

## **Reconsidering the neural representation of action-value - Are we regularly finding the neural representations of the wrong variables?**

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**Abstract.** Many studies have reported that neurons in the striatum (a brain area that has been implicated in learning and decision-making) represent a decision-related variable called 'action-value'. My talk will begin with our scientific finding that the conclusions of these studies are likely the result of a confound in the statistical analyses - temporal correlations in the neural data may be erroneously interpreted as action-value representations. This finding suggests that the general belief that striatal neurons represent action-value should be reconsidered. Further, it brings forth a general conceptual question, namely - what evidence is required to conclude that we have found the neural representation of action-value?

In the second part of my talk, I present a popular philosophical view of neural representation, the teleosemantic view, which posits that a representation includes both a correlation and the function of correlating with the represented feature. Then, I show that according to this view, even a true correlation between neural activity and action-value does not imply action-value representation. This is because another component is necessary - function. Using other examples, I show that this issue generalizes to many other neural representations, even though in the scientific literature correlations are often taken to imply representation. Finally, I discuss the implications of the dissonance between this popular philosophical view and neuroscientific practice.