

Measuring Attention in Both the Upper and Lower and the Left and Right Visual Fields

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Introduction

- Attention can be viewed as a system of three separate and independent networks: Conflict resolution, spatial Orienting, and Alerting.
- Posner and associates devised a simple computerized test to measure the attention networks: the Attention Network Test (ANT).
- We found differences between the Upper and Lower visual fields in the ANT, showing that Conflict was larger in the Lower VF than the Upper VF.
- Clinical and physiological data demonstrate attentional differences between the left visual field (LVF) and right visual field (RVF), indexing hemispheric differences.
- We ran a lateralized version of the ANT, which efficiently measured the attention networks separately in each hemisphere.
- Therefore, we adapted the ANT to measure the networks of attention in 4 quadrants.

Methods

Participants:

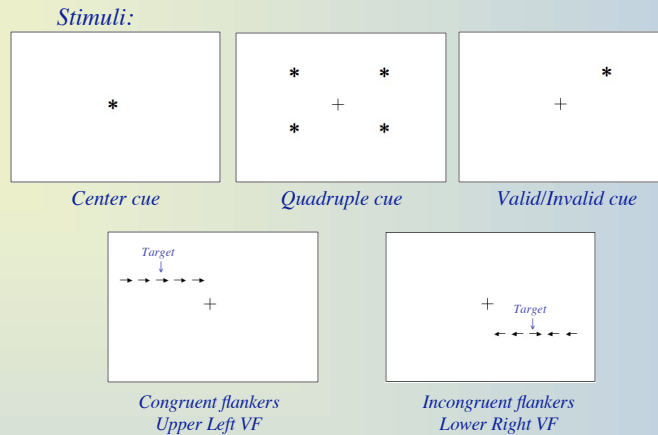
- 55 UCLA undergraduates ran the quadrant ANT

Stimuli:

- Target: middle arrow pointing left or right
- Flanker arrows:
 - Congruent = same direction as target
 - Incongruent = opposite direction from target
- Exposure: target & flanker arrows presented for 170msec
- Cue: target preceded by a warning cue:
 - Center cue = asterisk at central fixation
 - Quadruple cue = asterisk at each possible target location
 - Valid cue = asterisk at the location where the target will appear
 - Invalid cue = asterisk at the diagonally opposite location to where the target will appear
 - No cue

Task:

- Identify the direction of the target arrow by making a 2-choice manual button press

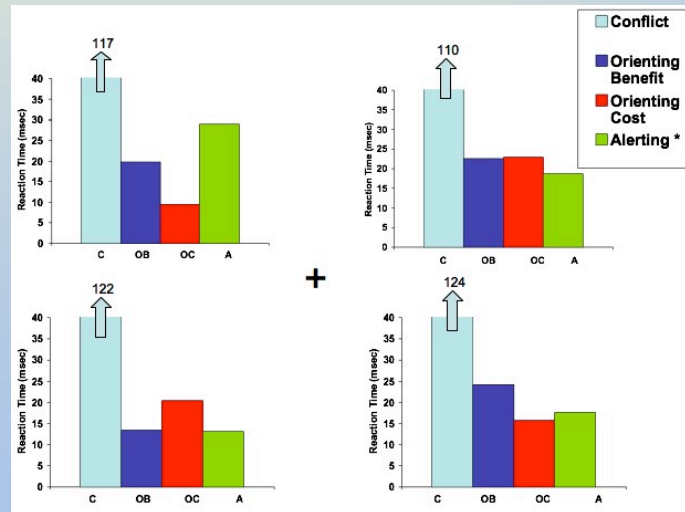


Definitions:

1. **Conflict:** C = Reaction time (RT) for trials with Incongruent flankers minus RT for trials with Congruent flankers
2. **Orienting:** divided into cost & benefit components
 - **Orienting benefit:** Ob = Center cues minus Valid cues
 - **Orienting cost:** Oc = Invalid cues minus Center cues
3. **Alerting:** A = No cues minus Quadruple cues

Results

- Each network (Conflict, Orienting benefit, Orienting cost, and Alerting) was represented in each of the four quadrants.
- Alerting interacted with quadrant, such that it was largest in the Upper Left VF, intermediate in the Upper Right and Lower Right VF, and smallest in the Lower Left VF (see Figure).
- There were no Upper and Lower VF differences in Conflict, in contrast with previous results from the ANT.



Conclusions

- Two attentional dimensions [Near space (lower VF) & Far space (upper VF) and Left hemisphere (RVF) & Right hemisphere (LVF)] show an interaction with the Alerting network of attention.
- The quadrant ANT can be useful for future measures of attention in normal and pathological conditions.

References

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