Detecting Mindless Gaze

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5.23.1 Abstract

Eye-tracking data contains mostly fixations, eye movements that stabilize over a stationary object of interest for a certain temporal duration [1]. Thresholds for determining fixations are arbitrary (about 100ms) and we assume that during a fixation people perceive an object meaningfully, which allows us to infer their cognitive processes [3]. This is an assumption though and the question is how often do people fixate objects ‘mindlessly’ (looking through an object or daydreaming), i.e., they fixate only the ‘syntactic Area Of Interest’ but do not relate to its semantics. It is important to detect such mindless gazes because otherwise we would incorrectly infer meaning and cognitive processes.
5.23.2 Introduction

Eye-tracking data contains mostly fixations, eye movements that stabilize over a stationary object of interest for a certain temporal duration [1]. Thresholds for determining fixations are arbitrary (about 100 ms) and we assume that during a fixation people perceive an object meaningfully, which allows us to infer their cognitive processes [3]. This is an assumption though and the question is how often do people fixate objects ‘mindlessly’ (looking through an object or daydreaming), i.e., they fixate only the ‘syntactic Area Of Interest’ but do not relate to its semantics. It is important to detect such mindless gazes because otherwise we would incorrectly infer meaning and cognitive processes.

5.23.3 Challenges and Research Questions

The first challenge is to come up with a clear definition of mindless gaze. Looking through an object and therefore not perceiving the stimulus is not the same as perceiving the stimulus but semantically misinterpreting it. Can both be defined as mindless gaze? Once a clear definition is reached, several research questions could be tackled by designing an experiment for detecting mindless gaze:

- What constitutes mindless gaze and which methods are best suited for its detection?
- This question connects to research on eye movements during mindless reading [4].
- Is there a correlation between mindless gaze and galvanic skin response (GSR) (or other bodily measures)?
- When testing which objects people have perceived, how can one distinguish between short-term memory capacity and mindlessness?
- People may fixate objects during a time-critical task but ‘miss them semantically’. Can this be a result of mindless gaze?
- What about tasks where identifying chunks is important (such as when playing chess)?
  A specific fixation per se is meaningless but successful if the chunk (in chess a meaningful configuration of pieces) is perceived and correctly identified as such.

Several domains and tasks are suitable for an experiment to detect mindless gaze. The experiment must be designed in such a way that allows for testing the participants’ semantic interpretation of fixated objects. Objects that were fixated for a certain amount of time but which participants cannot remember afterwards or attach meaning to, may be classified as belonging to ‘syntactic AOIs’ rather than ‘semantic AOIs’. This allows for distinguishing between meaningful and meaningless AOIs in the sense that the former are being utilized for solving the task at hand. One could, for example, imagine the scenario of an emergency center, where people must solve a cartographic map task [2] under time pressure. The type of task is important, therefore we expect different results depending on whether people must solve a concrete problem versus only explore an area.

It will be interesting to see whether the lack of connections of fixations to ‘interpreted objects’ is sufficient to identify mindless gaze or whether such detection requires data triangulation, e.g., GSR synchronized with the fixations. One can envision several potential application areas for mindless gaze identification, such as learning and education to detect whether pupils are studying or daydreaming.

References
