Comment on "In Monkeys Making Value-Based Decisions, LIP Neurons Encode Cue Salience and Not Action Value"

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Comment on “In Monkeys Making Value-Based Decisions, LIP Neurons Encode Cue Salience and Not Action Value”

William T. Newsome,* Paul W. Glimcher, Jacqueline Gottlieb, Daeyeol Lee, Michael L. Platt

Leathers and Olson (Reports, 5 October 2012, p. 132) draw the strong conclusion that neurons in the monkey lateral intraparietal (LIP) cortical area encode only cue salience, and not action value, during value-based decision-making. Although their findings regarding cue salience are interesting, their broader conclusions are problematic because (i) their primary conclusion is based on responses observed during a brief interval at the beginning of behavioral trials but is extended to all subsequent temporal epochs and (ii) the authors failed to replicate basic hallmarks of LIP physiology observed in those subsequent temporal epochs by many laboratories.

Leathers and Olson (1) draw the strong and broad conclusion that neurons in the lateral intraparietal area (LIP) of the monkey cortex encode cue salience, and not action value, during value-based decision-making. We compliment the authors on a nicely conceived study. Their data clearly suggest that the LIP neurons they studied encode cue salience during a transient 250-msec interval immediately after cue onset. This finding, which extends previous observations (2), is important and worthy of future study.

We are troubled, however, by two aspects of the paper: (i) the authors’ sweeping dismissal of action-value encoding during subsequent temporal epochs of behavior and (ii) the authors’ failure to replicate several delay-period effects, including action value, that have been extensively documented in numerous studies of LIP from many laboratories.

Our laboratories and others have repeatedly observed action-value signals during delay periods subsequent to initial transient responses, an epoch only fleetingly addressed by Leathers and Olson. In some studies, the reward value of alternative actions was indicated by features of visual stimuli presented on individual trials (3–10), whereas in others the animals estimated the reward value of alternative actions from choice and reward histories over multiple trials (11–18). Leathers and Olson dismiss these reports because of their own observation of cue salience.

In the reports cited above, action-value signals in LIP typically comprise modulations of the differential activity levels associated with one or the other planned saccade. Given the paucity of differential, saccade-related delay-period activity in the authors’ data, it is unsurprising that they failed to observe action-value signals: no “action,” no “action value.”

Despite our current skepticism, we are open to being convinced. We would be more intrigued, for example, had the authors been able to replicate the well-documented LIP action-value effects during the delay period of their task and then shown how cue salience at the beginning of the trial does, or does not, affect putative action-value signals during subsequent epochs. Given the current data, however, we see no basis for the authors’ sweeping conclusion that their results are not compatible with “the idea that LIP neurons represent action value.”

References
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