

DEMONSTRATOR FOR EXTRACTING COGNITIVE LOAD FROM PUPIL DILATION FOR ATTENTION MANAGEMENT SERVICES

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Benedikt Gollan (Research Studios Austria FG, Vienna)

Michael Haslgrübler (Institute for Pervasive Computing, JKU Linz)

Alois Ferscha (Institute for Pervasive Computing, JKU Linz)

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MOTIVATION

... to explore how the flood of notifications on different computing devices and in smart environments can be managed, in order to avoid information overload ...

not how or **if** but **when!**

EYE SENSING

■ Blinks

- Absence of Blinks can indicate **strong concentration**

■ Pupil Fixations

- Lower duration → **Automation of information encoding**/processing
- Higher duration → **Larger information gain** per fixation

■ Saccades

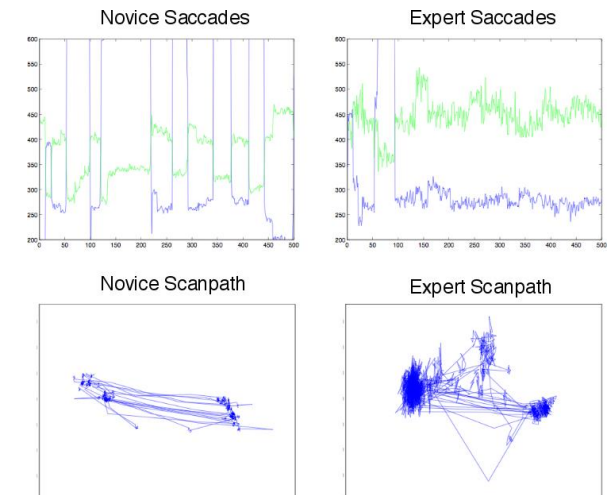
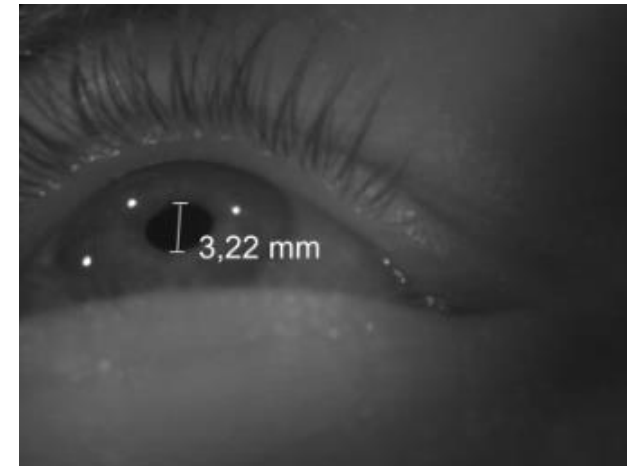
- Experts are repeatedly making **short saccades**
- Experts show a more **structured scan path** than novices

■ Pupil Dilation (Task-evoked pupil response - TEPR)

- Pupil dilation shows correlations to the **locus coeruleus-norepinephrine system (LC-NE)** a part of the middle brain which is responsible for controlling attention.
- The correlation with attention control expresses in impact on the **inhibition of return (IOR)**.

B. Gollan, A. Ferscha

Pupil Dilation as Online Input for non-laboratory Attention-aware systems
8th International Conference on Advanced Cognitive Technologies and Applications (Cognitive 2016).

