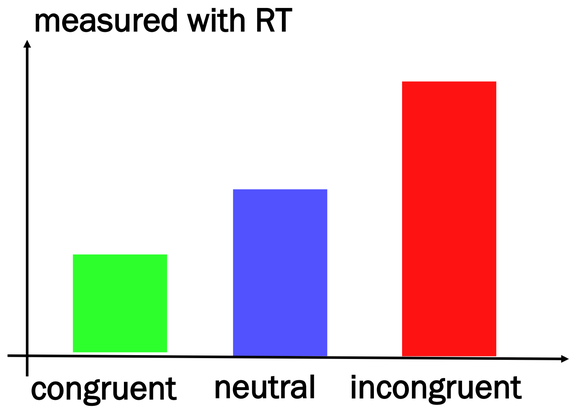
The Dissociation between Reaction Time and Pupil Dilation in the Numerical Stroop Task

Ronen Hershman[1,2], Lisa Beckmann[3] and Avishai Henik[2,4]

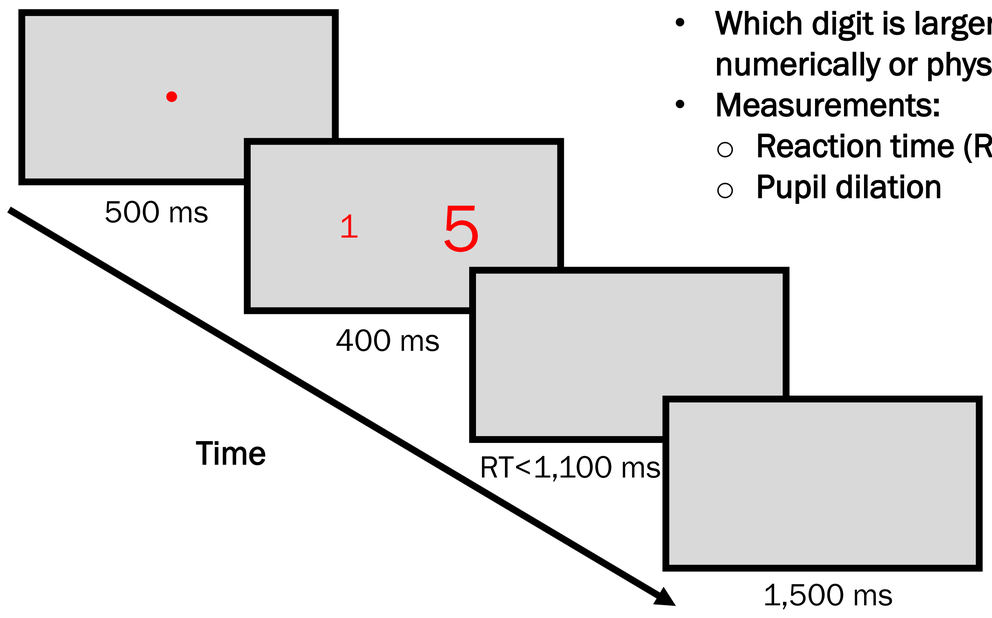
[1]Department of Cognitive and Brain Sciences, Ben-Gurion University of the Negev, Beer-Sheva, Israel
[2]Zlotowski Center for Neuroscience, Ben-Gurion University of the Negev, Beer-Sheva, Israel
[3]Department of Psychology, University of Konstanz, Konstanz, Germany
[4]Department of Psychology, Ben-Gurion University of the Negev, Beer-Sheva, Israel

