

## **Imagining what was there: looking at an absent offer location modulates neural responses in OFC**

When making choices, we allocate our fixations to each contemplated option, and tend to look longer at more valued ones<sup>1-5</sup>. The purpose of fixation during choice remains unknown. Here we examined behavioral and neural activity of rhesus macaques (*Macaca mulatta*) performing a two-options risky choice task in which offers occurred in sequence, each followed by a long (600 ms) blank screen delay period. As expected, we found that subjects allocated their gaze towards offer presentation locations and spent more time looking at the most valuable offers; after factoring out value, we found that more looking time was devoted to the chosen offer. Surprisingly, we found the same pattern before choice execution when the screen was blank: subjects spent more time fixating to the locations where valuable offers had occurred. Moreover, we found that neural encoding of the offers' expected values in orbitofrontal cortex (OFC) is modulated by eye position even when the screen is blank. Specifically, when gaze is directed to a former offer location, its value is more strongly encoded in OFC, while the encoding of the alternative offer value is suppressed. The same modulatory effects by gaze on value encoding are observed later in the trial when monkeys were supposed to report their choice while both offers were presented simultaneously. Our results provide evidence that eye position reflects an internal deliberation process that modulates the encoding of imagined content, providing a new window to study the hidden dynamics of decision-making.

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