

The development of flexibility and the prefrontal cortex: Computational and behavioral investigations

Yuko Munakata

One of the hallmarks of "higher" intelligence is the ability to act flexibly and adaptively, rather than being governed by simple habit. The prefrontal cortex appears to be critical in such flexible behavior. This talk will present computational and behavioral studies exploring the potential role of the prefrontal cortex in flexibility as it develops. Children often demonstrate a lack of flexibility by perseverating, repeating prepotent or habitual behaviors when they no longer make sense. Neural network models simulate such perseveration (and eventual success) in terms of a competition between active representations maintained in prefrontal cortex, and latent representations elsewhere. Interestingly, even as children persevere with their previous responses, they indicate through other behaviors that they may have some awareness of the correct response. Such dissociations across behaviors are also observed in adults with prefrontal damage, as well as in non-human primates. Models produce these dissociations due to the gradedness of representations, and lead to novel behavioral predictions.