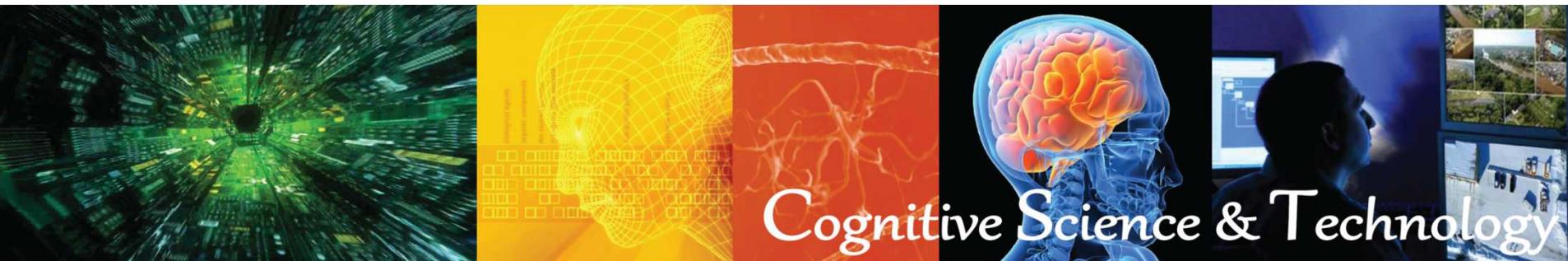


Real Time Assessment of Cognitive State: Research and Implementation Challenges

SAND2016-6655C



Michael Trumbo, Mikaela Armenta, Haass, Karin Butler, Aaron Jones, and Charles Robinson

