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AUTHORS (FIRST NAME INITIAL LAST NAME): J. L. Barbur[4], E. Llapashtica[1], D. M. Connolly[3], J. Sadler[2], T. Sun[6], K. Grattan[5]
INSTITUTIONS (ALL):
1. Division of Optometry and Visual Science, City, University of London, London, United Kingdom.
2. QinetiQ, Farnborough, Hampshire, United Kingdom.
3. Aircrew Systems, QinetiQ plc, Farnborough, Hampshire, United Kingdom.
4. Applied Vision Research Centre, City, University of London, LONDON, London, United Kingdom.
5. School of Mathematics, Computer Science & Engineering, City, University of London, London, United Kingdom.
6. School of Mathematics, Computer Science & Engineering, City, University of London, London, United Kingdom.
TITLE: THE EMAIL TEST – MEASUREMT OF INTEGRATED SACCADE LATENCY AND VISUAL PROCESSING TIMES WITHOUT EYE-TRACKING
ABSTRACT BODY:
Abstract Body: INTRODUCTION: The acquisition and processing of visual information often involve eye-movements and motor responses. Visual processing times and oculomotor parameters are of interest since fatigue as well as temporary changes in alertness caused by common drugs can also affect task completion times and overall accuracy in visual search. Eye-trackers are useful in such studies, but expensive equipment is needed and accurate measurements require careful calibration. We propose a new method to measure integrated oculomotor response parameters that is simple to carry out and does not require eye-tracking equipment. The EMAIL (Eye Movement and Intrinsic Latency) test captures parameters that describe both the time course of eye-movement generation as well as the time needed to detect and process specific object attributes at the end of each saccade.
METHODS: The test relies on measuring the time needed to detect peripheral targets, carry out an appropriate eye-movement and process some feature of the stimulus (such as colour, coherent motion, rapid flicker, spatial orientation or acuity). In this round of experiments, the stimulus was a Landolt ring flanked by distractors and presented at a randomly selected location on either side of fixation, 8^{o} in the periphery. The measurement variable is the target presentation time, δT, needed to achieve ~ 73% correct response. The subject's task is to saccade to the peripheral target, to register the gap in the central ring and to press one of four response buttons to indicate its correct orientation. Eye -tracking was added to this initial research study to separate the cortical processing time needed to detect the orientation of the gap in the Landolt ring from the integrated task completion time.
RESULTS: The results obtained so far show a significant effect of age and fatigue. Under normal conditions, measured times are in the range 160 to 270 ms. In general, δT values are longer when vertical eye-movements are involved. The greatest changes are observed in saccade latency and the cortical processing times.
DISCUSSION: The new EMAIL test provides a simple method to investigate how fatigue and other factors affect visual processing times. When combined with eye-tracking, the test makes it possible to measure changes in cortical processing times for specific stimulus attributes and may also turn out to be a useful tool to assess the severity of loss in traumatic brain injury studies.
Learning Objective 1: To learn about saccadic eye-movement latencies and visual processing times
Learning Objective 2: To investigate whether changes in oculomotor parameters can be used to assess fatigue
Learning Objective 3: To discover the extent to which saccadic latencies and visual processing times are affected by normal aging and / or fatigue
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