Neural Evidence of Good-based Economic Choice under Varying Action Costs

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Previous work indicated that economic decisions can be made independently of the visuomotor contingencies of the choice task (in goods space). However, when action costs vary, the brain might first compute the "stimulus values" then combine them with action costs into “action values” once the action to retrieve each offer is revealed. Alternatively, the brain might integrate action costs with other determinants of value in an abstract representation, a decision would then be made by comparing these abstract decision values. To test these two competing hypotheses, we recorded from the orbitofrontal cortex (OFC) while monkeys chose between two offers with different action costs. We also dissociated in time the offer and the presentation of the saccade targets associated with them. We discovered that the animal’s choice can be predicted from the activity of chosen juice and chosen cost neurons in the OFC well before target presentation, suggesting that economic decisions can indeed be made in goods space even when action costs vary. Furthermore, a sizable number of OFC neurons integrate juice quantity, taste and action costs immediately after offer presentation. These results support the hypothesis that good-based decisions generally take place within the OFC.

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