



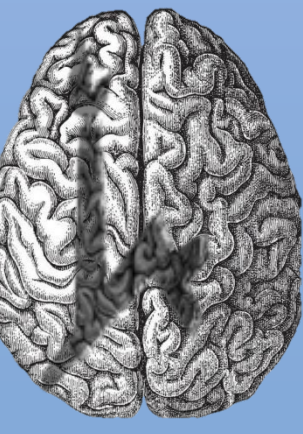
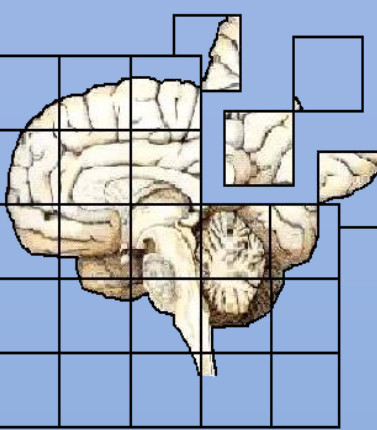
Stopping at a Red Light:

Recruitment of Inhibitory Control by Environmental Cues

Shachar Hochman^a, Eyal Kalanthroff^b and Avishai Henik^a

^aDepartment of Psychology and the Zlotowski Center for Neuroscience, Ben-Gurion University of the Negev, Beer-Sheva, Israel

^bDepartment of Psychology, The Hebrew University of Jerusalem, Israel



Introduction

- Inhibitory control is the ability to suppress or stop irrelevant information. It is commonly measured using the stop-signal task. In this task, participants respond to a cue (go process) and inhibit response usually due to an auditory signal (stop process) [1].
- The 'horse race model' suggests the two processes—go and stop—compete with each other and thus they are generally independent. The **SSRT** (stop-signal reaction time) represents the stop process, while the **nsRT** (no-stop reaction time) represents the go process [2].
- Verbruggen and Logan (2009) [3] presented task-irrelevant written words—STOP/GO—inside circle or square go-cues. Results indicated slower nsRTs if STOP was presented compared to when GO was presented and no differences between the words for SSRTs.

Current Study

- We examined whether 'automatic inhibition' (i.e., re-instantiation of response inhibition via retrieval of stimulus-stop associations [4]) was aroused with environmental cues.
- We used the stop-signal task with traffic lights as environmental go-cues. Thus, the stimuli were task-relevant and content-relevant.

Method

Stop-Signal Task:

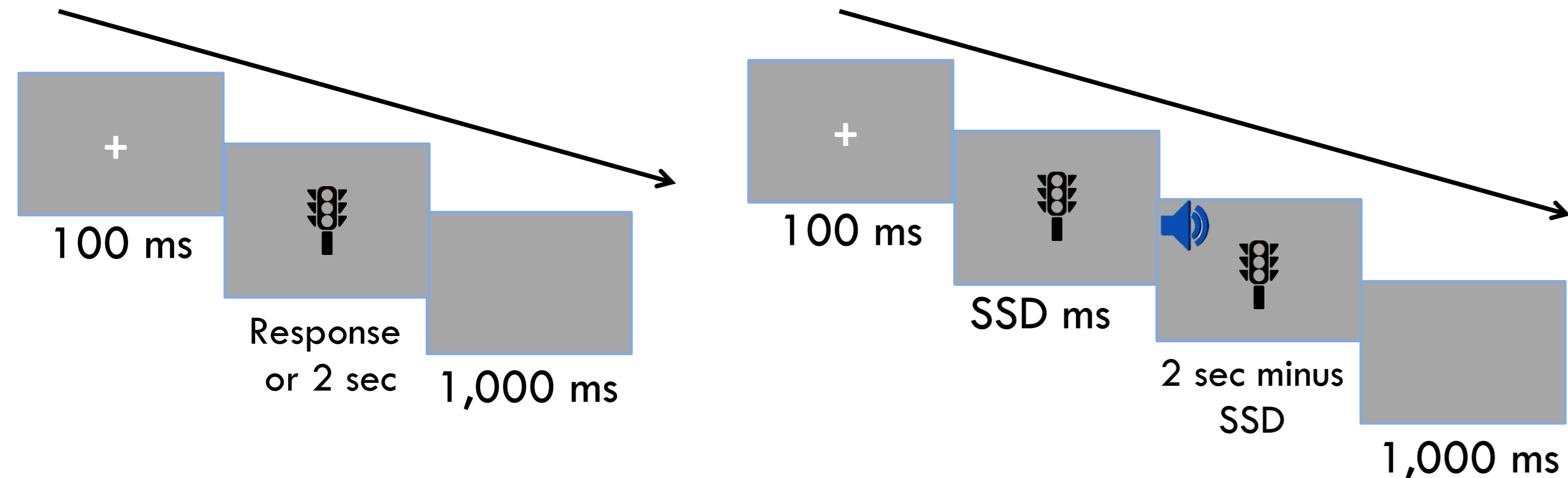


Fig. 1: Trial sequence in no-stop-signal trial

Trial sequence in stop-signal trial

Participants:

Experiment 1: 20 students (13 females) of Ben-Gurion University of the Negev.

Experiment 2: 30 students (19 females) of Ben-Gurion University of the Negev.

Stimuli:

Experiment 1: go signal was a picture of either a red or a green traffic light (see Figure

Experiment 2: go signal was a picture of either a red, black (as neutral) or a green traffic light (see Figure 2).

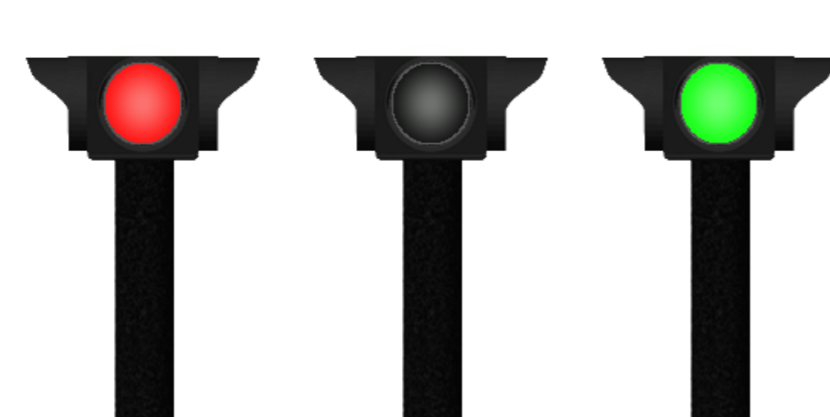
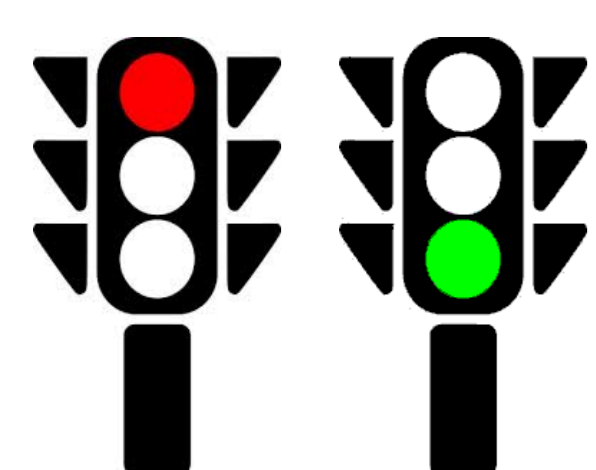


