

The contribution of parvo- and magnocellular pathways to size processing for perception and action

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Vision

To perceive the world

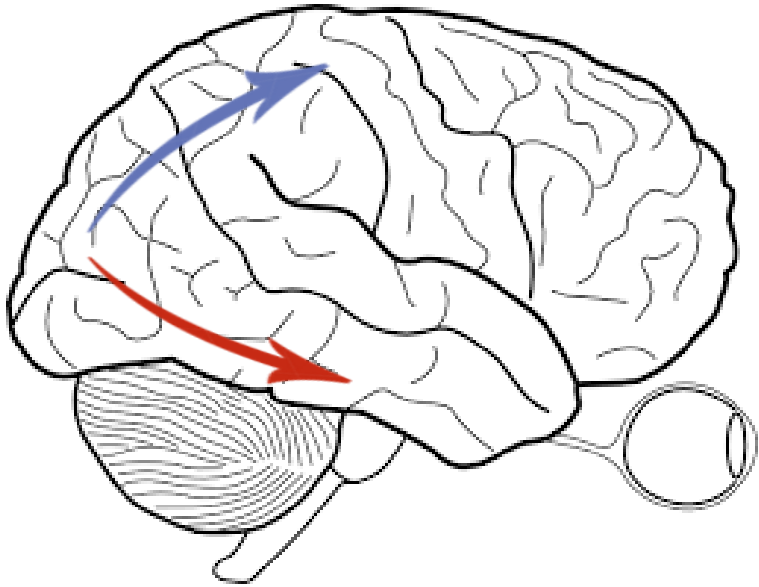


To act upon the world

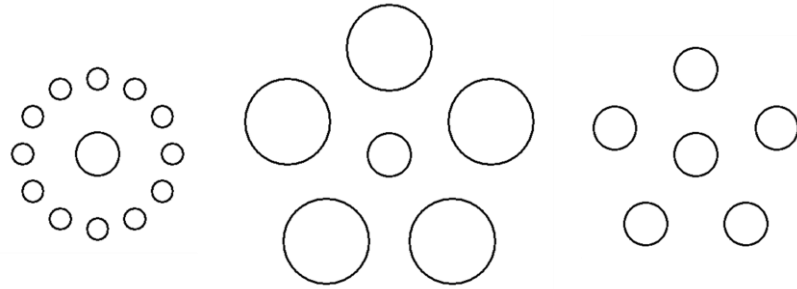


Higher stages of cortical processing

The size contrast illusion paradigm



Action is assumed to rely on real size estimates
and should thus be insensitive to size-contrast illusions



Perception is relative
and thus affected by size contrast illusions

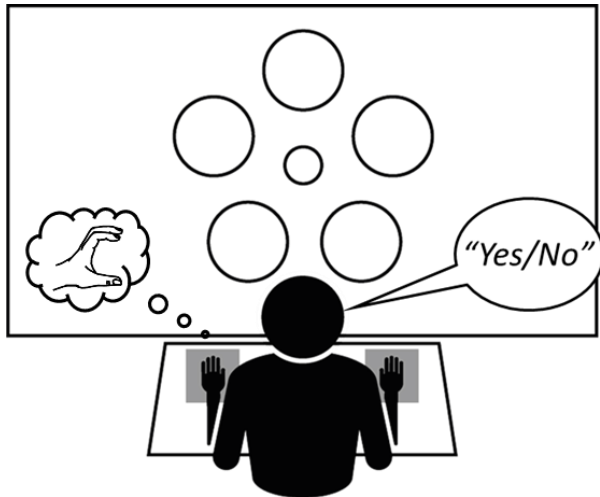
Prospective action judgements

i.e., judgements about how one is likely to act

- Covert activation, without visual and proprioceptive feedback

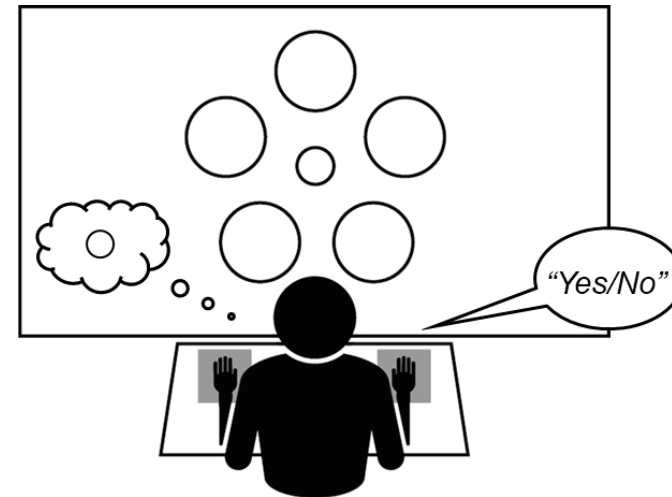
Grasping Judgement

“Would you be able to grasp the central circle between index finger and thumb?”