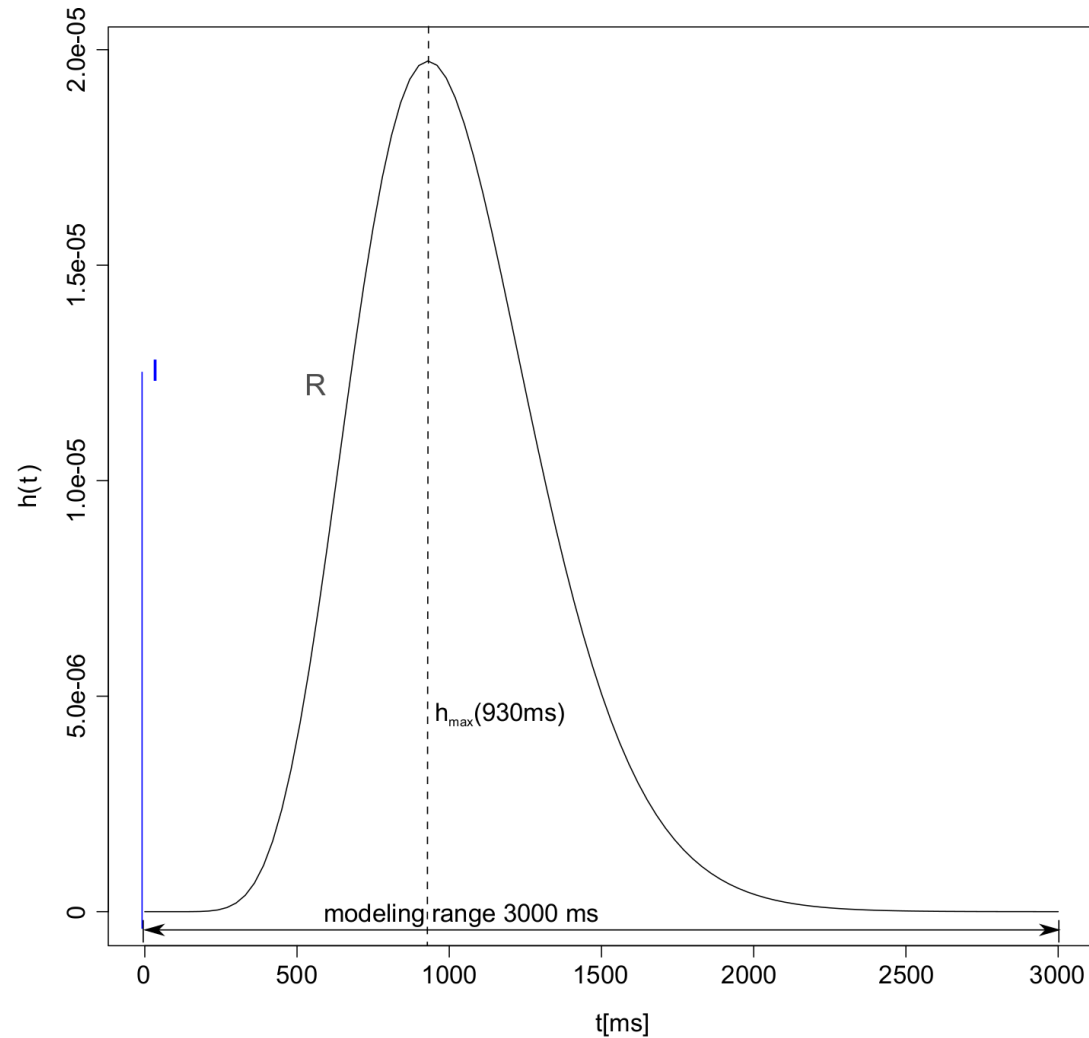


D. Wyatt, T. Busey

"Low and high level changes in eye gaze behavior as a result of expertise."