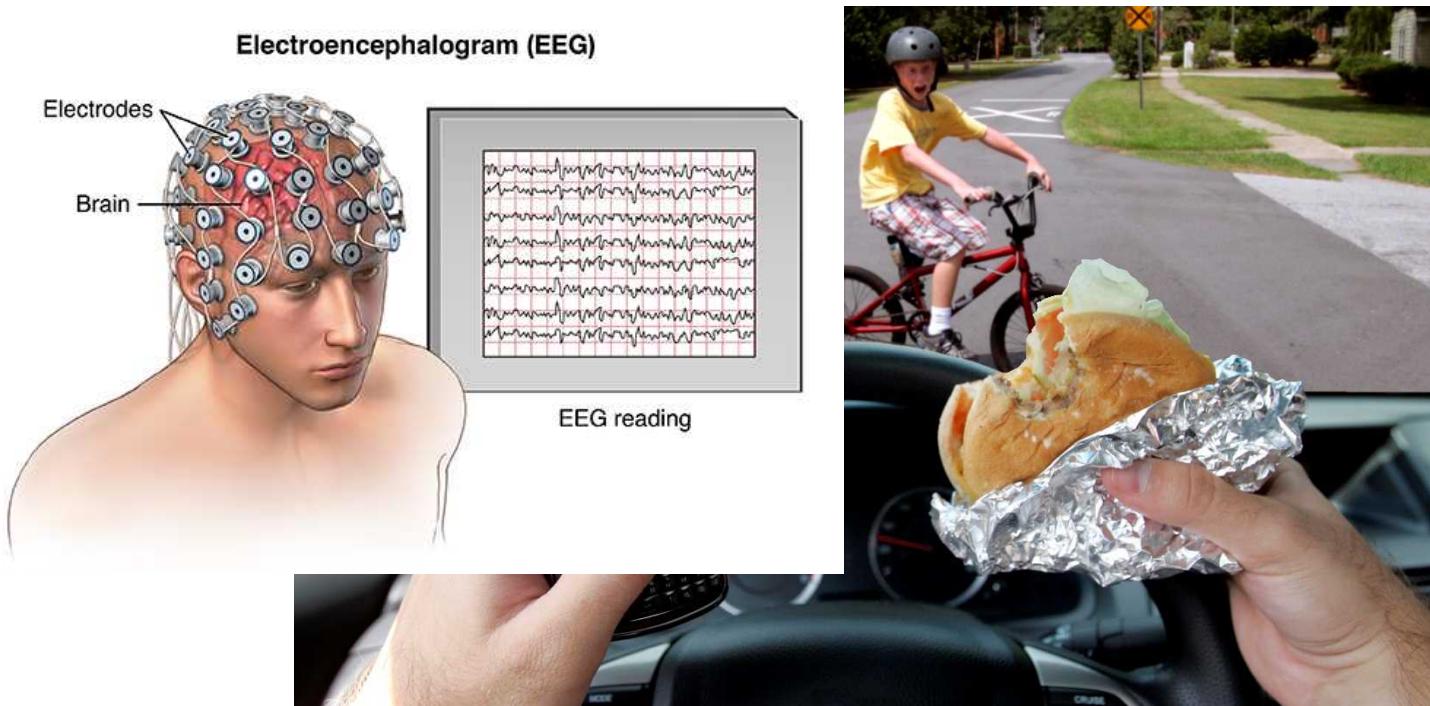


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Background



Background



Background



Background



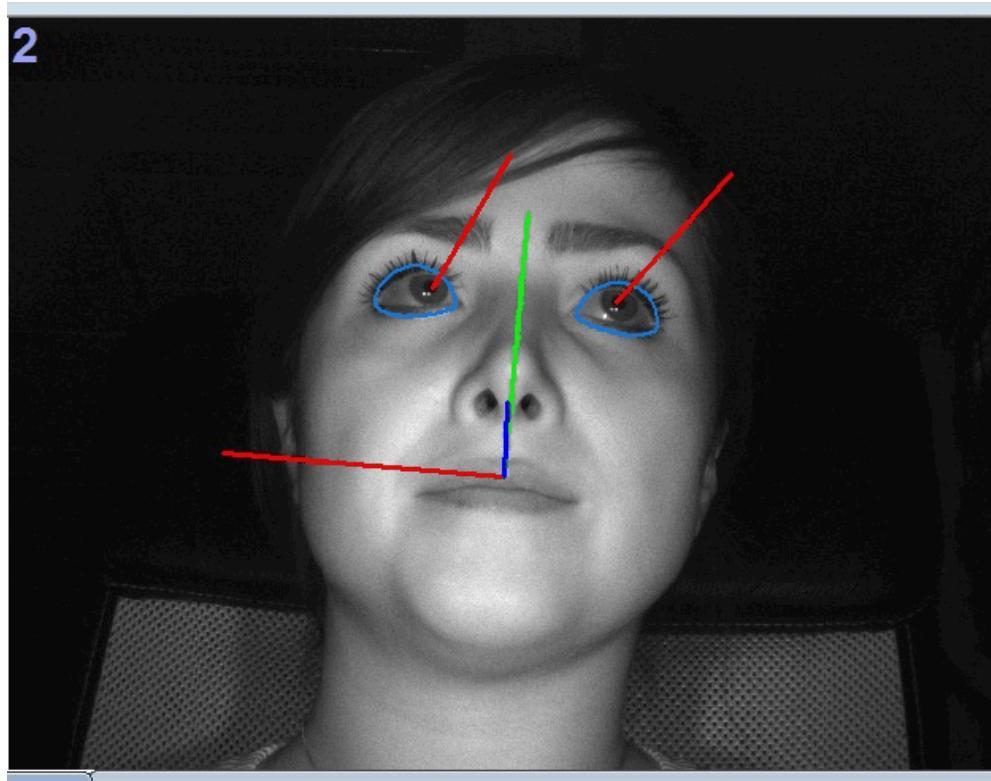
Background



Background

“The face is a picture of the mind with the eyes as its interpreter.”

