The pupillary light response reflects exogenous attention and inhibition of return

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The pupillary light response

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<http://youtu.be/QLCxJKJMZuE>

Henceforth *PLR* (pupillary light response)

The active pupil

- The PLR is traditionally considered a reflex
- Recent studies show cognitive influences
 - Brightness illusions and pictures of the sun (Laeng et al., 2012; Naber et al., 2013; Binda et al., 2013)
 - Binocular rivalry (Naber et al., 2011; Fahle et al., 2013; Harms, 1937)
 - Mental imagery (Laeng & Sulutvedt, 2014)
 - Voluntary shifts of attention (Binda et al., 2013, 2014; Mathôt et al., 2013, in press-a; Naber et al., 2013)

Does your pupil reveal exogenous
(involuntary) attention and inhibition of
return?

Methods

Implemented with OpenSesame (Mathôt et al., 2012)
Demonstration + poster by JB Melmi

Results

Prediction

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Attend bright

Small pupil

Attend dark

Large pupil

Inhibit bright

Large pupil

Inhibit dark

Small pupil

Shortly
after cue

Longer
after cue

Results

Interim discussion

- Pupil size reflects exogenous orienting
- ... and subsequent inhibition of return
- Can we link this to behavior?
 - Strong inhibition of return → Strong inhibition of light response?

Results

Behav. cuing effect (%)

Results

Discussion

- The pupillary light response reflects attention
 - Endogenous (voluntary) (Binda et al., 2013; Mathôt et al., 2013; Naber et al., 2013)
 - Pre-saccadic (Mathôt et al., in press-a)
 - Feature-based (Binda et al., 2014)
 - Exogenous (involuntary) (Mathôt et al., in press-b—this study!)
- ... and inhibition (of return)
 - Support for IOR as short-term depression (Satel et al., 2011)
- Pupil size is a powerful tool to track visual attention

Conclusion

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The Active Pupil

Thank you for your attention

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Mathôt, Dalmaijer, Grainger, & Van der Stigchel (in press).

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