Journal of Vision 8.6 (2008): 112-112.

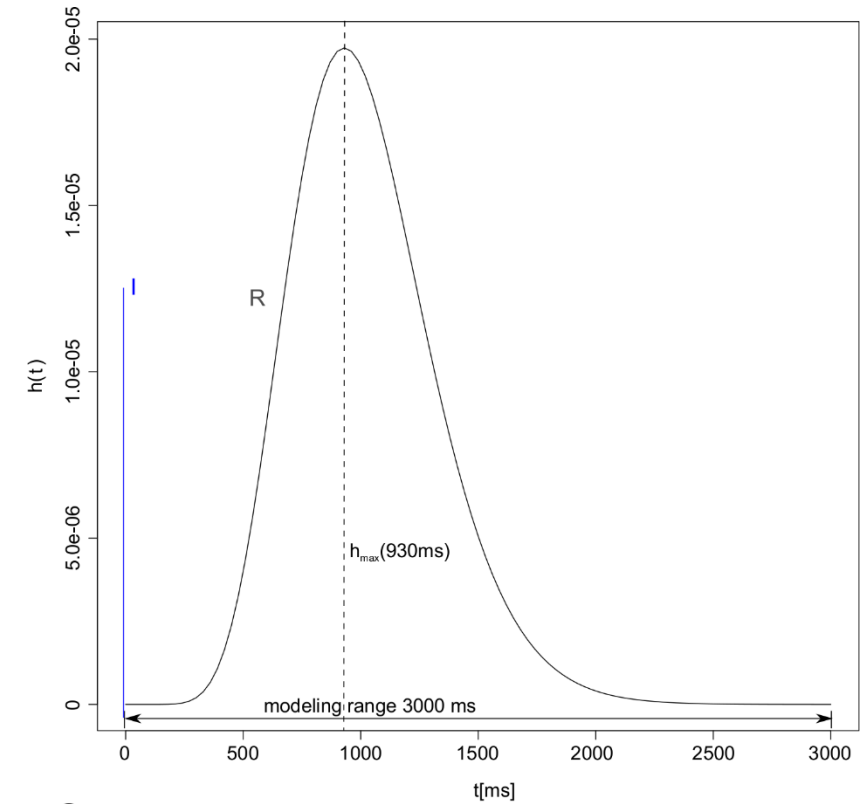
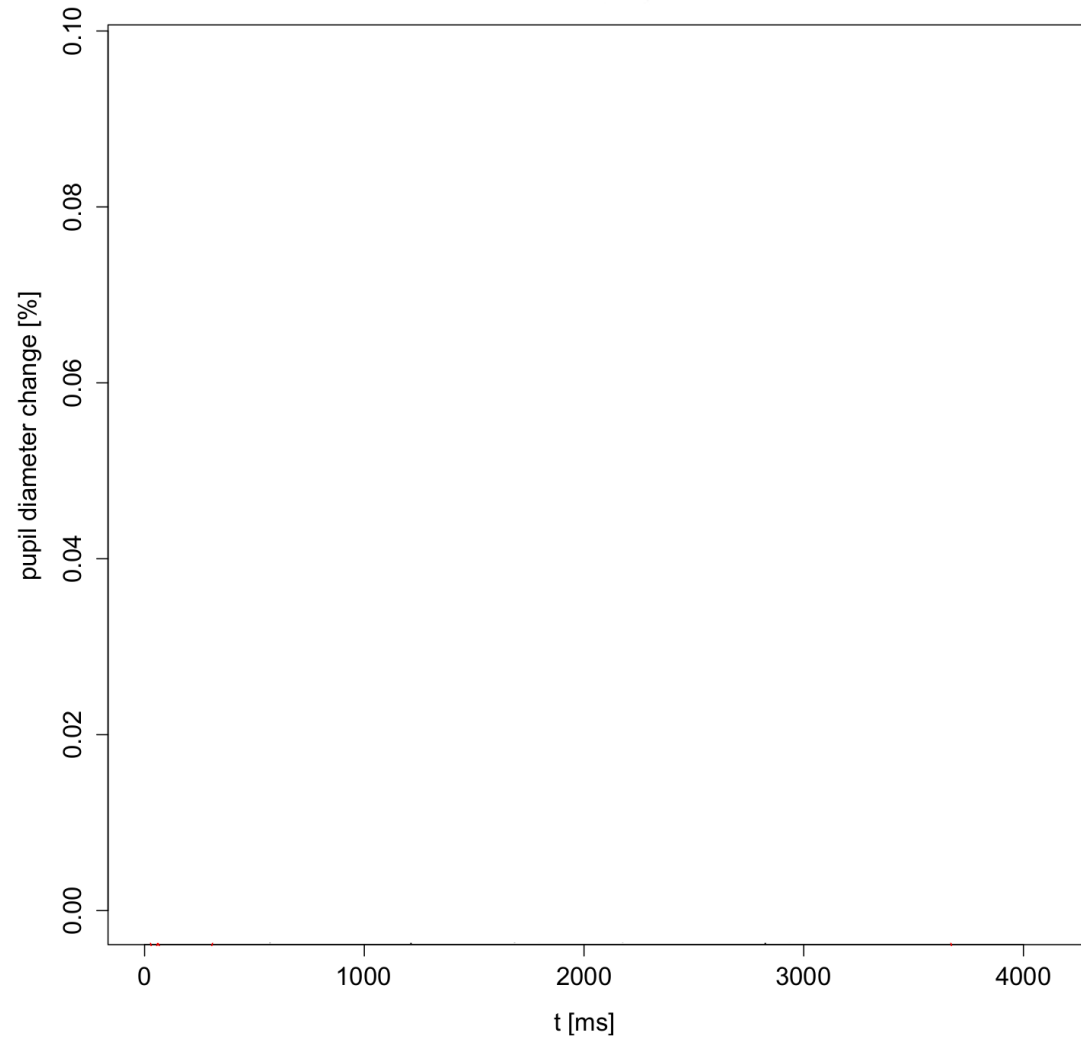
Institute for Pervasive Computing