Perceptual Judgement (of Size)

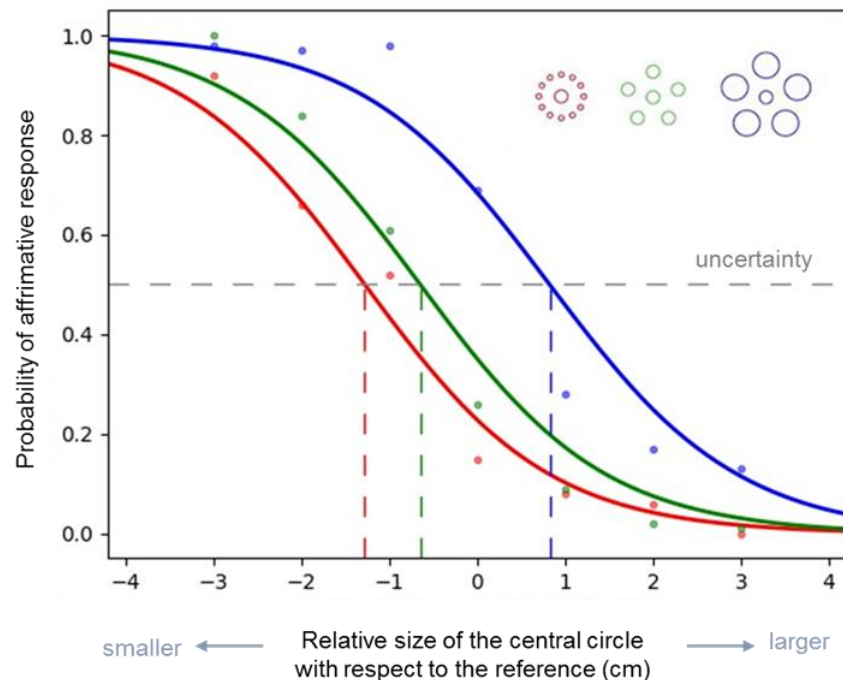
“Is the central circle smaller than the standard?”



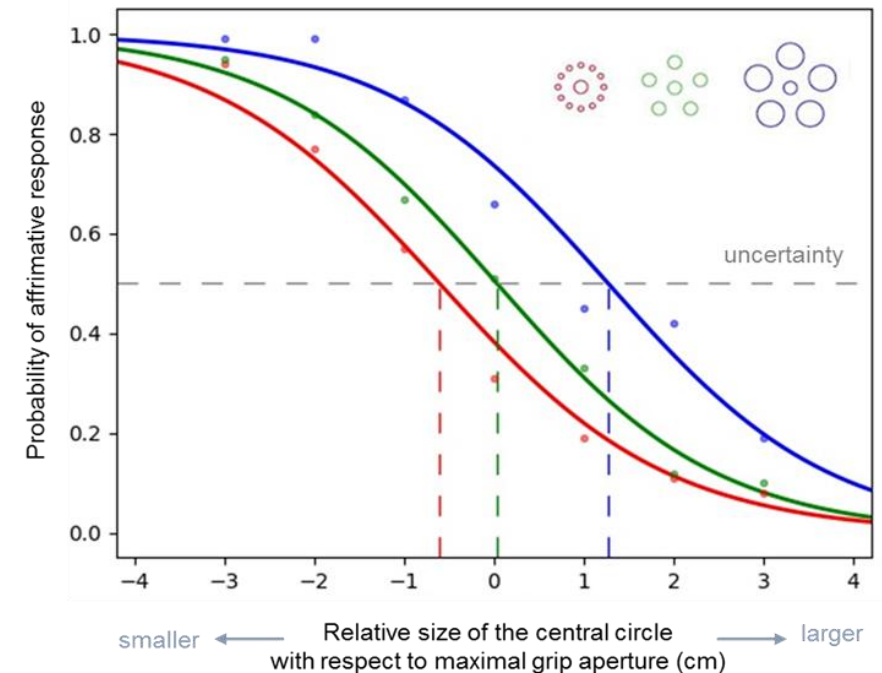
At the behavioural level

Similar effects of the illusion on perceptual and grasping judgements

Perceptual Judgement (of Size)



