

# Visual Performance Fields and Motor Control

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## Introduction

- **The ability to perceive objects is not evenly distributed across the visual field.**

- **Performance field:**

**Horizontal-vertical anisotropy (HVA)**

Superior discrimination and detection along the horizontal than vertical axis.

*Rijsdijk et al. (1980); Rovamo & Virsu (1979)*

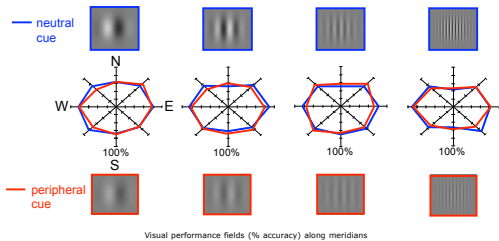
**Vertical meridian asymmetry (VMA)**

Impairment in performance at locations directly above fixation in contrast sensitivity and spatial resolution tasks.

Heterogeneities more pronounced with increasing spatial frequency, set size and eccentricity.

Spatial performance fields determined by visual, not attentional, constraints. Attention increases threshold, but performance fields remain constant.

*Carrasco, Talgar & Cameron (2001); Cameron, Tai & Carrasco (2002); Talgar & Carrasco (2002); Carrasco, Williams & Yeshurun (2002)*



- **Visually guided motor response:**

Spatial attention modifies both visually guided manual and ocular motor responses.

*Sheliga, Craighero, Riggio & Rizzolatti (1996); Lee (1999)*

Motor responses can be used to quantify covert attention.

*Peterson, Kramer & Irwin (in press)*

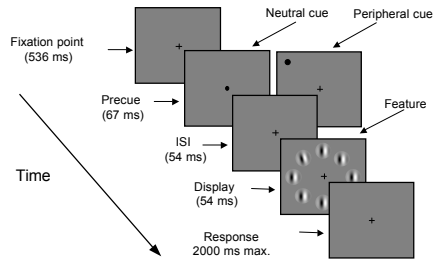
Upper and lower visual asymmetry present in visually guided pointing responses.

*Danckert & Goodale (2001)*

- **Are HVA and VMA present in visually guided pointing responses?**

- **Are responses affected by transient covert attention?**

## Trial Sequence



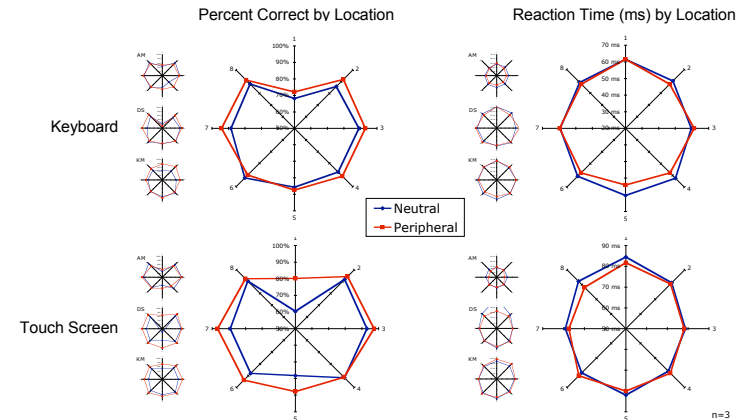
\* Stimulus contrast varied for each observer to attain accuracy of ~82%

## Methods

- 2AFC detection task
- 3 observers
- Target: 2°, 4 cpd, 30° tilted Gabor, present or absent
- Target at 1 of 8 isoecentric locations, at 9° eccentricity, with distracters
- Peripheral cue adjacent to potential target location
- Neutral cue at fixation
- Elo Entuitive 1525C 15" CRT Desktop Touchmonitor
- Keyboard response: press one of two buttons to indicate target present or absent
- Direct motor response: touch target's location on the monitor if detected, or touch fixation if no target perceived. Pointing movements started from a fixed location (keyboard spacebar)



## Results



- **Accuracy and reaction time VMA & HVA are present in both response paradigms.**
- **Attention modifies motor-response-generated performance fields.**

## Future Research...

Investigate modifications of three-dimensional response trajectory evoked by transient covert attention using Optotrak motion measurement system

## References

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Adam Moss contributed to this project as part of the Intel Science Talent Search (semifinalist)