The neuronal basis of biases

ABSTRACT:

Background
Goal-directed behavior often requires integrating current sensory information with the prior history of stimuli, actions and outcomes. However, if the past is uninformative for the task at hand, using prior history can induce disadvantageous behavioral biases.

Aims
Study the dynamics and neuronal basis of sequential biases in decision-making.
Study the neuronal representation of biases in the prefrontal cortex of non-human primates.
Testing a sequential-processing theory of decision making and its link to biased behavior.

Method
Experiments with highly-trained monkeys performing a motion direction discrimination task, as well as analysis of existing datasets.

Results
Here, we report the existence of history-dependent choice biases in highly-trained monkeys performing a motion direction discrimination task where only the current stimulus was behaviorally relevant. The observed biases fluctuated at two separate time scales: slow, spanning tens to hundreds of trials, and fast, involving variables from the previous trial. These biases were predictive of upcoming choices, and more so on trials with weak stimuli.
We found that pre-stimulus activity of neuronal ensembles in prearcuate gyrus represented biases and was also predictive of the monkey's upcoming choices. We show that similar axes in the neural population state space represent both bias and choices.

Conclusions
Further, biases are incorporated into the decision-making process as an offset of baseline activity along the decision axes that persists throughout the integration process of sensory evidence.

Keywords
Decision-making, Biases, Neuronal population, Brain

Published Work:

Mochol, G., Kiani, R., & Moreno-Bote, R. (2021). Prefrontal cortex represents heuristics that shape choice bias and its integration into future behavior. *Current Biology*, *31*(6), 1234-1244. doi: 10.1016/j.cub.2021.01.068

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