— Marcus Tullius Cicero

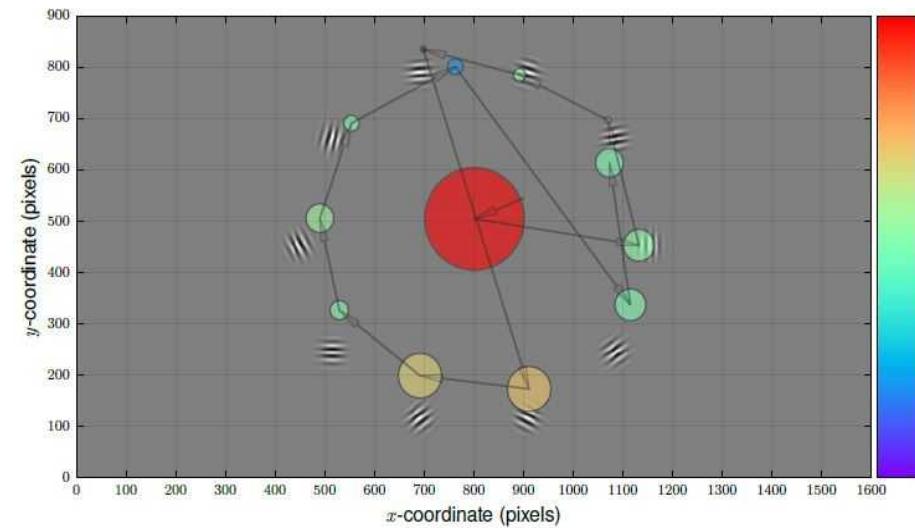
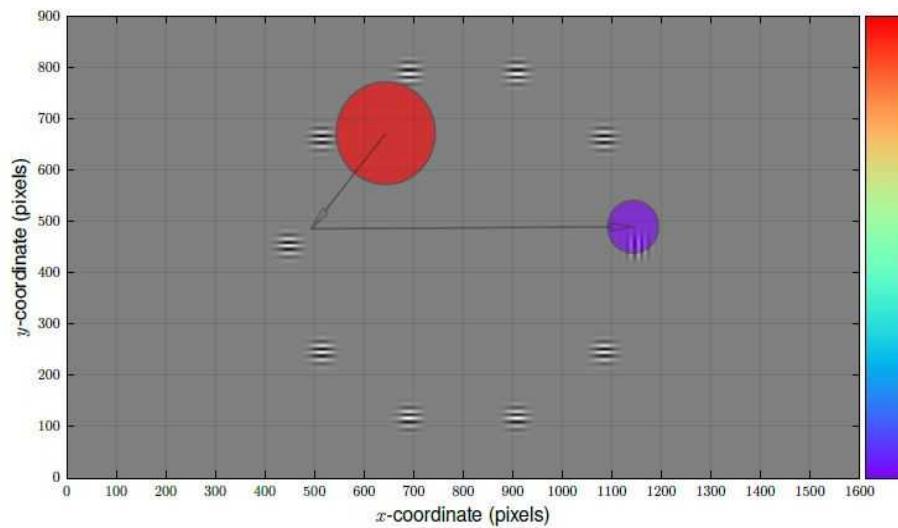


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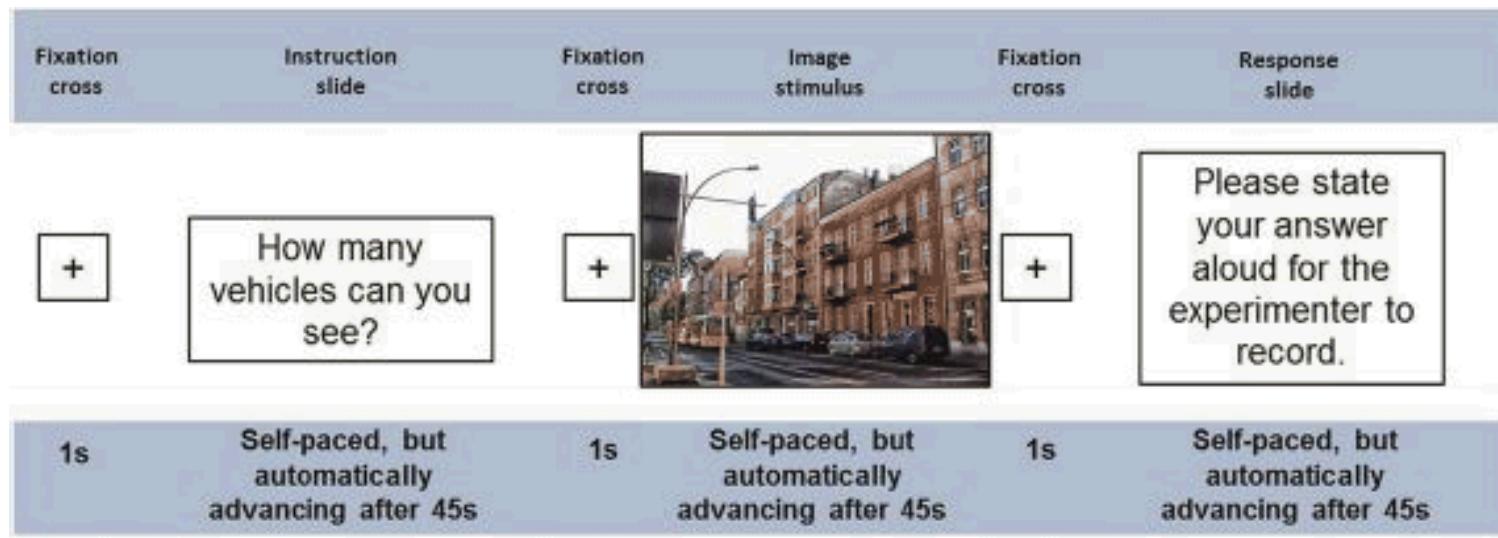
$$K_i = \frac{d_i - \mu_d}{\sigma_d} - \frac{a_{i+1} - \mu_a}{\sigma_a}, \quad i \in [1, n-1]$$

