



# Testing three systems of attention with saccadic and manual responses

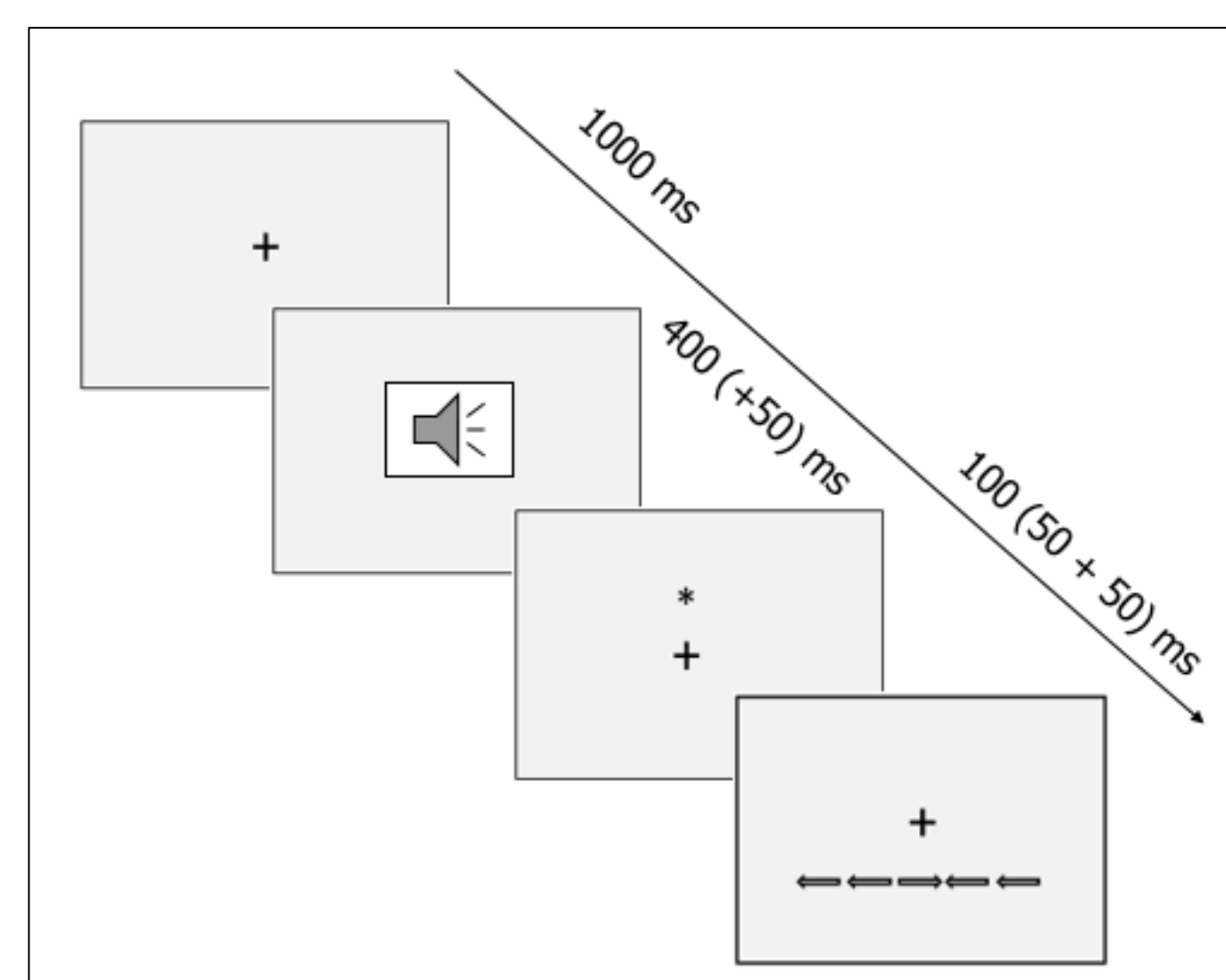