A MODEL FOR PUPIL RESPONSE TO EVENTS

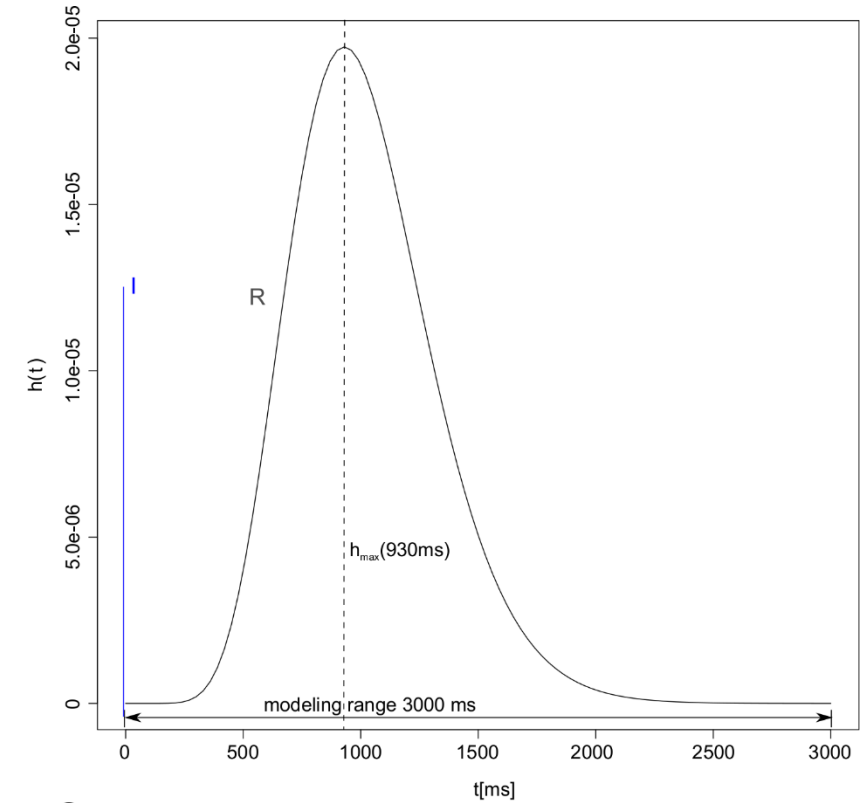
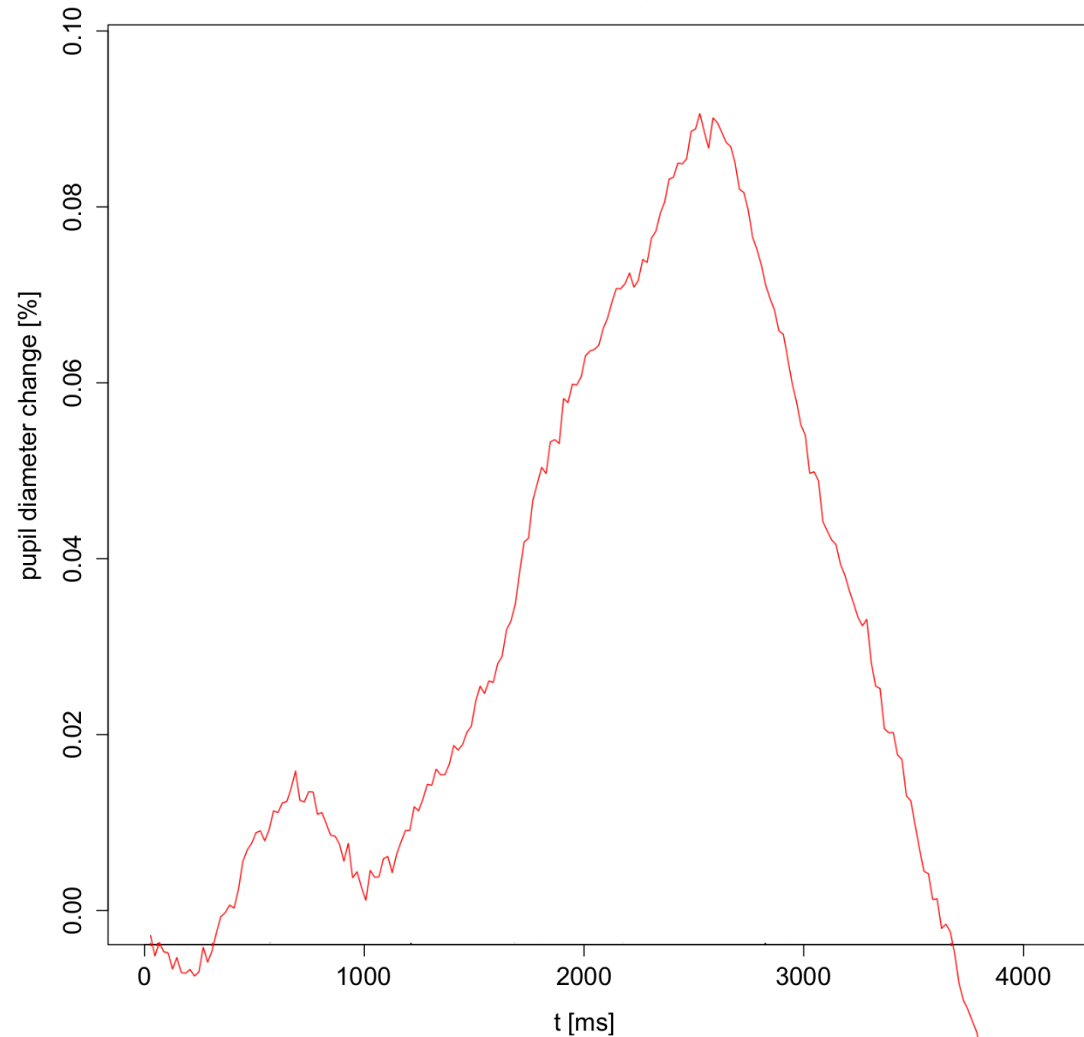


B. Hoeks and W. J. Levelt
"Pupillary dilation as a measure of attention: A quantitative system analysis,"
Behavior Research Methods, Instruments, & Computers, vol. 25, no. 1, 1993