Grasping Judgement



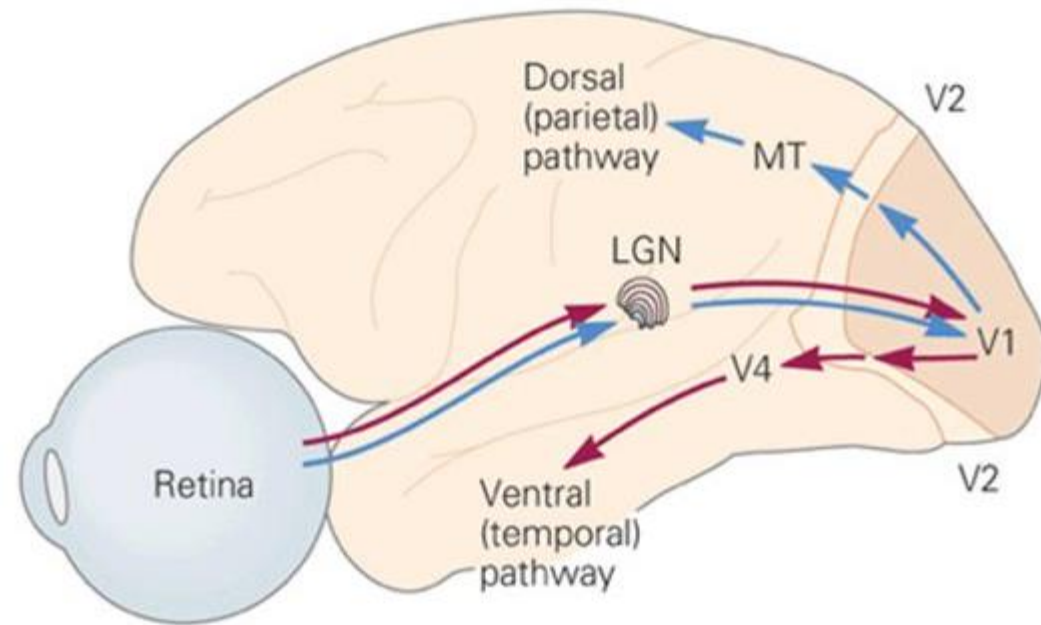
Lower stages of cortical processing

Magnocellular neurons

- Colour-blindness
- High luminance contrast sensitivity
- Low spatial resolution
- Fast temporal resolution

Parvocellular neurons

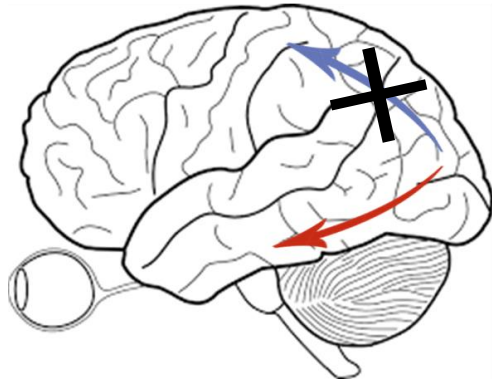
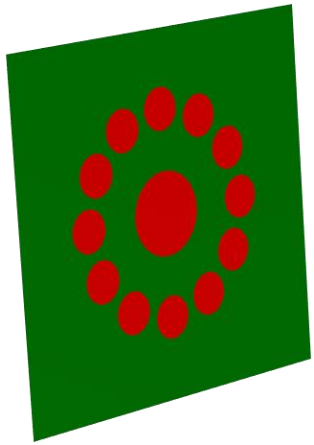
- Colour sensitivity
- Low contrast sensitivity
- High spatial resolution
- Slow temporal resolution