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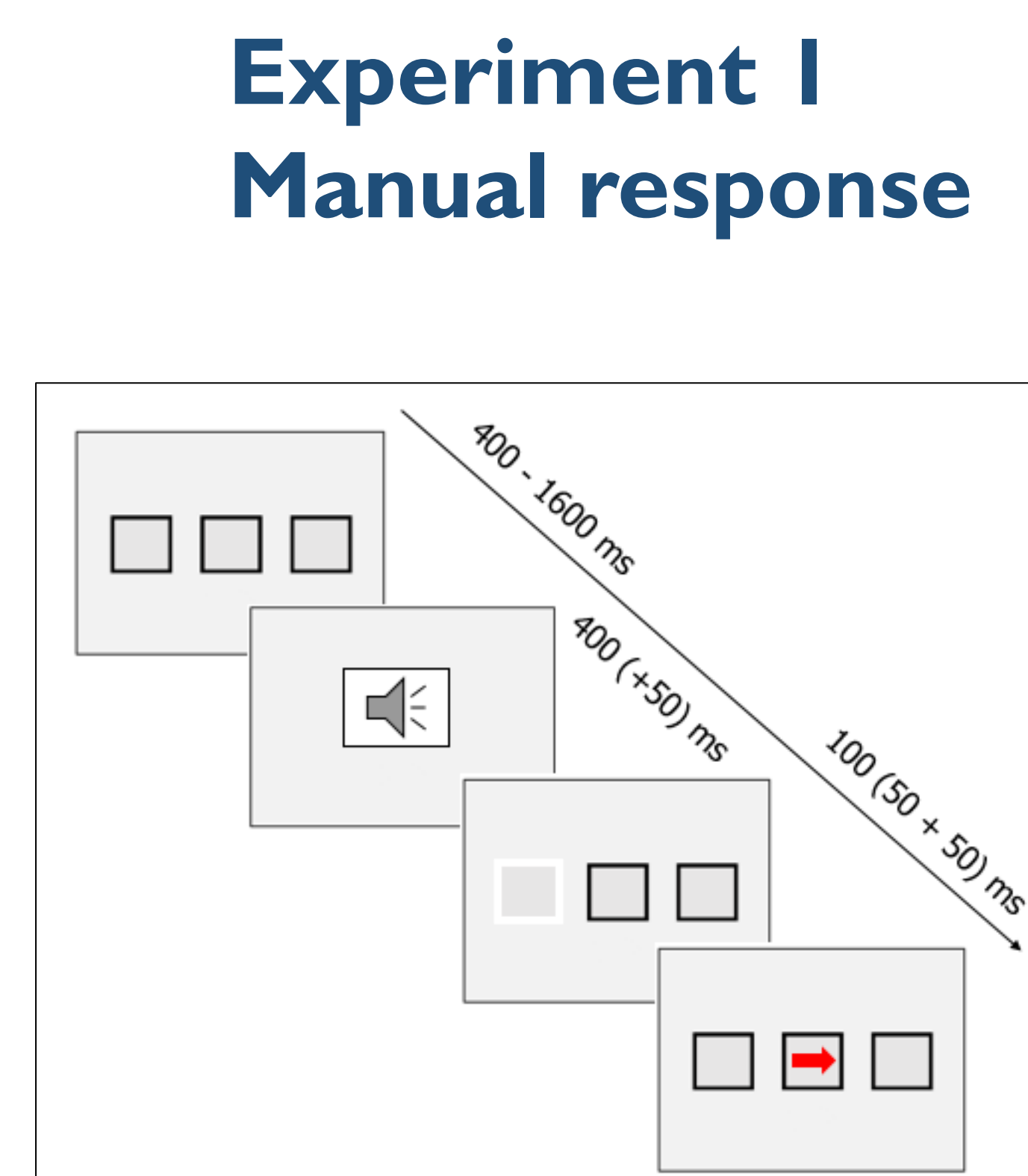
## BACKGROUND