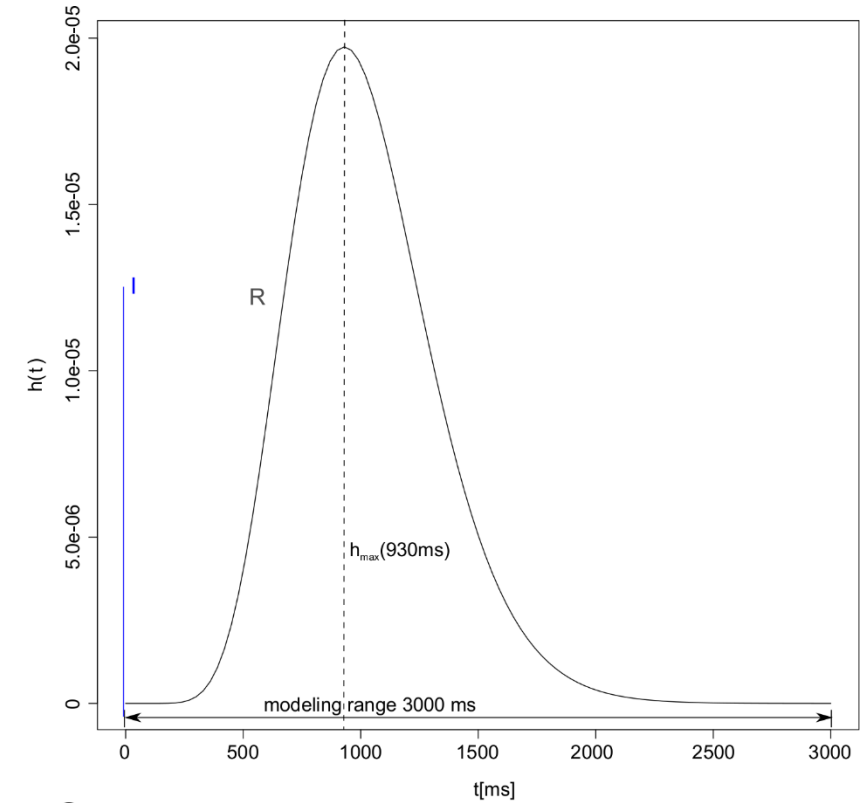
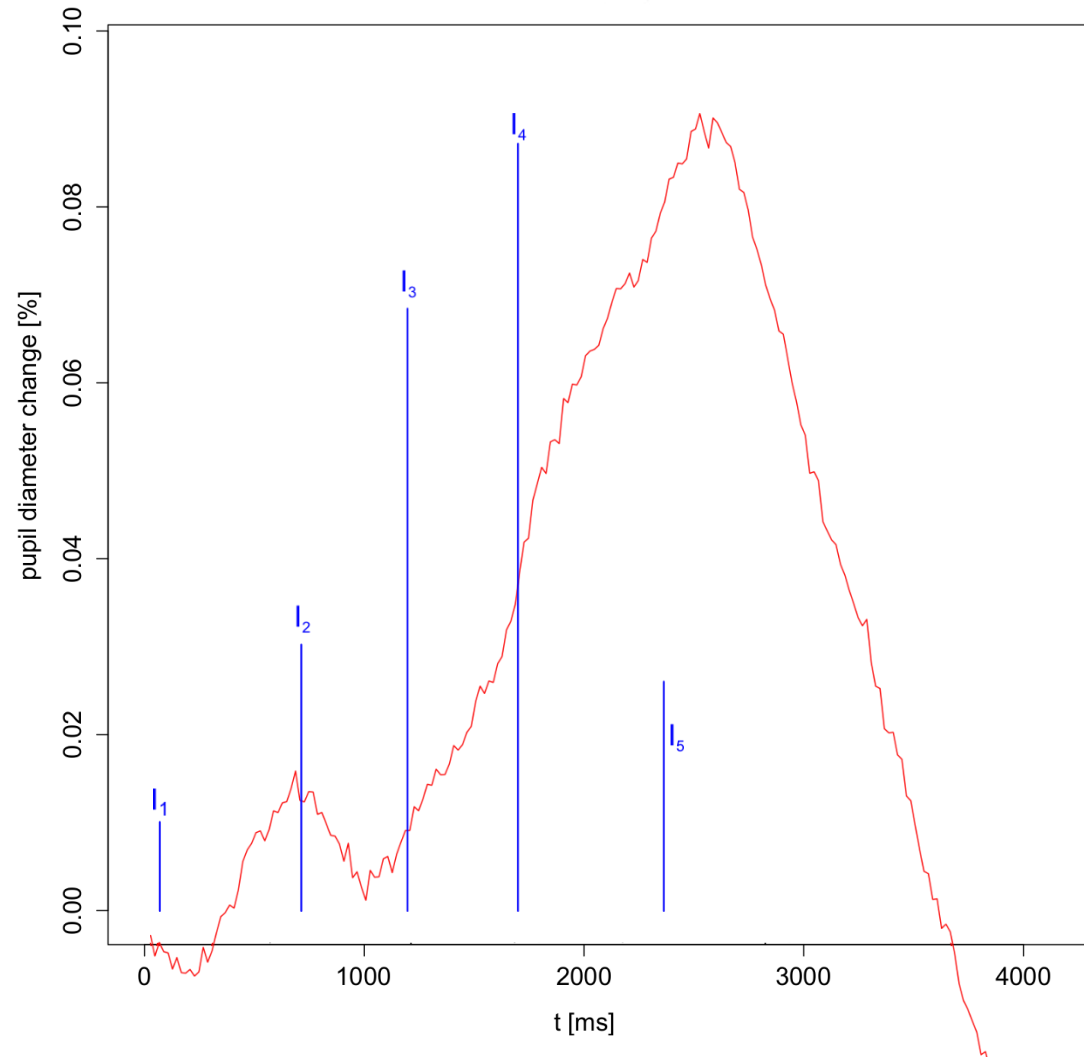
NON-LABORATORY PUPIL DILATION



