Influence of Form and Motion on Biological Motion Prediction

Introduction

• AIM: To explore the role of form and motion in biological motion prediction using an occlusion paradigm.
• Object form plays an important role in prediction of motion (Shiffrar & Freyd, 1990; Studler et al., 2012)
• Amount of motion exposure prior to occlusion also influences prediction performance (Parkinson et al., 2012)
• We compared biological vs. non-biological form and long vs. short motion exposure in a prediction task.
• We hypothesized the motion of biological objects would be more accurately predicted, particularly at short motion exposures.

Methods

• Occlusion paradigm (Graf et al., 2007)
• Factors: prime motion duration, object type, and temporal offset
• Offset: # of frames away from correct continuation
• All experiments within-subjects

Experiment 1

• Object type: human hand vs. oval
• Prime duration: 100ms, 500ms, 1000ms
• Offsets: -350, -100, -20, 0, 20, 100, 350
• Task: Respond early/late
• Measures: psychophysical curve threshold & slope
• N = 8; 28 trials per condition per subject
• Predictions: difference in full curves between prime durations & object types

Experiment 2

• Investigate more complex objects
• Object type: human hand vs. robot hand
• Prime duration: 110ms, 1000ms
• Offsets: -350, -200, -75, 0, 75, 200, 350
• Task: Respond congruent or not
• Measures: d-prime, response bias (c)
• N = 12; 30 trials per condition per subject
• Predictions: main effects of object type, prime duration, and offset in d-prime; possible interaction between object type & prime duration

Experiment 1 Results

- Oval: difference in full curve in 100 vs 1000, no other differences
- Human: difference in full curve in 100 vs 1000 and 500 vs. 1000

Experiment 2 Results

- D-Prime Results
- Offset Value
- Driven by an increase in hits; no change in false alarms
- Driven by a decrease in false alarms; no change in hits

Conclusions

• Both object form and motion exposure contribute to biological motion prediction, seemingly independently
• Increases in sensitivity for form & motion are driven by an increase in hits
• Increases in sensitivity for larger offset values are mainly driven by a decrease in false alarms

References