Eye-Tracking Test Batteries: Detecting Cognitive Impairments in Diverse Populations

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In the last decade, eye-tracking technology has become significantly more advanced, allowing for greater flexibility in testing conditions. Now, subjects do not need to stay perfectly still, and wearing prescription glasses is usually not a problem. These improvements have made it possible to use eye-tracking with sensitive groups, like patients and children, to find new biomarkers for early disease detection, prognostication, and monitoring.

This presentation highlights two innovative applications of eye-tracking technology:

1. An eye-tracking test battery for identifying cognitive impairments in preterm children. This tool helps detect early signs of cognitive impairments in children born prematurely. By studying their eye movements, we can spot potential developmental delays early, allowing for timely intervention and better long-term outcomes. The test battery is designed to be engaging and child-friendly.

2. A digital neuropsychological test battery for detecting mild cognitive impairment (MCI), a precursor to dementia, in adults. This tool aims to find early signs of MCI in older adults. Eye-tracking technology can detect subtle changes in cognitive function that traditional tests might miss. Early detection is crucial for starting interventions that can slow down cognitive decline.

Both applications aim for early detection but target different groups—from infants as young as a few months to elderly adults. Each group requires unique design strategies to address their specific needs and challenges. In our presentation, we will discuss the tasks in these test batteries, their implementation, user interaction, and the impact of design flaws. We will share key findings on MCI detection and compare engagement levels between two versions of the children's eye-tracking battery, showing the importance of good task design and implementation.