Conclusions: The hypothesis of presence of differences in personality and in the prefrontal cortex response as a function of the D2:D4 ratio is supported by the results.

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LEARNING INDUCES THE EMERGENCE OF INDIVIDUALITY

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Similar to humans, animals within a single population exhibit consistent differences in their behavior as well as underlying brain physiology. However, the mechanisms responsible for the development of inter-individual variability in brain and behavioral patterns are not well understood. In the absence of substantial genetic and environmental variance, the emergence of individuality is attributed to the 'non-shared' components of the environment. Environmental enrichment (ENR) is widely used as an experimental paradigm to study the neurobiology of individuality as it allows animals a differential experience of the non-shared environment, augmenting small initial differences and setting them on individual life paths. We used the IntelliCage apparatus as a form of ENR to study the role of learning and experience-encoding in inducing the emergence of individualistic patterns of behavior and brain plasticity. IntelliCage is a computer-based, fully-automated home cage system that allowed us to analyze the exploratory, learning, and social behavior of 16 genetically identical mice over 60 days. For both exploratory and learning behavior, mice showed individualized behavioral trajectories that diverged over time. Mice living in IntelliCage showed significantly higher levels of adult hippocampal neurogenesis as compared to mice living in standard laboratory cages. Moreover, levels of neurogenesis correlated positively with the learning rate and learning asymptote indicating that mice with higher learning efficiency grew more new neurons. This suggests that the process of experience-encoding or learning is linked to hippocampal neurogenesis, a form of brain plasticity and the feedback loop between the two could be a driving mechanism for the individualization of the brain and consequently behavioral patterns. Therefore, we show evidence that subjecting mice to a continuum of learning tasks in an IntelliCage apparatus can act as enrichment and lead to the emergence of individuality in learning styles, behavioral patterns, and brain plasticity.

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SHORT-TERM SOCIAL DEFEAT STRESS INDUCES AUTONOMIC AND BEHAVIORAL ALTERATIONS RELATED TO OXYTOCIN NEUROTRANSMISSION IN RATS.

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Social conflicts such as aggression, social defeat, abuse, or bullying can be harmful to individuals. Oxytocin is a neuropeptide implicated in social behaviors and social stressors coping. The resident-intruder (RI) model is used to study stress-related disorders (e.g., depression), and there is evidence of autonomic alterations induced by these conflicts. Sprague Dawley and Wistar rats were used as residents and intruders, respectively, presented 10 min/ day for seven days, followed by social isolation. Intruders were treated with saline or oxytocin antagonist (L-368,899 6μg/kg ip) 30 min before RI-protocol. Thereafter, animals were tested in: Splash test (ST), forced swimming test (FST), and later cardiovascular recording through a femoral arterial catheter both in the home cage and resident's cage. The stressed group showed a decrease in body weight and weight gain ($P < 0.05$) when compared to control group at day 7 of stress, the treatment with L-368,899 reduced these parameters from day 4 ($P < 0.05$). Furthermore, stressed group and the stress + L-368,899 animals showed an increase in latency time and a reduction in the grooming time on the ST compared to control animals ($P < 0.01$). In the FST, stressed animals showed a reduction in immobility time when compared to controls ($P < 0.01$). However, the analysis of pretest vs test data showed increased immobility in the control group on test day, indicating possible learning and memory processing. Such increase was not observed in the stressed group and in the treated group. Autonomic parameters: Stress + saline and stress + L-368,899 animals only showed increased basal heart rate in the home cage compared to controls ($P < 0.05$). All groups showed increased cardiovascular parameters in the resident´s cage. Short-term exposure to social stress is enough to affect behavior and heart rate. Pharmacological manipulation of the oxytocin central system seems to induce the worst heart rate and anhedonia-like behavior, which can be related to learning/memory impairment.

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