I. Bias stimuli to the P-pathway

By using equiluminant stimuli

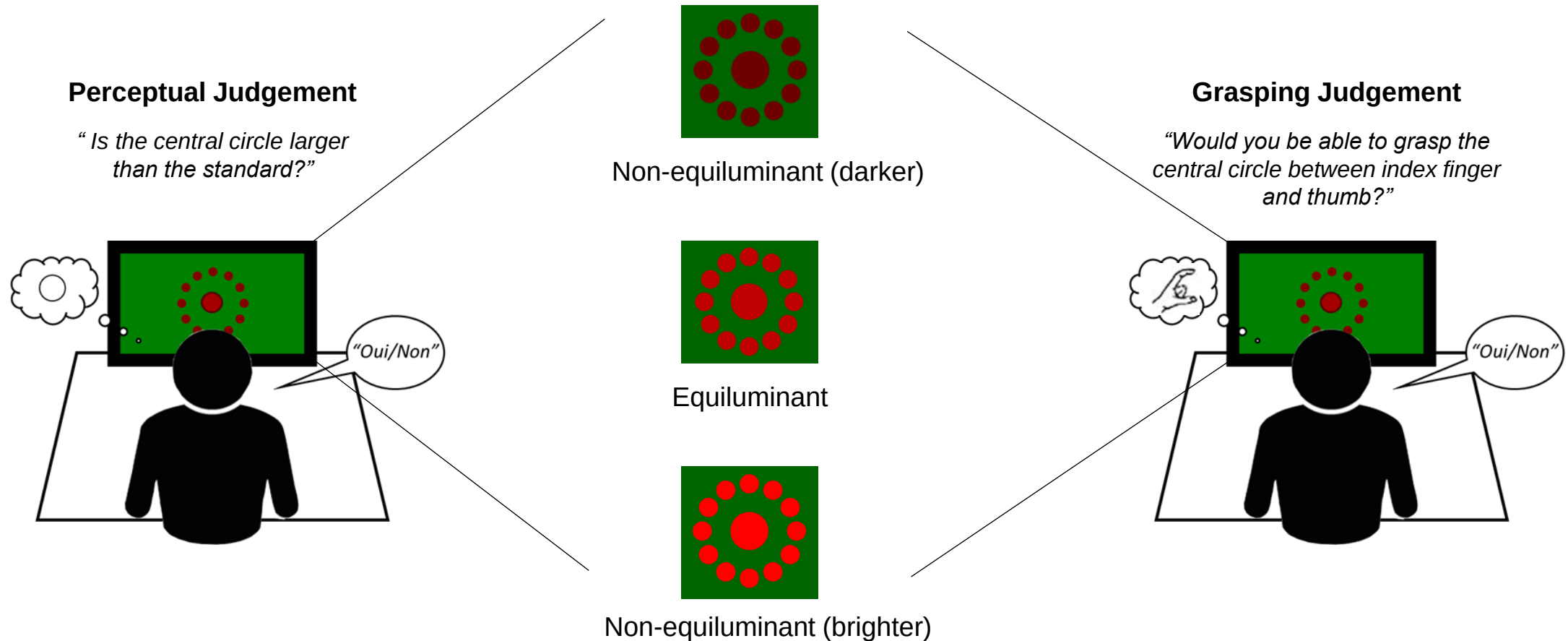
= stimuli containing colour, but not luminance modulation



Does it affect perceptual/grasping judgements on central circle ?

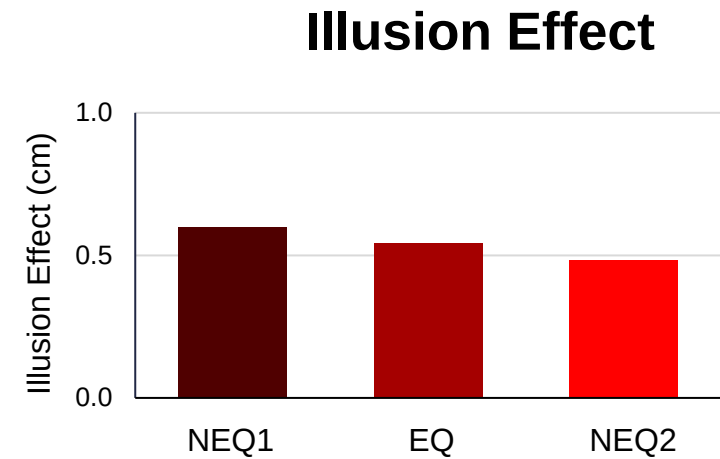
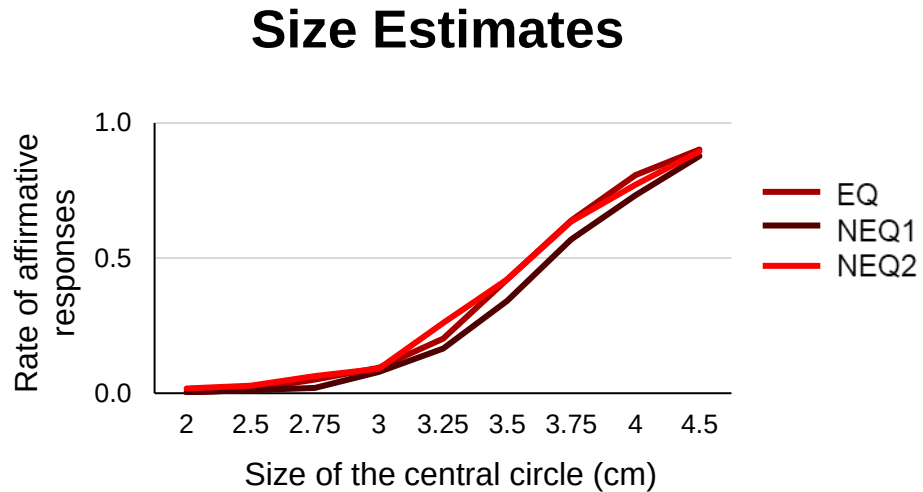
Does it modulate the size-contrast illusion ?

