

## **The Stuff of Thought: Investigating the Mechanisms of Cognition by Linking Neurotechnology and Neuromedicine**

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Cognitive functions are supported by a distributed brain network. Little is known about how the cognitive brain hubs represent and interpret sensory information to give rise to intelligent, goal-directed behavior. I will report recent work combining multi-site recordings from large populations of individual neurons in the prefrontal and parietal association cortex that provide a window into the mechanisms that underlie working memory, filtering of distracting information, and decision-making. In particular, I will highlight novel, translational approaches taken by our laboratory to bridge the gap between animal and human studies of cognitive functions. Emerging new technologies for the measurement and analysis of neuronal signals directly from the human brain with unsurpassed spatial and temporal resolution will significantly advance our understanding of high-level cognition and generate disruptive changes in the way we diagnose and treat disorders of mental health.

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## **Cognitive Neurorobotics Study Using Predictive Coding and Active Inference**

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The focus of my research has been to investigate how cognitive agents can acquire structural representation via iterative interaction with the world, exercising agency and learning from resultant perceptual experience. For this purpose, my group has investigated various models analogous to predictive coding and active inference frameworks for more than two decades. This talk attempts to clarify underlying cognitive and mind mechanisms for compositionality, social cognition, and consciousness from analysis of emergent phenomena observed in our recent robotics experiments using the frameworks.

### References

(1) Tani, J. (2016). "Exploring Robotic Minds: Actions, Symbols, and Consciousness as Self-Organizing Dynamic Phenomena.", Oxford University Press.

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