In this study we investigated the differences between reaction time registered with manual (Experiment 1) and saccadic (Experiment 2) responses in the Attentional Network Test (ANT) (Fan et al., 2002). For Experiment 1 we further developed the version of the ANT with an auditory trigger (Callejas, Lupiáñez, & Tudela, 2004) by adding an eye-tracker to control for eye movements made after cue onset. For Experiment 2, we modified the ANT by switching the modality of response and adding an anti-saccade task. Anti-saccades require executive attentional control (Vandierendonck et al., 2007), which suggests it as a saccadic replacement for congruency in the original ANT.

## EXAMPLES OF TRIALS



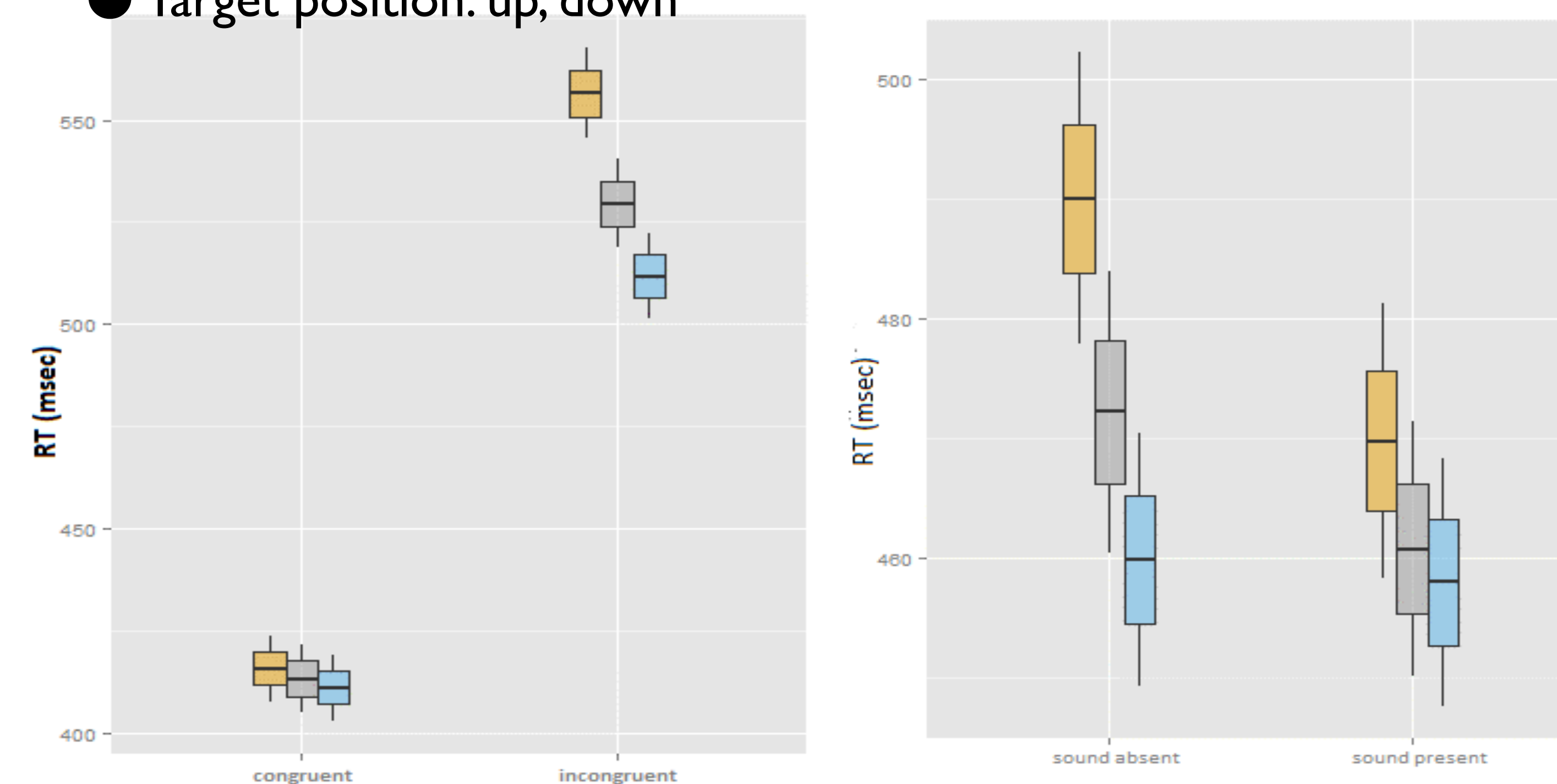
**Experiment 2**  
Saccadic response



**Experiment 1**  
Manual response

## EXPERIMENT 1

- Alerting sound condition: present, absent
- Cue condition: valid, invalid, neutral (regarding the target location);
- Cue location: up, down
- Target condition: congruent, incongruent
- Target position: up, down