- 1) Definition of equiluminance point with flicker fusion method
- 2) Perceptual/grasping judgements performed on

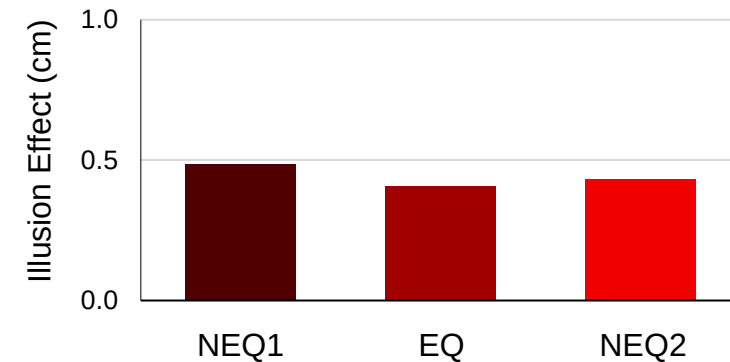
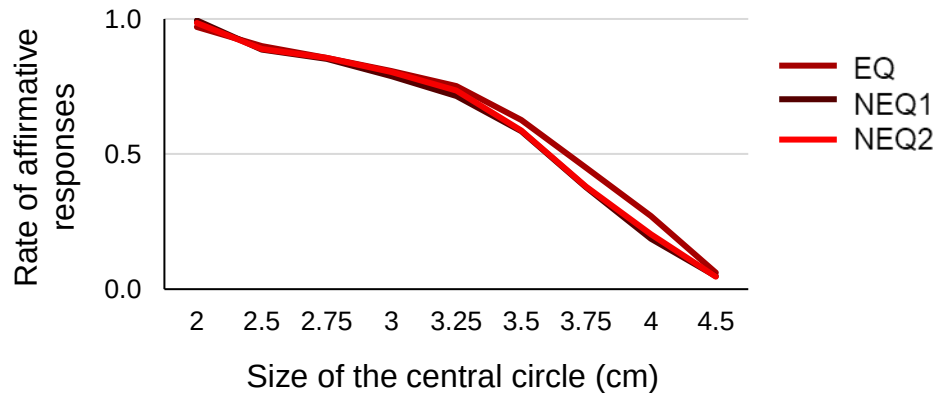


No effect of equiluminance on size estimates and illusion effect (= large – small condition) on both judgments

PERCEPTUAL JUDGMENTS

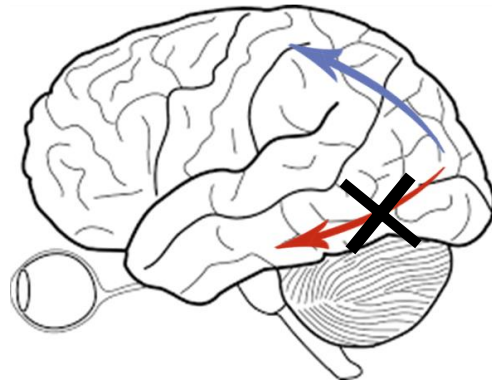
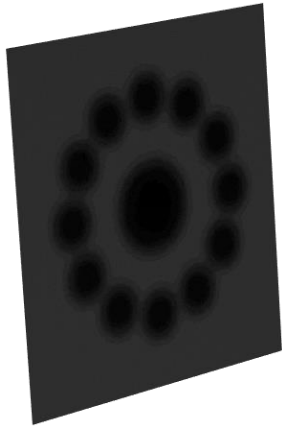


GRASPING JUDGMENTS



II. Bias stimuli to the M-pathway

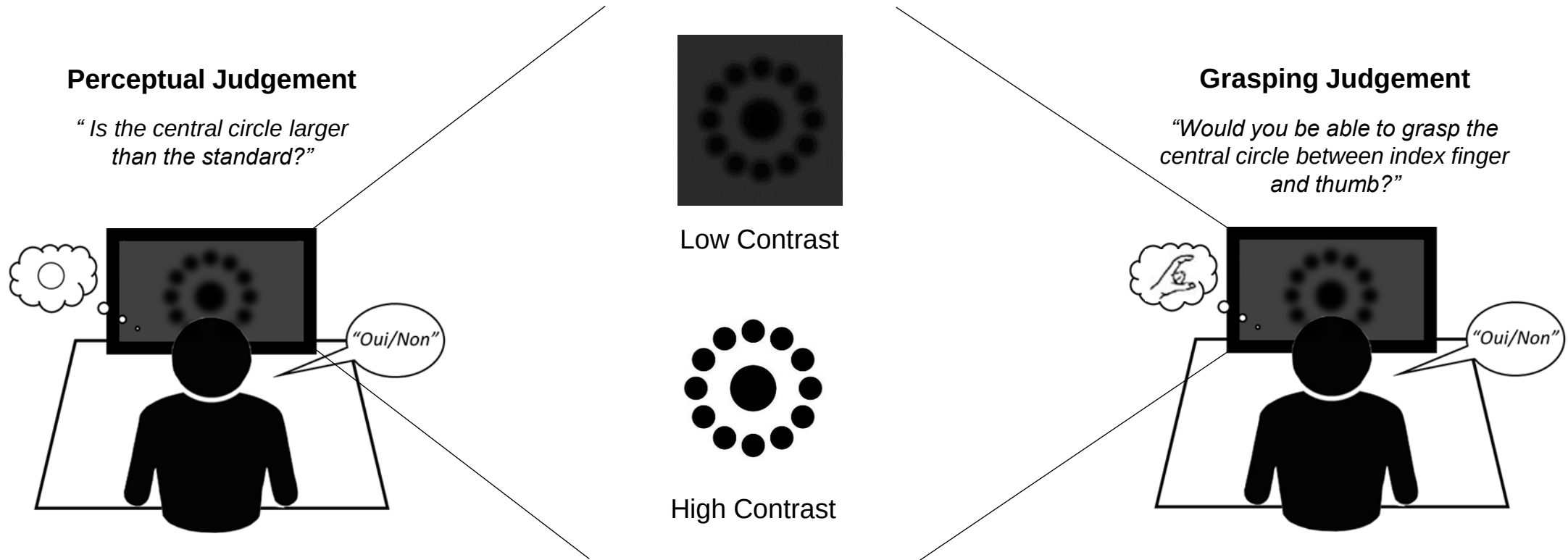
By using stimuli of low contrast, low spatial and high temporal frequencies