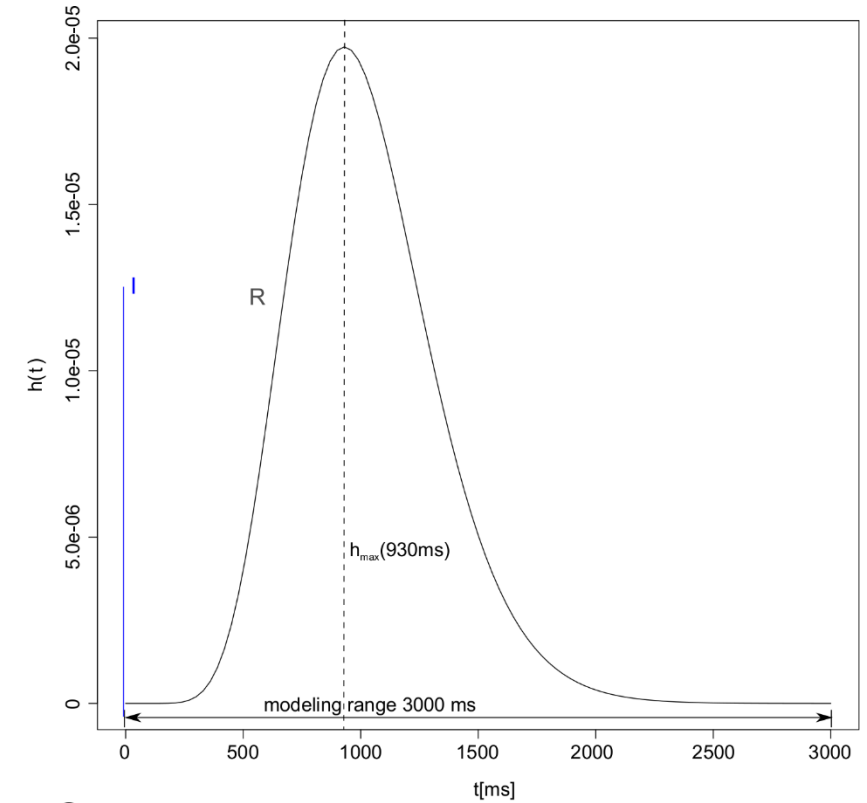
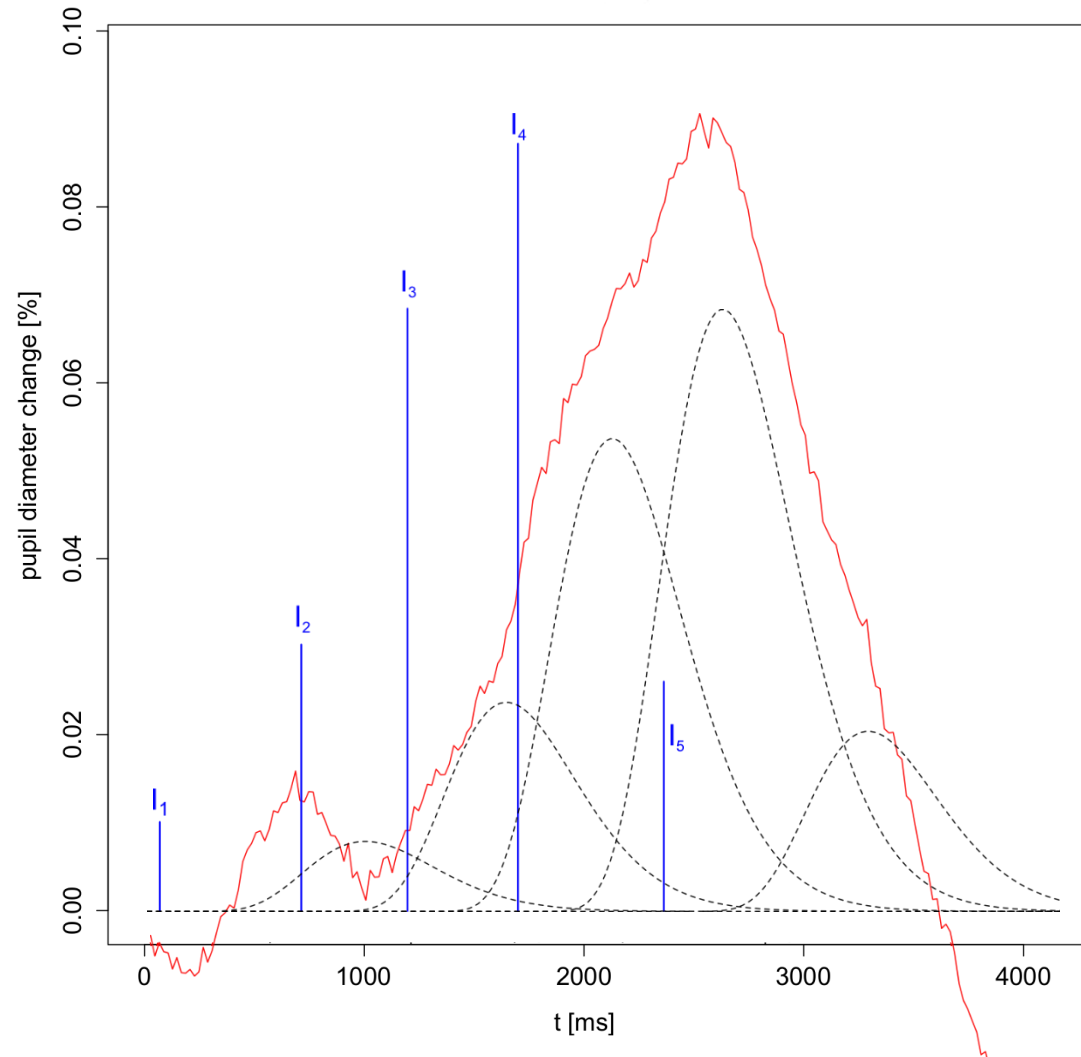
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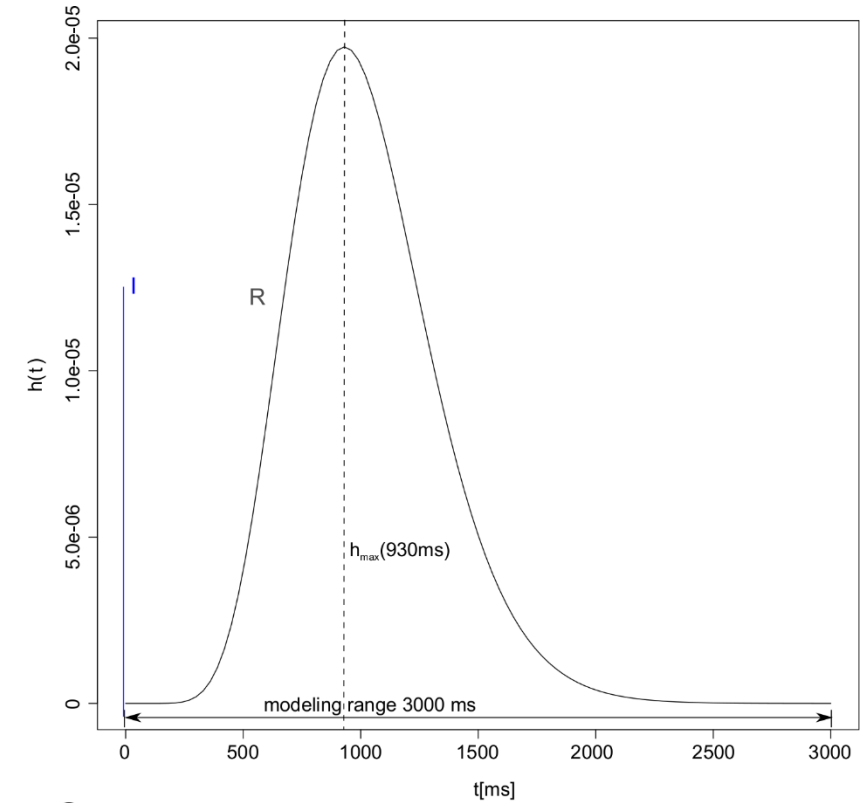
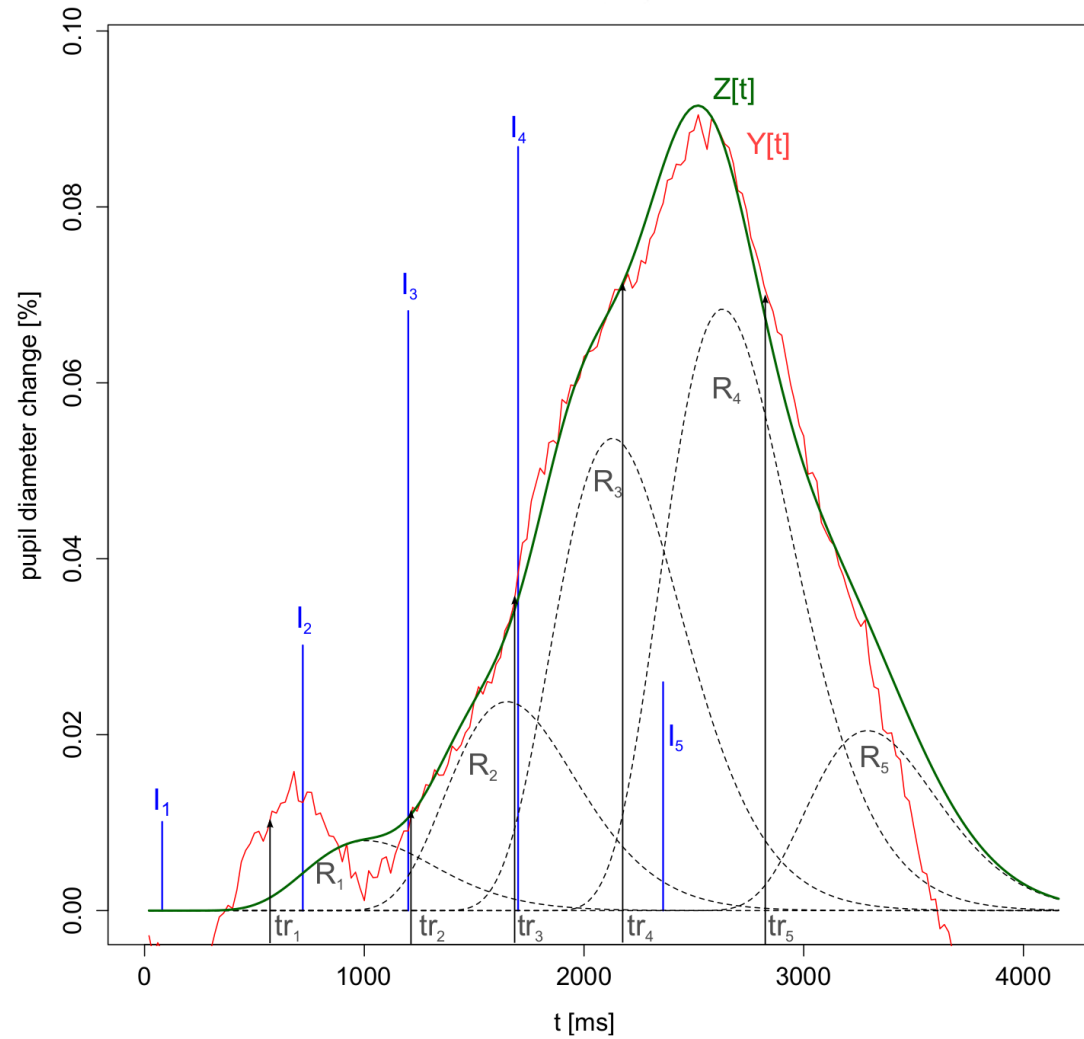
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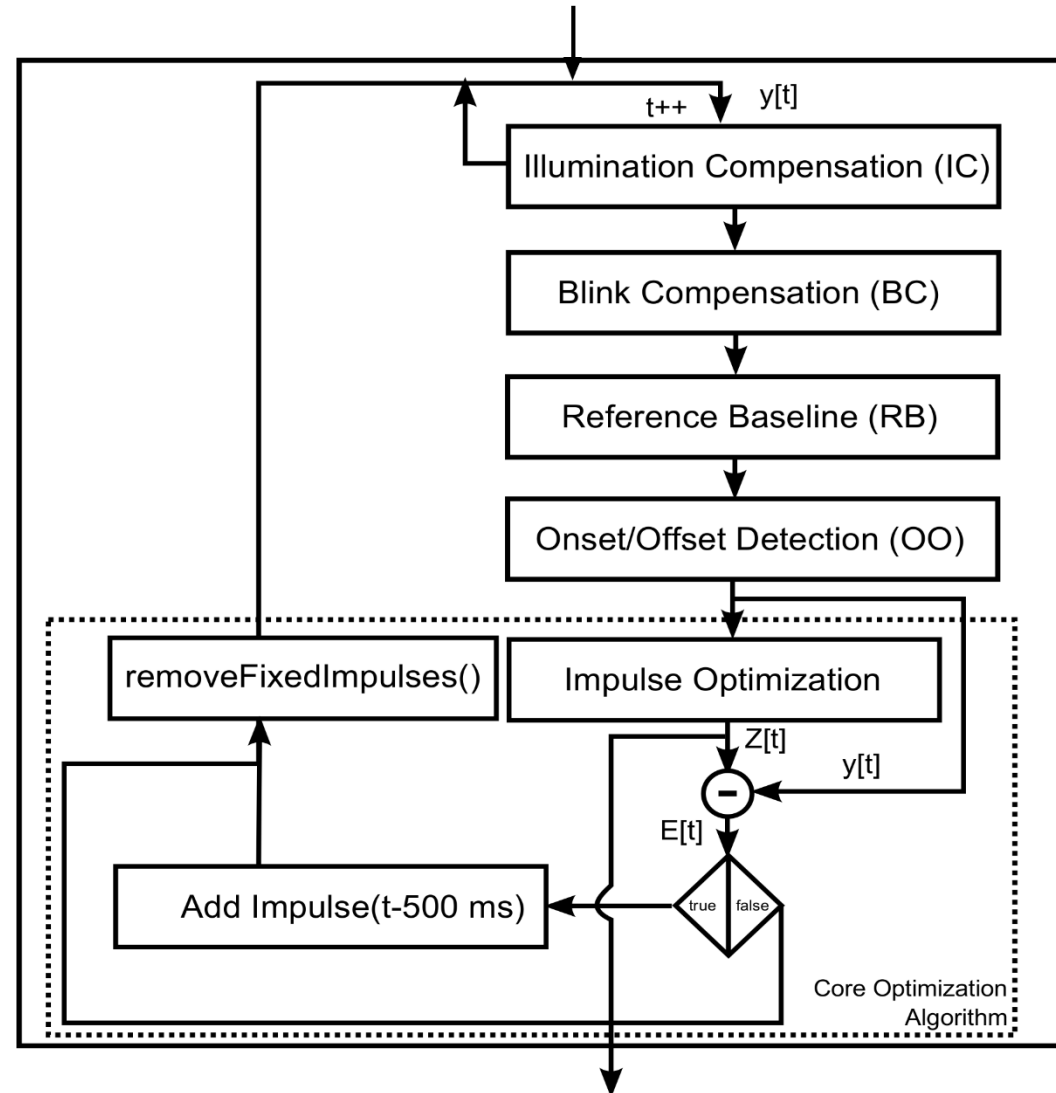
NON-LABORATORY PUPIL DILATION



NON-LABORATORY PUPIL DILATION



ALGORITHM FOR COGNITIVE LOAD DETECTION



A DEMONSTRATOR FOR COGNITIVE LOAD



Demo

Source: <https://pupil-labs.com>.

Kassner, Moritz, William Patera, and Andreas Bulling. "Pupil: an open source platform for pervasive eye tracking and mobile gaze-based interaction." In Proceedings of the 2014 ACM international joint conference on pervasive and ubiquitous computing: Adjunct publication, pp. 1151-1160. ACM, 2014

CONCLUSION

We can determine **when** the best time for an interrupt is and to some degree **how** this is perceived.