Fig. 2: Stimuli for Experiment 1

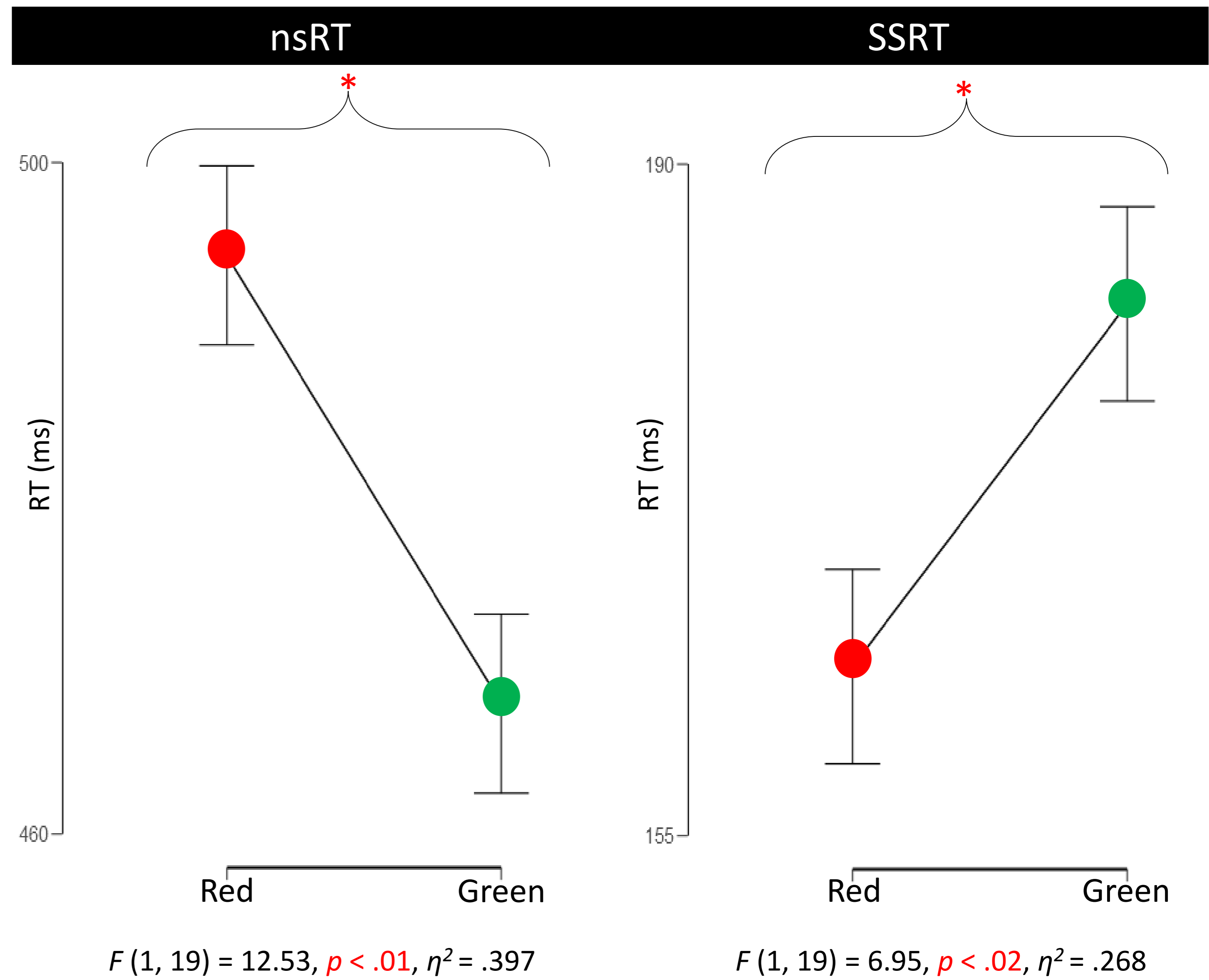
Stimuli for Experiment 2

Procedure:

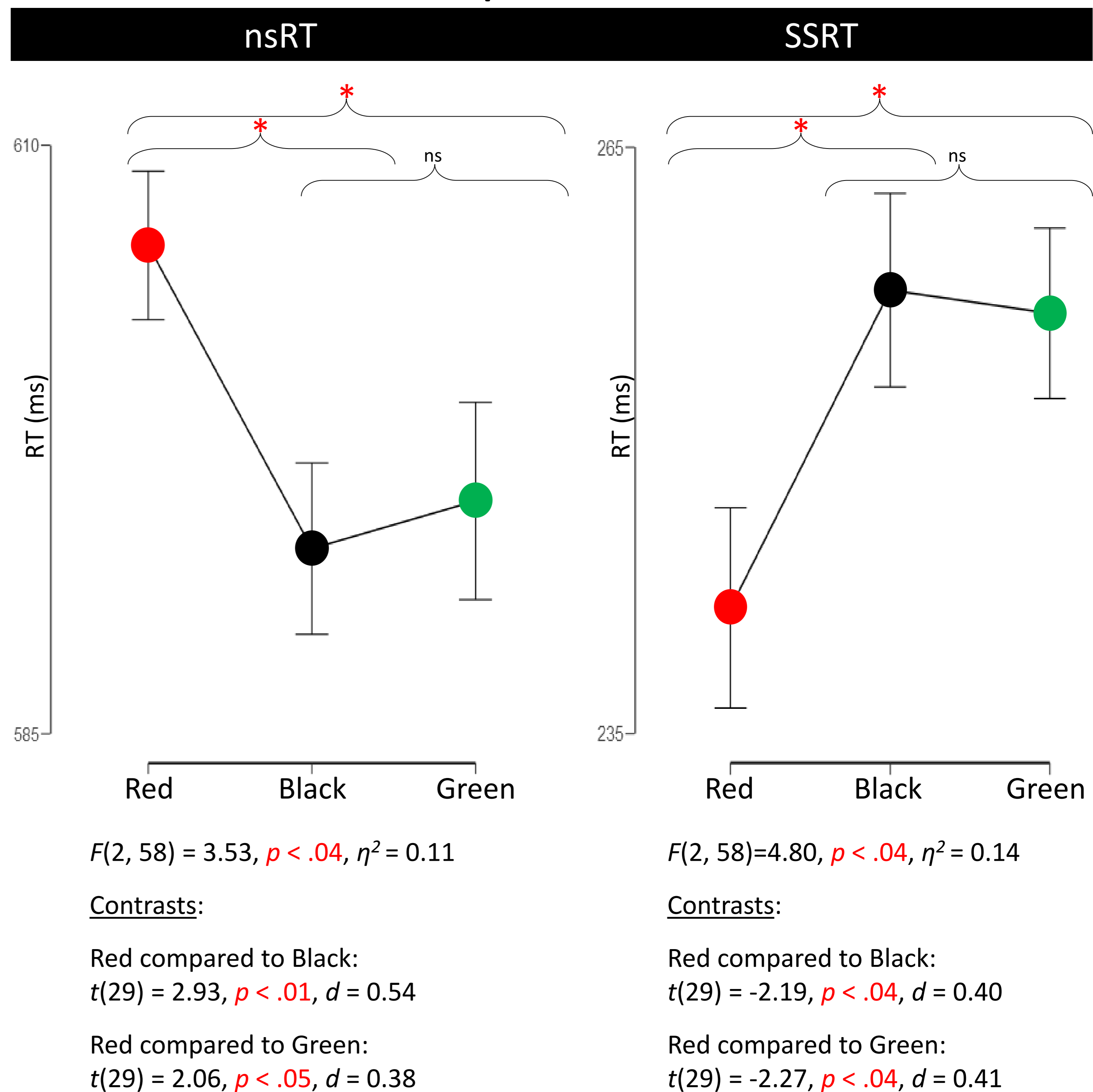
The participants were told to carry out a color discrimination task as fast and as accurately as possible. An auditory stop signal was presented in a random selection of 25% of the trials and the different colors appeared in equal proportions. The stop signal was presented after a variable stop-signal delay (SSD) that was initially set at 250 ms and was continuously adjusted to obtain a probability of stopping of 50% for each color.

Results

Experiment 1



Experiment 2



Discussion

- In Experiment 1 we found that RTs for a green cue were significantly shorter compared to the red cue. Most importantly, we found that stopping was more efficient when a red cue was presented.
- Experiment 2 replicated the results of Experiment 1. Furthermore, the red cue was slower than the neutral in the go-process and faster in stopping compared to the neutral. Differences between the green cue and the neutral didn't reach significance, either in go-process or stop-process.
- Our results strengthen the suggestion that environmental cues affect higher attention processes and interestingly, influence complex cognitive operations, such as inhibition of a prepotent response.

References:

- Verbruggen, F., & Logan, G. D. (2008). Response inhibition in the stop-signal paradigm. *Trends Cogn Sci*, 12, 418-424.
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- Verbruggen, F., & Logan, G. D. (2008). Automatic and controlled response inhibition: associative learning in the go/no-go and stop-signal paradigms. *J Exp Psychol Gen*, 137, 649-672.

Correspondence:
 Shacharh@post.bgu.ac.il