



# The role of the attentional gradient in line bisection performance of simulated hemineglect

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## INTRODUCTION:

- Hemineglect may involve a gradient of attention favouring ipsilateral space.
- Patients also bias line bisection ipsilaterally.

**QUESTION:** Is bisection bias due to the attentional gradient?

## STRATEGY:

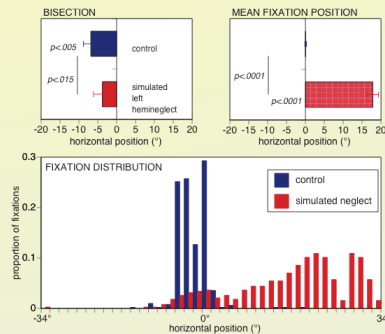
- Examine this in a simulated neglect model
- Create attentional gradient with a demanding conjunction search task involving luminance and movement on the right side of the screen.

## EXPERIMENT 1:

- Manual line bisection simultaneous with right-sided conjunction search task.

## METHODS

- 12 subjects, 2 blocks, 48 trials.
- 'control' - bisection alone
- 'simulated left neglect' - bisection plus right conjunction search task



## RESULT:

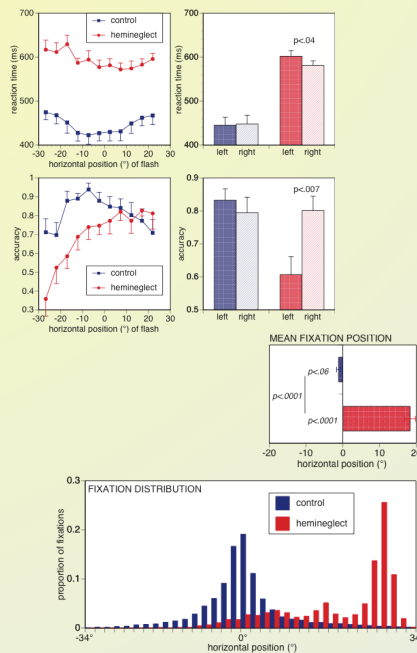
- Neglect-like ocular motor behaviour, with shift of fixations to right, but only a small rightward shift of bisection compared to control condition.

## EXPERIMENT 2:

- Did the conjunction search in fact generate an attentional gradient?

## METHODS

- Randomly occurring probe flashes presented at different horizontal positions, subjects pressed key if they detected the probe.
- 12 subjects, 2 blocks, 96 trials.
- 'control' - flashes alone
- 'neglect' - flashes + search task



## RESULTS:

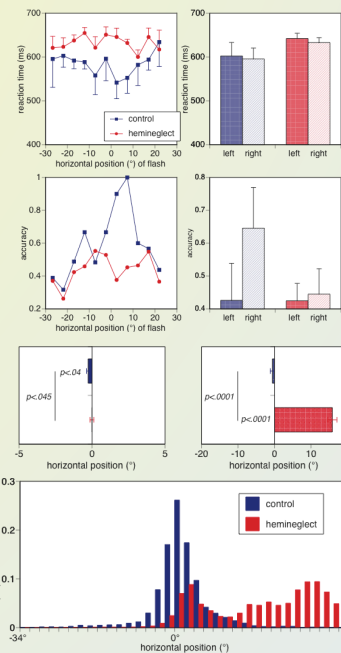
- Accuracy of probes detection shows convincing attentional gradient, which is also reflected in similar ocular motor behaviour to Experiment 1

## EXPERIMENT 3:

- Does the conjunction search task create an attentional gradient during line bisection?

## METHODS

- Probe flashes occur while subjects perform line bisection AND right conjunction search task.
- 12 subjects, 2 blocks, 48 trials
- 'control' - flashes + bisection
- 'neglect' - flashes + bisection + search task



## RESULTS:

- Ocular motor shift replicated, but still only very small shift of bisection. However flash probes now show no convincing evidence of attentional gradient.

## EXPERIMENT 4:

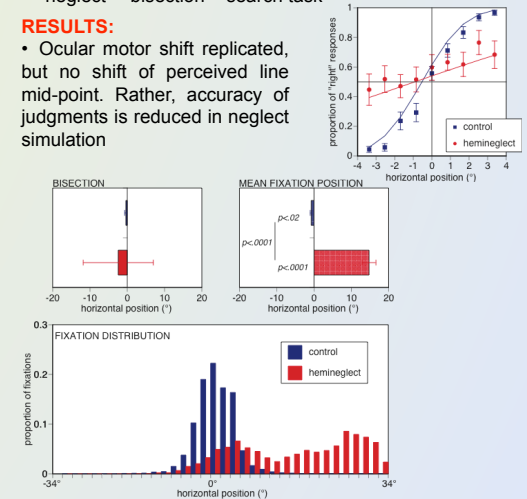
- If we use very brief line presentation, can the attentional gradient shift perception of line mid-point?

## METHODS:

- Pre-bisected lines were presented for 60ms, subjects responded whether mark was left or right of line center.
- 10 subjects, 2 blocks, 108 trials
- 'control' - bisection
- 'neglect' - bisection + search task

## RESULTS:

- Ocular motor shift replicated, but no shift of perceived line mid-point. Rather, accuracy of judgments is reduced in neglect simulation



## CONCLUSIONS:

- Right conjunction search task can produce an attentional gradient.
- This can bias ocular motor behaviour during line bisection, but creates only a minimal shift in bisection judgments.
- This may in part be due to marked reduction in the attentional gradient when line bisection task is added.
- Brief line presentation, too brief to allow saccades, still does not shift bisection point.
- Perhaps humans are too adept at rapid shifts of attention, making this search task an inadequate model of neglect.
- Alternatively, bisection bias may reflect other phenomena, such as altered representation of spatial metrics.