Introduction

Typical numerical Stroop results measured with RT



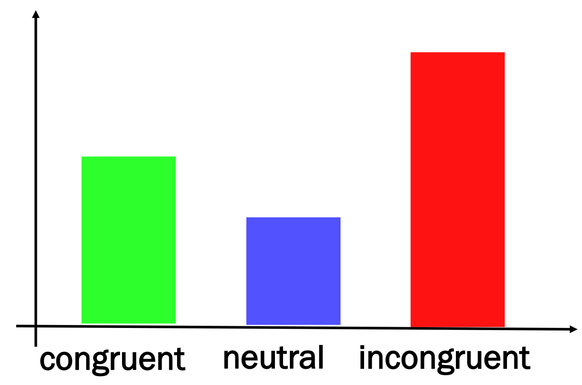
Method



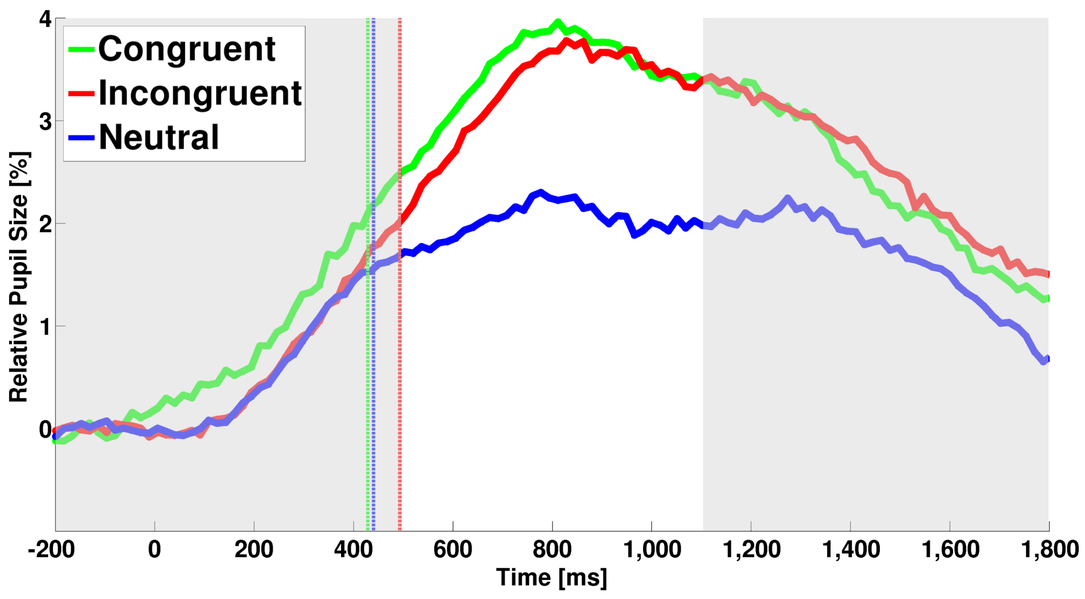
- Which digit is larger numerically or physically?
- Measurements:
  - Reaction time (RT)
  - Pupil dilation

Motivation/Expected Results

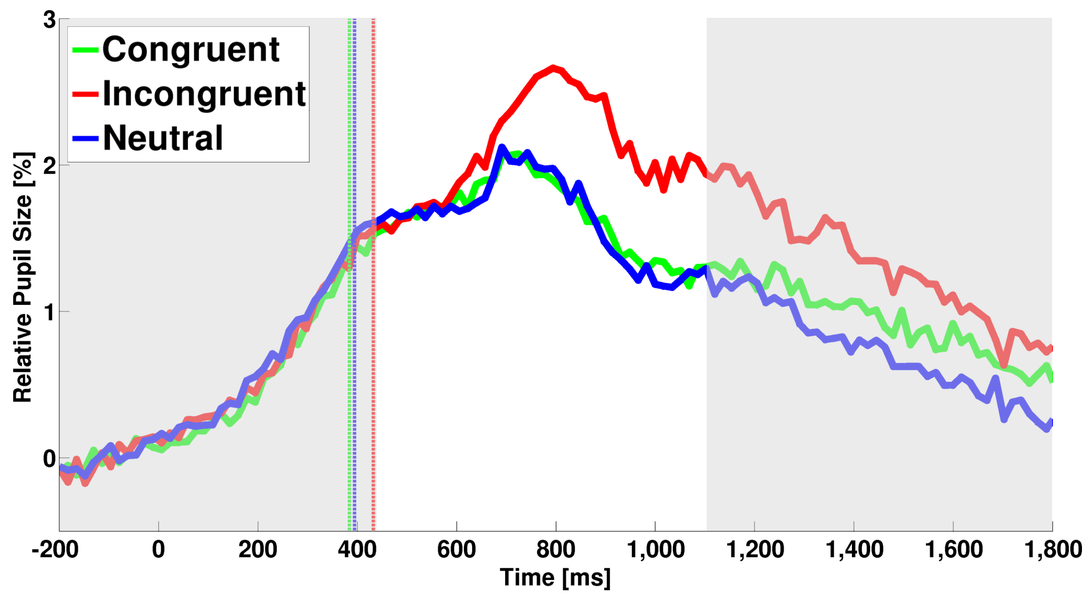
Color-Word Stroop results measured with pupil dilation



