics, University of Southern California, 3620 Los Angeles, CA, USA.

^d Laboratoire de Neurosciences Cognitives, Institut National de la Santé et de la Recherche Médicale, 75005 Paris, France

^e Département d'Études Cognitives, École Normale Supérieure, 75005 Paris, France.

In everyday life, we are constantly confronted with decisions. Usually, we can only experience the consequence of the decision we made and not of alternative decisions we could have made. However, knowing this additional information has a positive effect on learning. While the cognitive and neural mechanisms underlying actual outcomes processing when only information about the outcome of the selected option is available are well studied, the mechanisms subserving the encoding of foregone outcomes when the relative information is also provided, have been less investigated. In this study, we explored the neural substrates of both actual and foregone outcomes when either partial or complete information about the outcomes is provided.

Twenty-eight participants performed a probabilistic instrumental learning task while undergoing fMRI scanning. On each trial, they had to choose between two symbols probabilistically associated with a certain reward (or punishment). At the end of the trial, the outcome of the decision was shown. Importantly, on half of the trials participants received feedback only about the outcome of the decision they made, while in the other half they were informed about both the actual and the alternative outcome. We used univariate as well as multivariate methods to explore outcome value encoding for both actual and foregone outcomes, in trials with either complete or partial outcome information. Furthermore, we assessed the neural code by which value is represented in these different conditions.

Our results show that: 1) not only factual but also foregone outcomes could be decoded from neural patterns of brain activity, 2) both multivariate and univariate effects differ between regions along the dorsoventral axis of medial PFC, 3) univariate effects also differ between conditions, and 4) outcome value is represented with a fully-adaptive code in complete information trials, while in partial information trials it is represented with a partially-adaptive code. These findings suggest the presence of multiple adaptive-coding mechanisms flexibly activated in different choice settings.