

Studying everyday eye movements could aid in diagnosis of neurological disorders

August 30 2012

Researchers at the University of Southern California have devised a method for detecting certain neurological disorders through the study of eye movements.

In a study published today in the *Journal of Neurology*, researchers claim that because [Attention Deficit Hyperactivity Disorder](#) (ADHD), [Fetal Alcohol Spectrum Disorder](#) (FASD) and Parkinson's Disease (PD) each involve ocular control and attention dysfunctions, they can be easily identified through an evaluation of how patients move their eyes while they watch television.

"Natural attention and eye movement behavior – like a drop of saliva – contains a biometric signature of an individual and her/his state of [brain function](#) or dysfunction," the article states. "Such individual signatures, and especially potential biomarkers of particular neurological disorders which they may contain, however, have not yet been successfully decoded."

Typical methods of detection—clinical evaluation, structured behavioral tasks and neuroimaging—are costly, labor-intensive and limited by a patient's ability to understand and comply with instructions. To solve this problem, doctoral student Po-He Tseng and Professor Laurent Itti of the Department of Computer Science at the USC Viterbi School of Engineering, along with collaborators at Queen's University in Canada, have devised a new [screening method](#).

Participants in the study were simply instructed to "watch and enjoy" television clips for 20 minutes while their eye movements were recorded. Eye-tracking data was then combined with normative eye-tracking data and a [computational model](#) of [visual attention](#) to extract 224 quantitative features, allowing the team to use new machine learning techniques to identify critical features that differentiated patients from control subjects.

With eye movement data from 108 subjects, the team was able to identify older adults with Parkinson's Disease with 89.6% accuracy, and children with either ADHD or [FASD](#) with 77.3% accuracy.

Providing new insights into which aspects of attention and gaze control are affected by specific disorders, the team's method provides considerable promise as an easily-deployed, low-cost, high-throughput screening tool, especially for young children and elderly populations who may be less compliant to traditional tests.

"For the first time, we can actually decode a person's neurological state from their everyday behavior, without having to subject them to difficult or time-consuming tests," Itti said.

Provided by University of Southern California

Citation: Studying everyday eye movements could aid in diagnosis of neurological disorders (2012, August 30) retrieved 25 April 2024 from <https://medicalxpress.com/news/2012-08-everyday-eye-movements-aid-diagnosis.html>

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