Decision Making

Monday, Jun 18: 2:45 PM - 4:00 PM
Oral Sessions
Monday - Oral Session

Presentations

1597: Perceptual learning supports the bias in future value-driven decisions

2:45 PM - 2:57 PM
Reinforcement learning can bias decision-making towards the option with the highest expected outcome. This effect is well described by cognitive learning theories and associated with the constant tracking of stimulus values in prefrontal cortex, as well as, the careful evaluation of choice outcomes in the striatum. Nevertheless, at the onset of each decision, we often begin with the processing of incoming sensory information, and to date, far less is known about the interplay between learning and perception. In this study, we recorded fMRI from a probabilistic learning experiment using faces to evaluate two questions (Figure 1, Design). First, we examined how trial-by-trial BOLD fluctuations in perceptual regions relate to the tracking of differential value, or the evaluation of choice outcomes. Second, we focused on the importance (or relevance) of perceptual regions in the correct prediction of future value-based decisions, alongside the striatum and prefrontal cortex.

Presenter

Sara Jahfari, Spinoza Centre for Neuroimaging

1581: Decisions to explore are preceded by increased baseline arousal

2:57 PM - 3:09 PM
Adaptive gain theory (AGT) posits that switches between exploration and exploitation are arbitrated by a norepinephrine-based arousal system that responds to changes in the expected utility of selecting an action (Aston-Jones and Cohen, 2005). Recent studies suggest that the activity of this norepinephrinergic system can be assessed by measuring pupil diameter (Joshi et al., 2016). Here we tested key predictions of the AGT: 1) Exploratory choices are preceded by higher pre-stimulus baseline arousal and activity increases in brain areas associated with value-based decision-making 2) The relationship between pre-stimulus baseline arousal and exploration holds even when controlling for the estimated option values on exploration. 3) Pre-stimulus baseline arousal is influenced by estimated option value differences. 4) Increases in pre-stimulus baseline arousal are linked to increases in neural activity in anterior cingulate cortex (ACC) during explore vs. exploit choices.

Presenter

Anjali Raja Beharelle, SNS Lab, University of Zurich

1493: Regulating negative emotions affects dietary choice via modulation of value signals in vmPFC

3:09 PM - 3:21 PM

Many people eat specific foods to distract themselves from, or cope with, negative affect such as stress, anxiety, or fear, (1,2,3). Most such "comfort" foods are indulgent, sweet, carbohydrate- and fat-rich and therefore provide immediate satisfaction. Notably, negative emotions can also increase the salience of immediate, concrete goals and thereby increase the preference for indulgent foods (4). Such dietary choices are difficult to control and can have severe consequences for people's health. One intriguing countermeasure, however, could be to improve one's emotion regulation. In this study, we tested whether down-regulating emotional responses to negative images leads to less unhealthy subsequent food choices. We further investigated how emotion regulation interacts with the brain's valuation and decision-making circuitry during decision-making using functional magnetic resonance imaging (fMRI).

Presenter

Carmen Morawetz, Freie Universität Berlin

1586: Neurocomputational mechanisms underlying motivational biases in perceptual decision-making

3:21 PM - 3:33 PM

Desires and wants exert a powerful influence on how people make judgments and decisions (Braver et al., 2014). For example, ambiguous information is likely to be interpreted favorably, and desirable events are judged as more likely than unfavorable ones (Hughes & Zaki, 2015; Sharot et al., 2011). Such motivational biases can lead to irrational decisions that are not grounded in reality. Here, we adapted a perceptual decision-making paradigm to study the underlying cognitive and neural processes.

Presenter

Yuan Chang Leong, Stanford University

2929: Classification of collaboration and competition with different reasoning orders using fMRI data

3:33 PM - 3:45 PM

Searchlight-based multivoxel pattern analysis (MVPA; [1-3]) has been applied to decode representative patterns classification of competition and collaboration [4, 5]. To our knowledge, there is no previous attempt to investigate the neuronal substrates of competitive and collaborative social interactions across two reasoning orders. We hypothesized that the competitive (CP) and collaborative (CB) decision-making processes as well as the reasoning orders can be classified using the multivoxel patterns.

Presenter

Dong-Youl Kim, Korea University

1577: Transforming brain signals related to value evaluation and self-control into behavioural choices

3:45 PM - 3:57 PM

There are two processes in determining the behavioural choice during intertemporal decision making(McClure et al., 2004; Kable and Glimcher, 2007; Figner et al., 2010): 1) value evaluation process and 2) self-control process. Activity in the ventral medial prefrontal cortex (vmPFC) and striatum may be implicated in the value evaluation process(Kable and Glimcher, 2007). The dorsolateral prefrontal cortex (dlPFC) is considered important in the self-control process(Figner et al., 2010; van den Bos et al., 2015). The main effect of choice (i.e., choosing long-term rewards versus choosing short-term rewards), however, fails to reach significance in these brain regions in previous studies (McClure et al., 2004; Kable and Glimcher, 2007; Monterosso et al., 2007; Hare et al., 2014; Jimura et al., 2017). Multi-voxel pattern analysis (MVPA) takes into account the spatial patterns of voxels' activity to examine what information they express jointly(Cohen, et al. 2017,Nature Neuroscience). We hypothesized that these brain regions of interest (ROI) guide human behavioural choices during intertemporal decision making through spatial patterns of activity of multiple voxels.

Presenter

Rujing Zha, USTC