Does it affect perceptual/grasping judgements on central circle ?

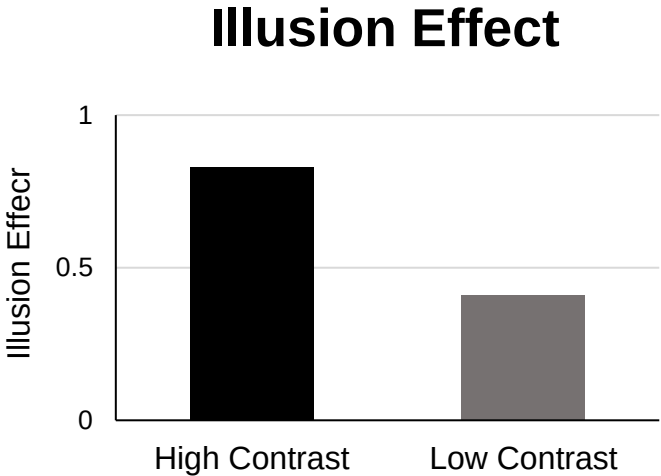
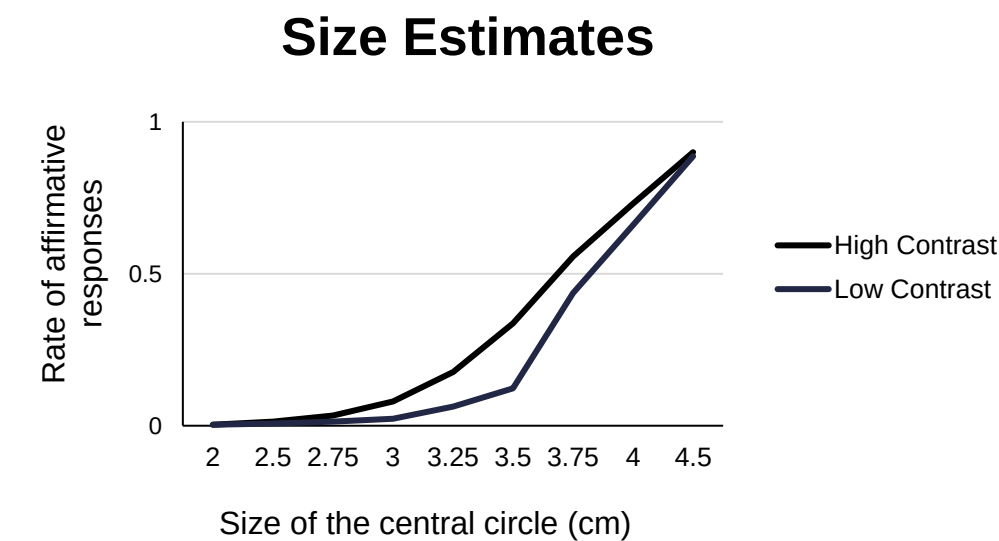
Does it modulate the size-contrast illusion ?

