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Study findings: Achievement motivation and error processing

UM brain-behavior children's study

University of Michigan Psychology — exploring the mind

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Hello again!

This newsletter presents our findings on children's achievement motivation and error processing. Thank you very much for your participation in our research study!

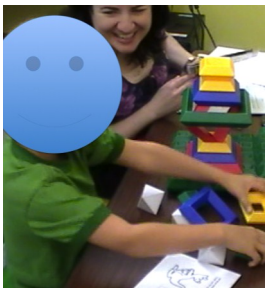
Error processing

When a child or adult makes a mistake, frontal areas of the brain are activated. Using EEG, we explored two neural "signatures" related to error processing: the error-related negativity (ERN) and the error positivity (Pe). The ERN reflects the brain's detection of an error, and the Pe reflects the person's conscious awareness of and increased attention to the mistake.

The Zoo Game

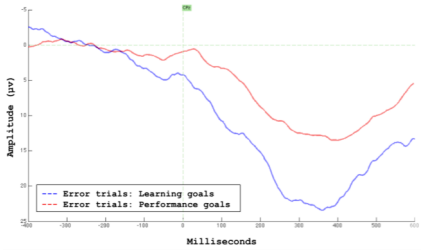
As you may remember, we recorded neural activity using EEG while your child played the Zoo Game. Your child was asked to press a button to capture the animals that had gotten out of their cages, but not to press the button when he/she saw an orangutan helper. An "error trial" occurred when the child incorrectly pressed the button for an orangutan.

Achievement goal theory



Research suggests that children have different achievement-related goals. A child has a *learning goal* when he/she is interested in learning for its own sake, or a *performance goal* when the child is mostly interested in the outcome (such as getting a good grade in school). We determined children's goals by their reactions to the challenging puzzles that they worked on.

Children with learning goals had a larger Pe (blue line dips below the red line) than children with performance goals. These children may pay particularly close attention to their mistakes and learn from them.

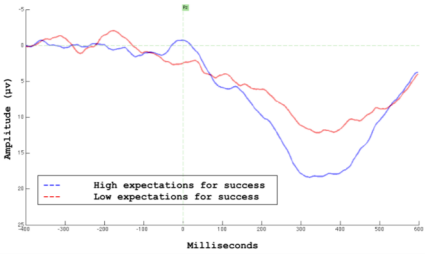


Note: Negative is plotted *upward* in these waveform graphs.

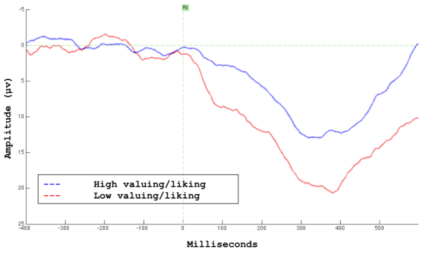
Expectancy-value theory

We also explored whether children believed they were good at puzzles, as well as the degree to which children liked and valued the puzzle task. We determined these beliefs through questions we asked using puppets.

Children with high expectations of success (i.e., children who thought they were good at puzzles) had a *larger* Pe (blue line dips below the red line). These children may devote more attention to their mistakes in order to improve or maintain performance, so that they do as well on the puzzles as they expected to.



Children who said they liked and valued the puzzles the most had a *smaller* Pe (blue line does not dip below the red line). These children may engage in less conscious error awareness, because for them, building the puzzle was more important than whether they actually built the puzzle correctly.



Summary: Researchers are still exploring ways to promote positive achievement motivation, an important psychological process related to academic and social skills. Our study shows that children's motivation is related to the error positivity (related to conscious awareness and increased attention to mistakes). We still don't know whether certain experiences or training can influence error-related neural activity. However, this study is a first step towards findings answers to these questions!