Duchowski & Krejkt, 2016

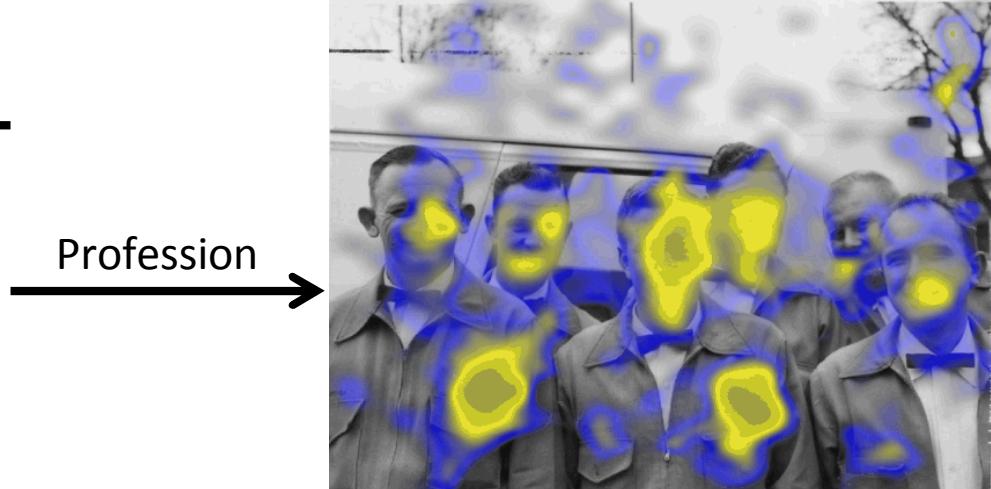
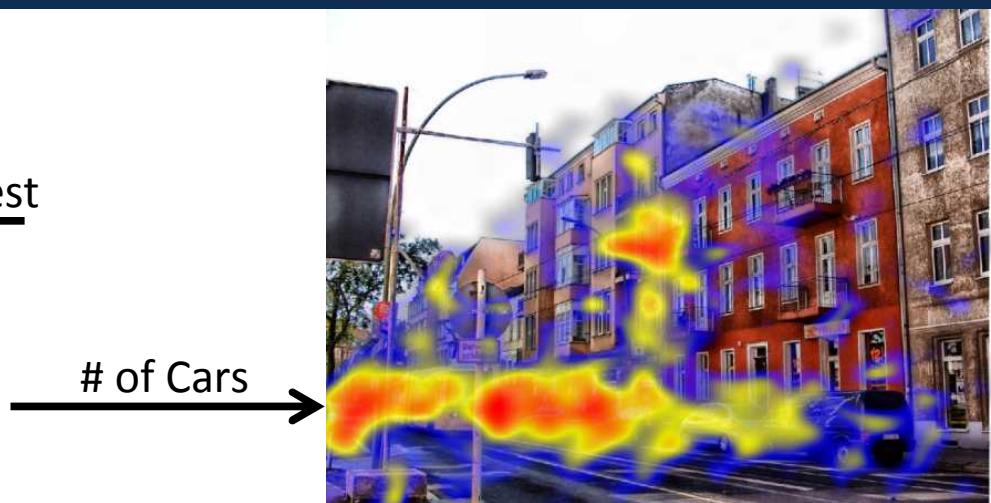
- μ_d and σ_d represent the mean and standard deviation, respectively, of the fixation duration
- μ_a and σ_a represent the mean and standard deviation, respectively, of the saccade amplitude
- Negative values indicate short fixation and long saccade: Ambient attention
- Positive values indicate long fixation and short saccade: Focal attention