Results – Numerical Task (N=19)

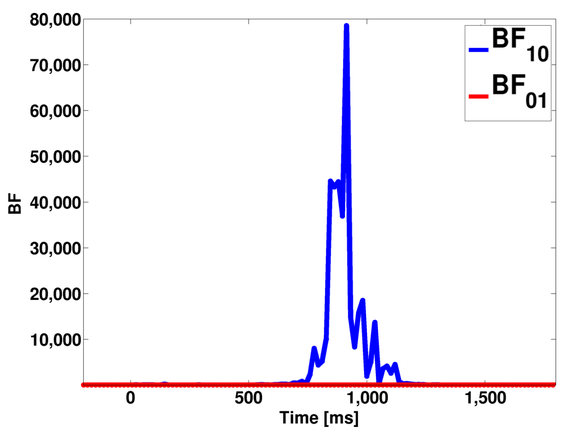


Results – Physical Task (N=17)

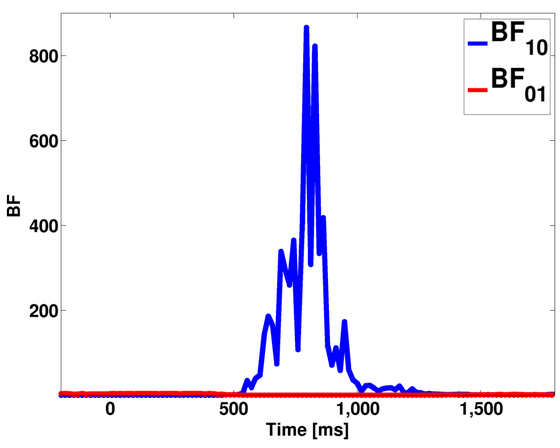


Statistical Bayesian Analysis – Numerical Task

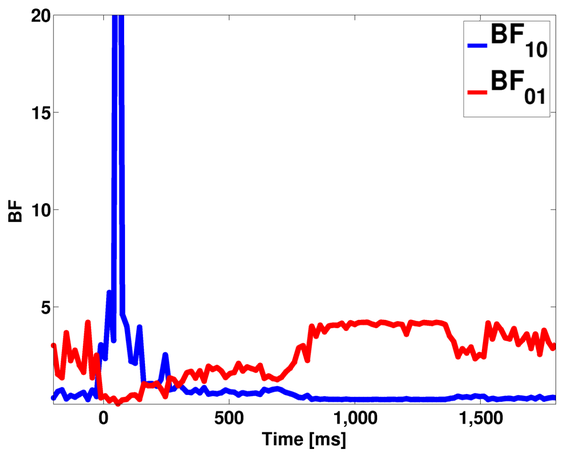
Congruent vs. Neutral



Incongruent vs. Neutral



Incongruent vs. Congruent



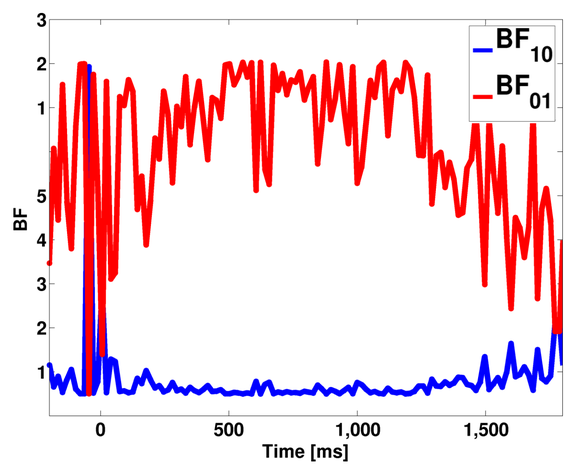
RT Analysis	Numerical Task		Physical Task	
	F	$\log(BF_{10})$	F	$\log(BF_{10})$
Congruent - Neutral	12.01	3.097	16.89	3.851
Incongruent - Neutral	78.18	16.694	170.46	13.143
Incongruent -Congruent	174.72	17.614	87.25	12.885

$p < .001$

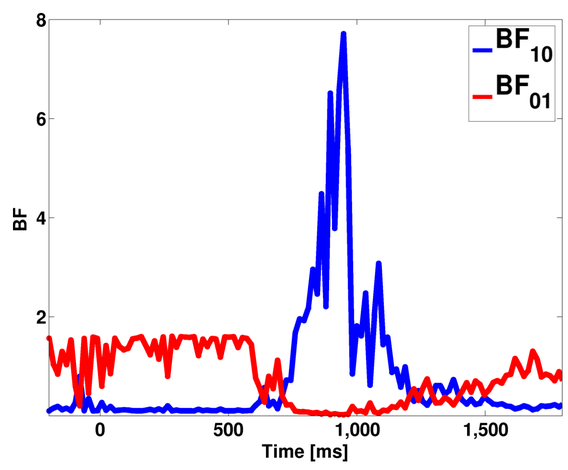
Significant main effect for task :
$F(1, 34) = 8.24, p = .007\ (BF_{10} = 6.441), \eta_p^2 = .19$
Significant main effect for congruency:
$F(2, 68) = 210.76, p < .001\ (\log(BF_{10}) = 58.85), \eta_p^2 = .86$