- 1) Fixed contrast (3%), spatial frequency (1.25 c/deg), temporal frequency (25hz)
- 2) Definition of contrast threshold
- 3) Perceptual/grasping judgements performed on

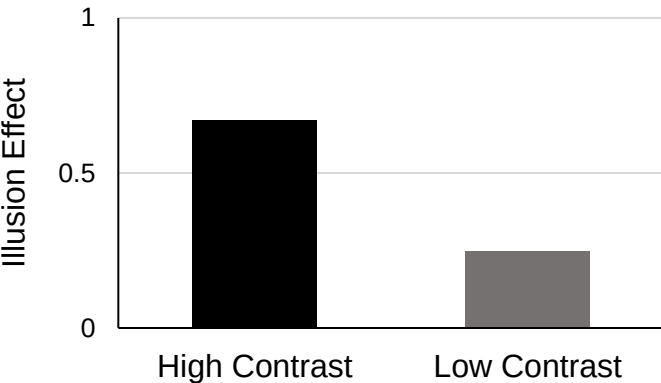
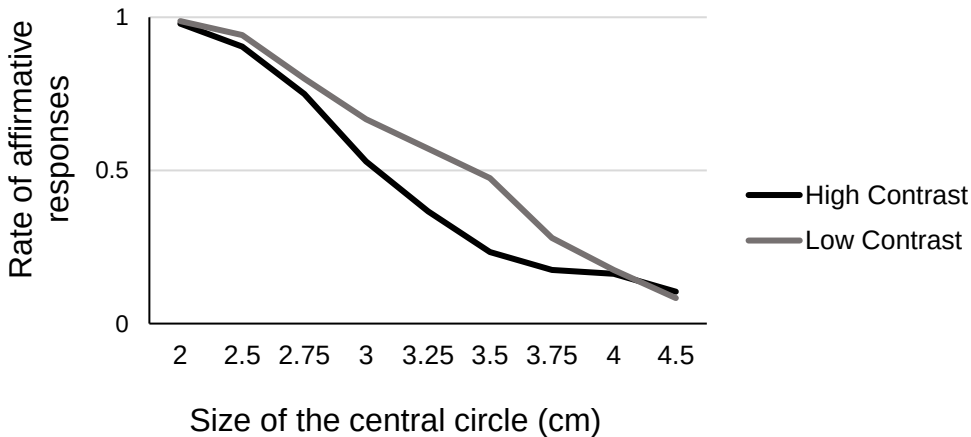


Effect of M-biased stimuli on size estimates and illusion effect on both judgments (preliminary results)

PERCEPTUAL
JUDGMENTS



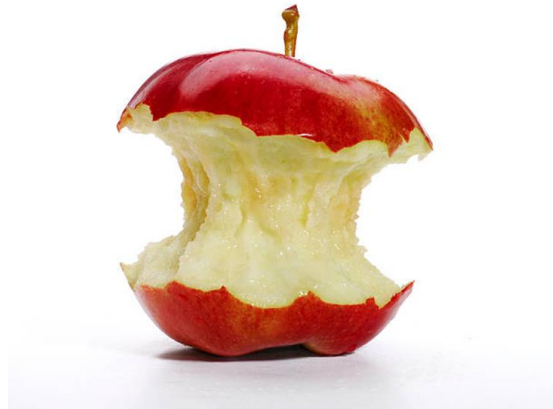
GRASPING
JUDGMENTS



Conclusion

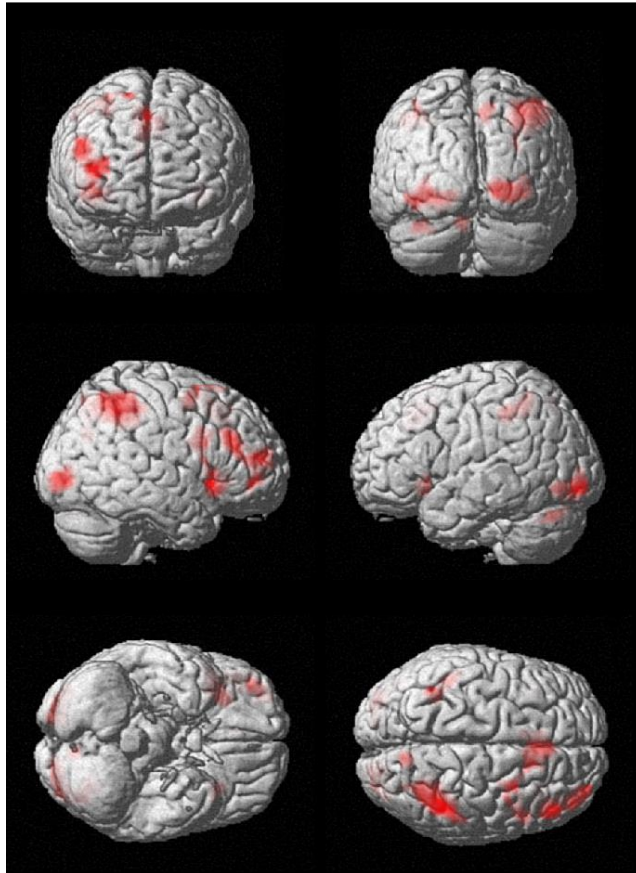
- The illusion influences both perceptual and grasping judgements
- P-biased stimuli did not affect perceptual or grasping judgments
- M-biased stimuli affected similarly the illusion effect on perceptual and grasping judgments
- Perceptual and grasping judgments seem to rely on similar high and low level processing

Thank you for your attention !