Current Study



Tasks



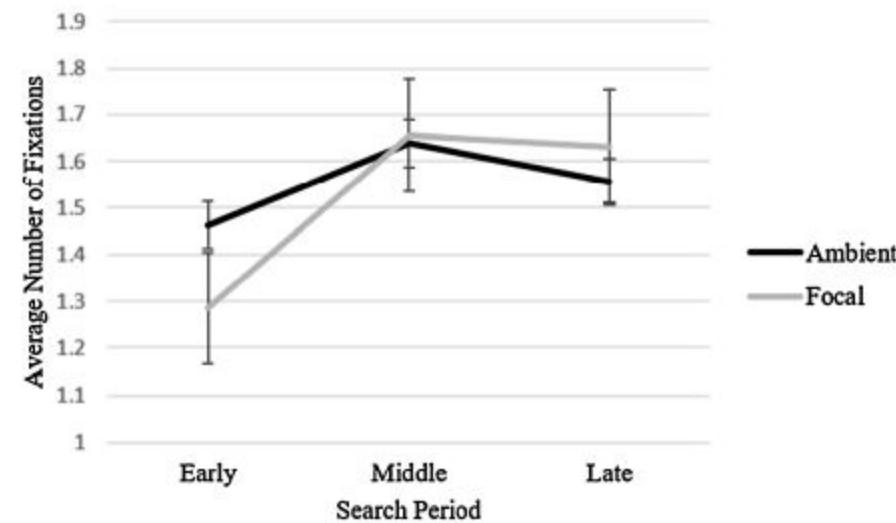
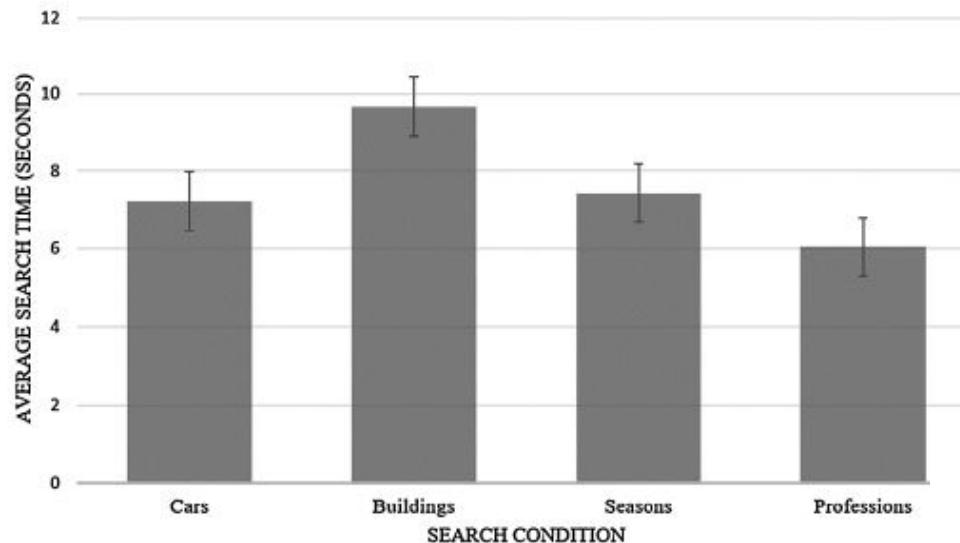
Free Viewing of Natural Scenes



Ambient (a) and focal (b) fixation maps.

From: Follet, Le Meur, & Baccino, 2011

Current Study



Limitations

- Task/stimuli characteristics; goal-directed vs. free-viewing
- Ecological validity; laboratory vs. real-world application
 - Ideal vs. real conditions
 - Feasible technologies
- Classifier construction
 - Multiple data streams even within a technology
 - Acceptable margin of error
 - Individual differences (age, sex, ethnicity, disease state)
 - Change over time, internal and external