Significant interaction between congruency and task:
$F(2, 68) = 4.86\ p = .01\ (BF_{10} = 5.47), \eta_p^2 = .12$

Statistical Bayesian Analysis – Physical Task

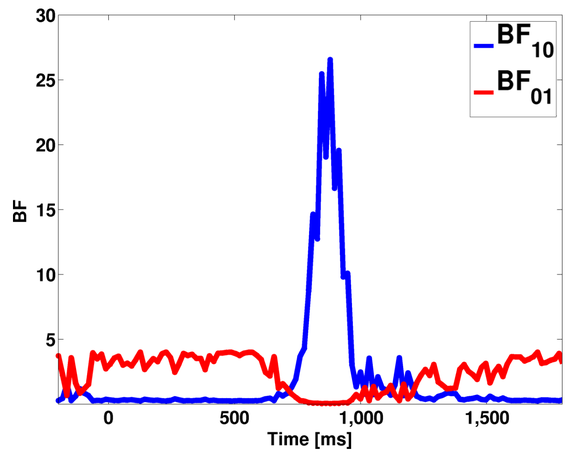
Congruent vs. Neutral



Incongruent vs. Neutral



Incongruent vs. Congruent



What Does It Mean?

- *Dissociation between reaction time and pupil dilation*

Measure	Task	Effects
RT	Physical & Numerical	Congruency, Interference and Facilitation
Pupil Dilation	Numerical	Interference, *Reverse* Facilitation
	Physical	Congruency and Interference

- *RT indicates both tasks have the same pattern. Measurement of pupil dilation shows different patterns for each task. This could indicate involvement of different processes in these two tasks.*

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Correspondence: ronenhe@post.bgu.ac.il | lisa.beckmann@uni-konstanz.de