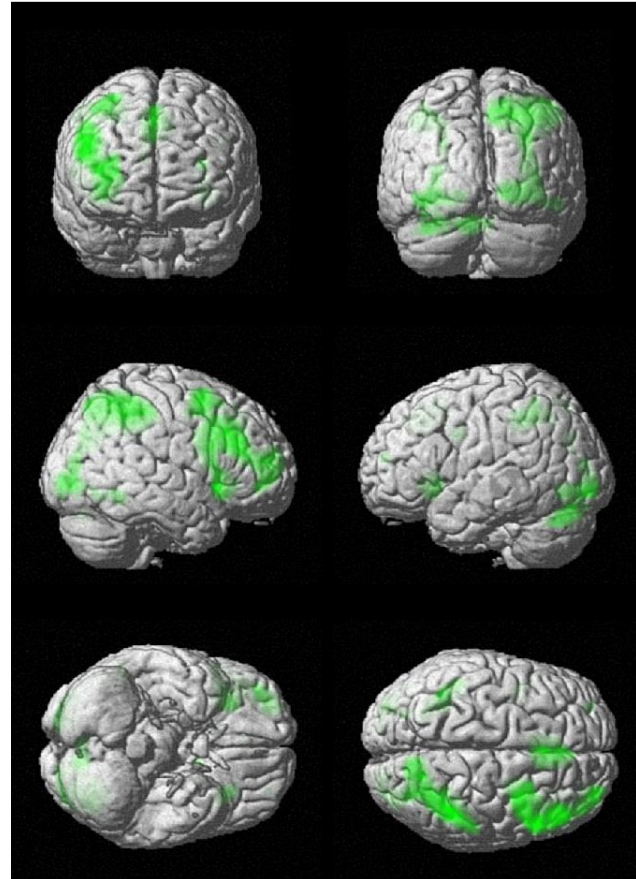


At the neural level

Grasping Judgement

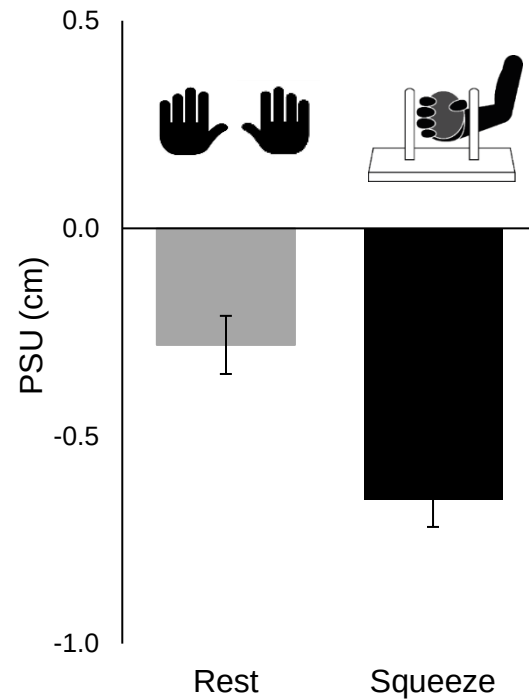


Perceptual Judgement



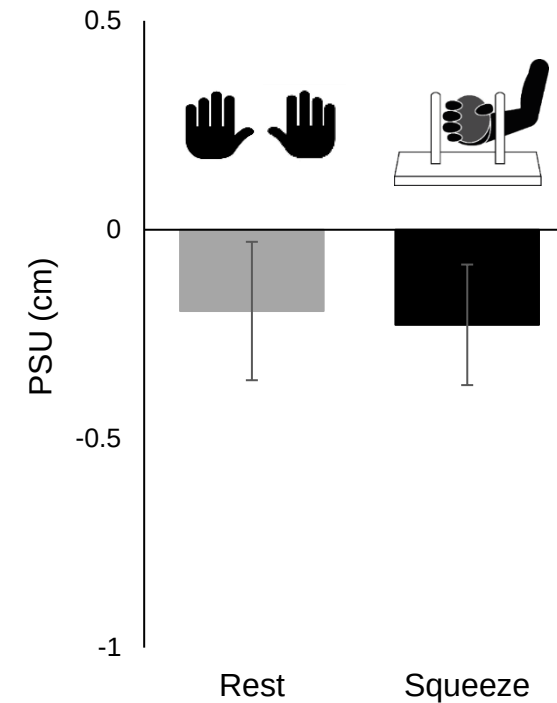
Effect of hand position on grasping judgements

Grasping Judgement



Underestimation of grasping capability

Perceptual Judgement



No effect of the motor task