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## Eyeblink Conditioning May Help in Assessing Children With Fetal Alcohol Exposure

*Children with fetal alcohol syndrome (FAS) are extremely difficult to diagnose, as well as treat. But new research indicates that eyeblink conditioning may provide a better model for assessing and diagnosing FAS in children.*

Fetal alcohol spectrum disorder (FASD) is an irreversible disorder in children that affects the learning centers of the brain and results in cognitive and behavioral impairment in the child for life. One of the most pressing problems in studying and treating this disorder is that it is difficult to diagnose. Although the more severe form of the disorder, fetal alcohol syndrome (FAS), is characterized by a distinct set of facial features and growth retardation, the majority of lack these features, and there is no recognized diagnostic criteria that can be used to identify them.

However, a new study released in the Feb. 2011, issue of *Alcoholism: Clinical & Experimental Research*, which is currently available at Early View, has been researching this problem and found that, by using classical conditioning methods, a consistent FASD deficit has been identified.

According to Sandra Jacobson, a Professor in the Department of Psychiatry and Behavioral Neurosciences at the Wayne State University School of Medicine, Honorary Professor in the Departments of Human Biology, and Psychiatry at the University of Cape Town Faculty of Health Sciences, and lead author of the paper, the research examined whether heavy prenatal alcohol exposure has an impact on both delay and trace learning in school-age children.

The study involved pairing a tone with a puff of air into the child's eye, causing him/her to blink. The goal was to determine whether heavy alcohol exposure affected the child's ability to associate the tone with the puff, causing him or herself to blink when the tone was heard. Delay conditioning involves an overlap between the tone and the puff of air, while trace conditioning involves the more difficult task of introducing a stimulus-free interval between the tone and air puff.

"Although trace conditioning is more complex," said Jacobson, "we found that the impact of prenatal alcohol exposure on both forms of conditioning was similar in magnitude, suggesting that the alcohol effect on the cerebellar neural circuits that mediate both forms of conditioning may be responsible for the deficits seen in both tasks."

The researchers tested 63 children on delay conditioning and then returned to test 32 of the same children on trace conditioning 1.5 years later in Cape Town, South Africa, where there is a high rate of heavy drinking during pregnancy by women. Of the 34 heavily exposed children in the study, six were diagnosed with FAS and 28 were classified as heavily exposed to alcohol, but lacking the facial anomalies that characterize FAS; the remaining 29 control children were born to abstaining or light drinkers.

Only 33 per cent of those tested with FAS met criterion for delay conditioning, compared with 79 per cent for the control group. The more difficult trace conditioning task showed a similar result with 17 per cent of the children with FAS meeting the criteria for this form of learning, compared with 67 per cent for the control.

According to Claire Coles, a Professor in the Department of Psychiatry and Behavioral Science and Pediatrics at the Emory University School of Medicine, the children that were diagnosed with FASD (including the heavily exposed group) showed a significantly slower ability to process information, as well as an overall inability to meet the required criteria for eyeblink conditioning. But, it was of interest that by extending the training for some of the children who did not meet the initial criteria, a response did form, albeit impaired.

"This kind of learning or conditioning is only one aspect of memory," said Coles. "The goal of mapping out all of the learning and memory deficits that are found as a result of alcohol exposure would be of major importance scientifically and could also be the basis for the design of effective interventions."

Even with the research suggesting that eyeblink conditioning can be used to better understand how drinking during pregnancy affects brain development and help to identify alcohol-affected children, further research is needed to determine the underlying mechanisms of how alcohol affects the response to conditioning and to identify other deficits associated with FASD to improve further treatments and interventions.