Local motion versus global shape in biological motion: A cueing eye movement task

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INTRODUCTION

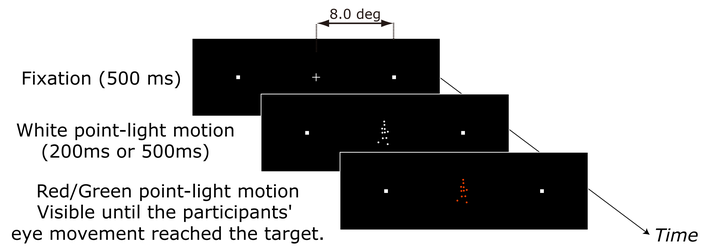
- Directional information from point-light walker (PLW) displays can be obtained from:
  - »the overall, motion-mediated shape of the figure[1]
  - »the local motion from the motion of the feet[2]
- Conflicting findings are reported regarding incongruency effects:
  - »local motion induces an incongruency effect[3]
  - »local motion does not induce an incongruency effect[4]
- Previous eye movement studies revealed that social cues such as gaze and head orientation control the focus of attention in the voluntary eye movement task.[5-7]

Here we investigated how the two sources of directionality contained in PLWs affect the saccade latency and accuracy in the voluntary eye movement task.

METHODS

- Participants
  16 naive observers (Exp.1), 12 naive observers (Exp.2,3)
- Stimuli
  - PLWs were presented in sagittal or frontal view
- Design factors
  - Coherency (Exp.1,2) / Direction (Exp.3)
    - »Exp.1 (coherent or scrambled PLW)
    - »Exp.2 (coherent or scrambled all but feet PLW)
    - »Exp.3 (coherent forward or backward PLW)
  - Stimulus Color Onset Asynchrony (SCOA: 200ms or 500ms)
  - Congruency (congruent, neutral, or incongruent)
- Task
  - Saccade to either left or right target square when the color of point-lights changes from white to green or red

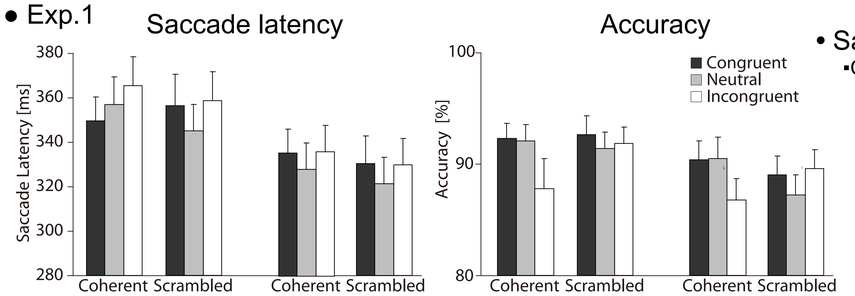
- Experimental procedure



- Data Analysis
  - The first saccade was detected automatically using a velocity criterion of 30°/s. A trial with saccadic latencies below 80 ms or more than 3 S.D. above the mean was discarded.

RESULTS

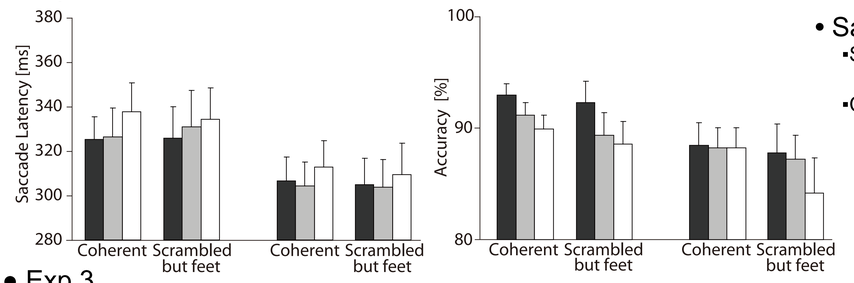
- Exp.1



- Saccade latency
  - Coherency × SCOA × Congruency, p<0.05
    - »Coherent PLW condition (200ms SCOA): Incongruent > Congruent, Neutral
    - »Scrambled PLW condition 200ms SCOA > 500ms SCOA Congruent, Incongruent > Neutral
- Accuracy
  - SCOA, p<0.01
    - »200ms SCOA > 500ms SCOA
  - Coherency × Congruency, p<0.05
    - »Congruent, Neutral > Incongruent for the coherent PLW, but not for the scrambled PLW

Global shape affects saccade latencies and accuracies, but local motion does not.

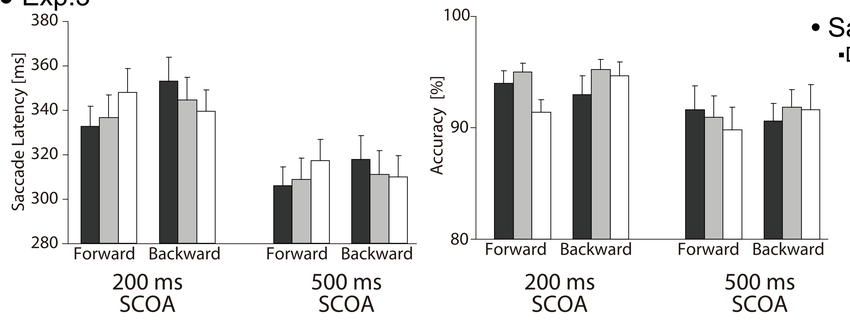
- Exp.2



- Saccade latency
  - SCOA, p<0.01
    - »200ms SCOA > 500ms SCOA
  - Congruency, p<0.01
    - »Incongruent > Congruent, Neutral
- Accuracy
  - SCOA, p<0.05
    - »200ms SCOA > 500ms SCOA
  - Congruency, p<0.05
    - »Congruent > Incongruent

Local motion affects saccade latencies and accuracies, if they are in the original place.

- Exp.3



- Saccade latency
  - Direction × Congruency, p<0.01
    - »Forward: Incongruent > Congruent, Neutral
    - »Backward: Congruent > Incongruent, Neutral
- Accuracy
  - SCOA, p<0.05
    - »200ms SCOA > 500ms SCOA

Again, local motion affects saccade latencies, even if global shape is identical

DISCUSSION

- Local feet motion cues have a significant effect on overt attention when they retain their familiar, predictable location within the display.
- When incongruent with the cued side, the direction of the feet increased saccade latencies and induced more errors.
- The current findings resolve previous conflicting findings regarding an incongruency effect for the local motion of the feet.
  - »Flanker task[4]
    - incongruency effect observed only for coherent PLW
    - for scrambled PLW, location of each dot was changed by trial by trial (→Experiment 1)
  - »Simon task[3]
    - incongruency effect was observed for both coherent and scrambled PLW
    - for scrambled PLW, the point-lights were always displaced to the same locations, and the feet point-lights were nearly kept in their original place (→Experiment 2)

References

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