

## Computational Principles Underlying the Learning of Sensorimotor Repertoires

Daniel Wolpert

Zuckerman Mind Brain Behavior Institute, Columbia University, New York, USA

Humans spend a lifetime learning, storing and refining a repertoire of motor memories appropriate for the multitude of tasks we perform. However, it is unknown what principle underlies the way our continuous stream of sensorimotor experience is segmented into separate memories and how we adapt and use this growing repertoire. I will review our work on how humans learn to make skilled movements focusing on the role of context in activating motor memories and how statistical learning can lead to multimodal object representations. I will then present a principled theory of motor learning based on the key insight that memory creation, updating, and expression are all controlled by a single computation – contextual inference. Unlike dominant theories of single-context learning, our repertoire-learning model accounts for key features of motor learning that had no unified explanation and predicts novel phenomena, which we confirm experimentally. These results suggest that contextual inference is the key principle underlying how a diverse set of experiences is reflected in motor behavior.