

An integrated model for the shading and silhouette cues in the perception of biological motion

Introduction

- Body motion stimulus can induce bistable perception (Vanrie et al. 2004; 2006; Vangeneugden et al. 2012; Schouten et al. 2011).
- The perception of body motion has been modelled using physiologically plausible architectures (Giese & Poggio, 2003; Lange & Lappe, 2006). These models cannot deal with perceptual multi-stability.

Bistable body motion stimulus



- No disparity cues.
- Upper and lower body consistent with motion in different directions.
- Two movement directions are perceived in 2006).
- Similar multi-stability for point-light biological motion walkers in oblique projection.
- Perceptual multi-stability observed for many other perceptual phenomena (reviews e.g. Blake et al. 2001, Leopold et al. 1999).

Goal

Development of a model that accounts for these dynamic phenomena in body motion perception.



• A. Examples of walker stimuli B. Model architecture

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alternation; perceptual switching (Vanrie et al.

- integrates input from form and shading pathways





Recognized Direction

SILHOUETTE stimulus

Recognized Direction

Recognized Direction

- stimulus when both pathways are turned on
- C. Only form pathway on, shaded stimulus walking AWAY
- E. Both pathways active, shaded stimulus walking AWAY.

A. Activity of motion pattern(MP) neurons in response to unshaded

Recognized Direction

B. Mean percept time of MP neurons in response to SILHOUETTE D. Only shading pathway on, shaded stimulus walking TOWARDS

• F. Both pathways active, shaded stimulus walking towards

Histogram of percept durations for model simulation similar to psychophysical data for SILHOUETTE walker

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ABC

- Percept durations show similar form of distribution
- Studies with other multi-stable stimuli report gamma-like distribution, but for the SILHOUETTE walkers both for model and data gamma function is a

1000 randomly positioned disks with texture sampled with probability p from AWAY walker, and with 1-p from TOWARDS walker, changing p allows for gradual transition between perceptual alternatives



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