New Research from *Psychological Science*

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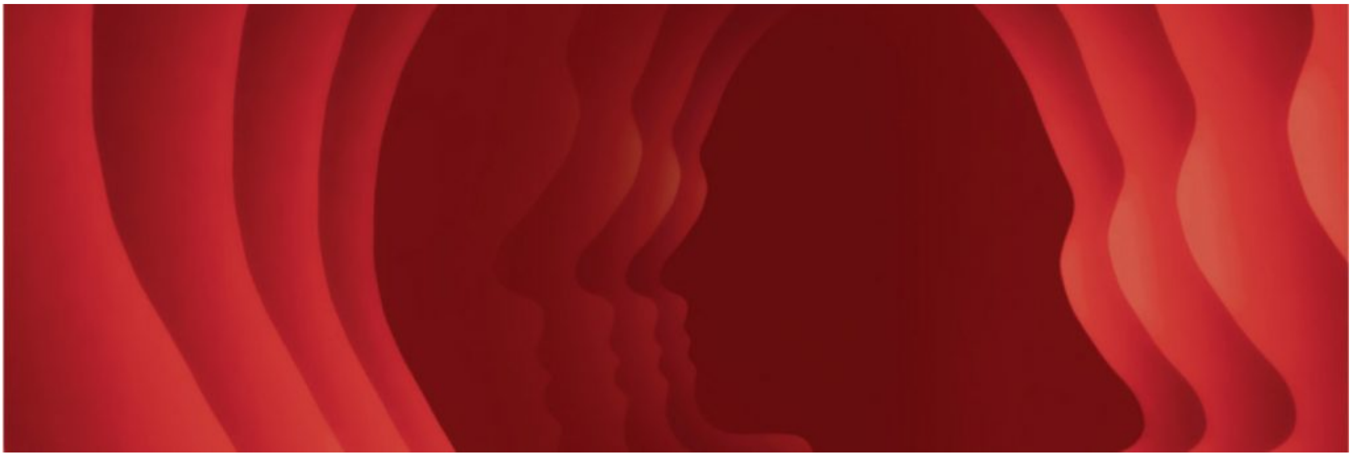

Read about the latest research in the APS flagship journal.

Poverty and Puberty: A Neurocognitive Study of Inhibitory Control in the Transition to Adolescence

Kirby Deater-Deckard, Mengjiao Li, Jacob Lee, Brooks King-Casas, and Jungmeen Kim-Spoon

Puberty is usually associated with a shift toward more risky decision-making accompanied by a slowly developing ability to exercise inhibitory control over one’s impulses. To test whether low-income environments in combination with early pubertal timing accentuate less mature inhibitory control, Deater-Deckard and colleagues tested a sample of 14-year-olds with diverse household incomes. Participants reported their pubertal development status (e.g., facial hair growth, menarche) and performed a multisource-inference (MSIT) task, in which they saw sets of three digits and pressed a button to indicate which of the digits was different. In this task, the different digit could be congruent with its location (e.g., “3” in the third position) or incongruent with its location (e.g., “3” in the second position). The researchers used the times participants took to make their decisions, their intraindividual standard deviations, and their accuracy in incongruent and congruent trials to calculate a score of inhibitory control. There were no differences in MSIT task performance for any participants. However, among participants from lower-income households, those who were more advanced in puberty had higher neural-activity scores (measured by fMRI), indicative of poorer inhibitory control. These findings are congruent with the effects of resource availability on brain development. Deater-Deckard and colleagues suggest that prevention and intervention tools to address the effects of poverty on brain development might benefit from considering the interplay of household poverty levels and pubertal development on potential deficits in inhibitory control.

Visually Entrained Theta Oscillations Increase for Unexpected Events in the Infant Brain

Moritz Köster, Miriam Langeloh, and Stefanie Hoehl

To test how unexpected events are processed in the infant brain, Köster and colleagues used rhythmic visual brain stimulation in 9-month-olds while presenting events with expected and unexpected outcomes. Rhythmic visual brain stimulation can be manipulated by the rhythm of flickering images— a flicker rate of 6 Hz and a flicker rate of 4 Hz stimulate infants' alpha and theta brain frequencies, respectively. The researchers collected electroencephalographic data while infants viewed images presented at theta or alpha frequencies of events such as a ball hitting a wall (expected outcome) or a ball passing through to the other side of a wall (unexpected outcome). Results indicated that the brain synchronization with the theta waves sharply increased for unexpected outcomes, but alpha oscillations did not differ between unexpected and expected outcomes. Because increases in theta oscillations usually accompany the processing of novel information and are involved in learning processes, Köster and colleagues propose that infants might integrate novel information provided by unexpected outcomes to learn and refine basic representations. Köster and colleagues highlight the importance of visual brain-stimulation techniques as new ways to investigate neuronal oscillation and synchronization in early brain development.

Automated Study Challenges the Existence of a Foundational Statistical-Learning Ability in Newborn Chicks

Samantha M. W. Wood, Scott P. Johnson, and Justin N. Wood

Researchers have reported that newborn chicks use statistical learning to encode the transitional probabilities (TPs) of shapes in a sequence (i.e., complex probabilities in a sequence in which one shape does not depend on the previous shape). This finding would suggest that newborn chicks have more powerful statistical-learning abilities than newborn humans, who fail to encode TPs until 5 months of age. However, Wood and colleagues show that this might not be the case when an automated experiment is used and when experimenter bias and possible error are eliminated. They exposed newborn chicks to an imprinting sequence of four animated shapes presented in an order defined by the TPs between shapes. In their second week of life, the chicks were forced to "choose" between two sequences presented on opposite walls. One sequence was defined by the same TPs as the imprinting sequence, and the other one was not. Wood and colleagues also manipulated whether the test sequences had the same shapes as the imprinting sequence. To measure chicks' choices, the researchers calculated how much time chicks spent at each wall. Chicks spent more time at a wall when the sequence had new shapes, but the TPs did not influence the time spent at a wall. These findings were replicated in a second experiment that was a closer replication of the prior studies that had shown TP learning in newborn chicks. None of the chicks showed the ability to learn TPs between sequentially presented shapes, which challenges the claim that TP-based statistical learning is present in newborn brains.