

PROJECTE DE DOCTORAT INDUSTRIAL EXPEDIENT 2013 DI 072

DADES DE L'EMPRESA I DE L'ENTORN ACADÈMIC

Títol del projecte

Towards novel diagnostic methods by eye tracking

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BREU DESCRIPCIÓ DEL PROJECTE DE RECERCA

Scientific problem

Attention deficit hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders, affecting an estimated 4 to 12% of school-aged children worldwide. It is characterized by low degree of attention, high degree of hyperactivity and impulsivity, and the inability to inhibit inappropriate actions. About half of childhood ADHD continues into adulthood, causing stress in the family environment and deteriorating personal adaptation. The routine assessment of ADHD, which is based on questionnaires and developmental, physical and mental examination, has many flaws and is inaccurate. Moreover, while clear symptoms are present at 3 years of age, current diagnosis cannot be done before the age of 6 (DSM-IV/DSM-V) prohibiting early treatment, which is essential for preventing personal and social problems, and economical costs associated to ADHD.

Hypothesis

Recently we found an unpredicted but clear relation of eye vergence movements with visual attention. Vergence refers to the simultaneous movement of both eyes in opposite directions to obtain single binocular vision. When the eyes rotate towards each other (convergence) the angle of eye increases and when the eyes rotate away from each other (divergence) the angle becomes smaller. We observed that during orienting attention, the eyes briefly converge to a nearer plane, i.e. the vergence angle increases when shifting attention. We hypothesize that monitoring eye vergence can be used for the development of a biomarker of attention to detect mental disorders like ADHD at early developmental stages and in adults.



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Plan

We will carefully select healthy and ADHD participants (children and adults). ADHD patients will be rigorously re-assessed by two independent specialists (psychiatrist, pediatrician, and/or psychologist). Subjects will be tested in a psychophysical task to probe attention. Tests are customized for age and will last from 10 minutes to a maximum of 20 minutes. Images will be child friendly. During the task eye vergence will be measured via a remote binocular eye tracker that also tracks head movements, such as the Tobii T120/TX300 that have sufficient spatial and temporal resolution. The study will be randomized, controlled, and double blind. Both medicated and non-medicated patients will be tested and classified according to ADHD subtype. Results will be compared to the results obtained from normal age/sex-matched subjects.

Participating organizations

The project will collaborate with psychiatrists from the department of Health and Addiction of the Hospital of in Mataro and with people from the department Child and Adolescent Psychiatry of the hospital Sant Joan de Deu in Barcelona. They are specialized in neurodevelopmental disorders.