

Title: NEURODEVELOPMENTAL TIMING OF SOCIAL LEARNING IN MICE

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Observational learning constitutes a key feature in the evolution of mammals, including mice. Unlike trial-and-error learning strategies, observational learning provides a safer and efficient way for knowledge acquisition. It involves an Observer (OBS) witnessing a Demonstrator's (DEM) behavior, allowing the OBS to detect the action-outcome relationship avoiding risks of wrong choices. Despite previous studies reported this ability in mice, it remains unclear how it emerges and evolves during development on behavioral and neurobiological levels. In this study, we investigate how observational learning evolves across development in mice and how the social propensity of a demonstrator shapes it.

Using a food-sharing task, mice at post-natal-day (PND) 45 and 60 acted as observers witnessing adult demonstrators exhibiting either prosocial or selfish tendencies. After observation, PND45 and PND60 mice were tested as performers in the same task. Procedural learning was quantified by the total number of task responses, while the social coherence was captured by a Learning Index. We found a positive correlation between the demonstrator's prosociality and observers' Learning Index, suggesting that the prosocial tendencies of the model act as an enhancer of social coherence.

We found that the social preference of demonstrators exerts a differential effect across developmental stages, with PND45 mice showing increased susceptibility to selfish models, whereas PND60 mice were more influenced by prosocial ones.

We characterized procedural learning in observers and found that, while PND60 can learn from adults, PND45 mice successfully learn only when paired with age-matched demonstrators, suggesting a developmental constraint on cross-age social learning.

Together, these findings reveal a developmental shift in the social valence of models guiding observational learning, with selfishness exerting greater impact during early adolescence and prosociality predominating in later stages. Ongoing experiments combining automated behavioral tracking and activity-dependent neuronal tagging will investigate the neural circuits underlying these age-dependent social learning mechanisms.

(Max. 300 words)