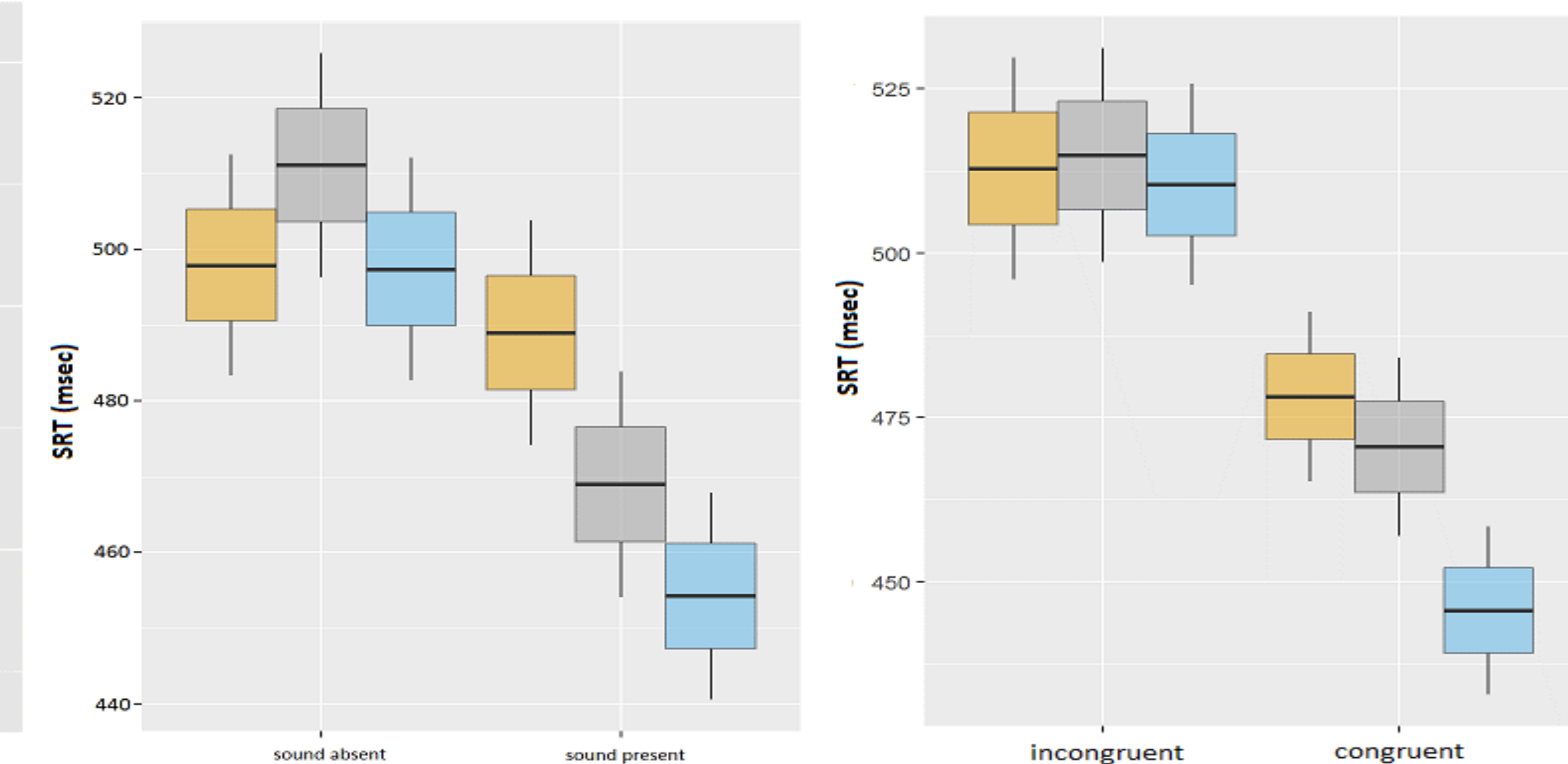
**Experiment 1**

Invalid Valid Neutral

- ANOVA for trials with correct responses only;
  - All three main effects observed:  $F(1)=8.718, p=.003$  for alertness;  $F(1)=252.957, p<.001$  for congruency;  $F(2)=11.337, p<.001$  for validity;
  - Interaction between congruency and validity ( $F(2)=4.093, p=.017$ ).
- Apart from that, we also tested for differences in RT in trials with and without eye movements (Experiment 1). We ran ANOVA for 3 large categories of data (1) All trials included; (2) Trials with an eye movement in between cue-target interval excluded; (3) Only trials with no eye movements included. We found no significant difference in main effects or interaction between these categories.

## EXPERIMENT 2

- Alerting sound condition: present, absent
- Cue condition: valid, invalid, neutral (regarding the final fixation point location);
- Response condition: saccade, anti-saccade
- Response direction: left, right



**Experiment 2**

- ANOVA for trials with correct responses only;
- Main effects of alerting and congruency:  $F(1)=31.398, p<.001$  for alerting;  $F(1)=57.112, p<.001$  for congruency;
- Interaction between alerting and validity ( $F(2)=3.661, p=.026$ ), with a trend of increase in SRTs in trials with alerting sound, but without such trend in trials without alerting sound.

### References

Callejas, A., Lupiáñez, J., & Tudela, P. (2004). The three attentional networks: On their independence and interactions. *Brain and Cognition*, 54(3), 225–227.  
 Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience*, 14(3), 340–347.  
 Vandierendonck, A., Deschuyteneer, M., Depooter, A., & Drieghe, D. (2007). Input monitoring and response selection as components of executive control in pro-saccades and anti-saccades. *Psychological Research*, 72(1), 1–11.