

MOVEMENT & EVENT PERCEPTION

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PSYC 579

March 16, 2011

Outline

- ① Movement Perception
- ② Event perception
- ③ Application to visual design

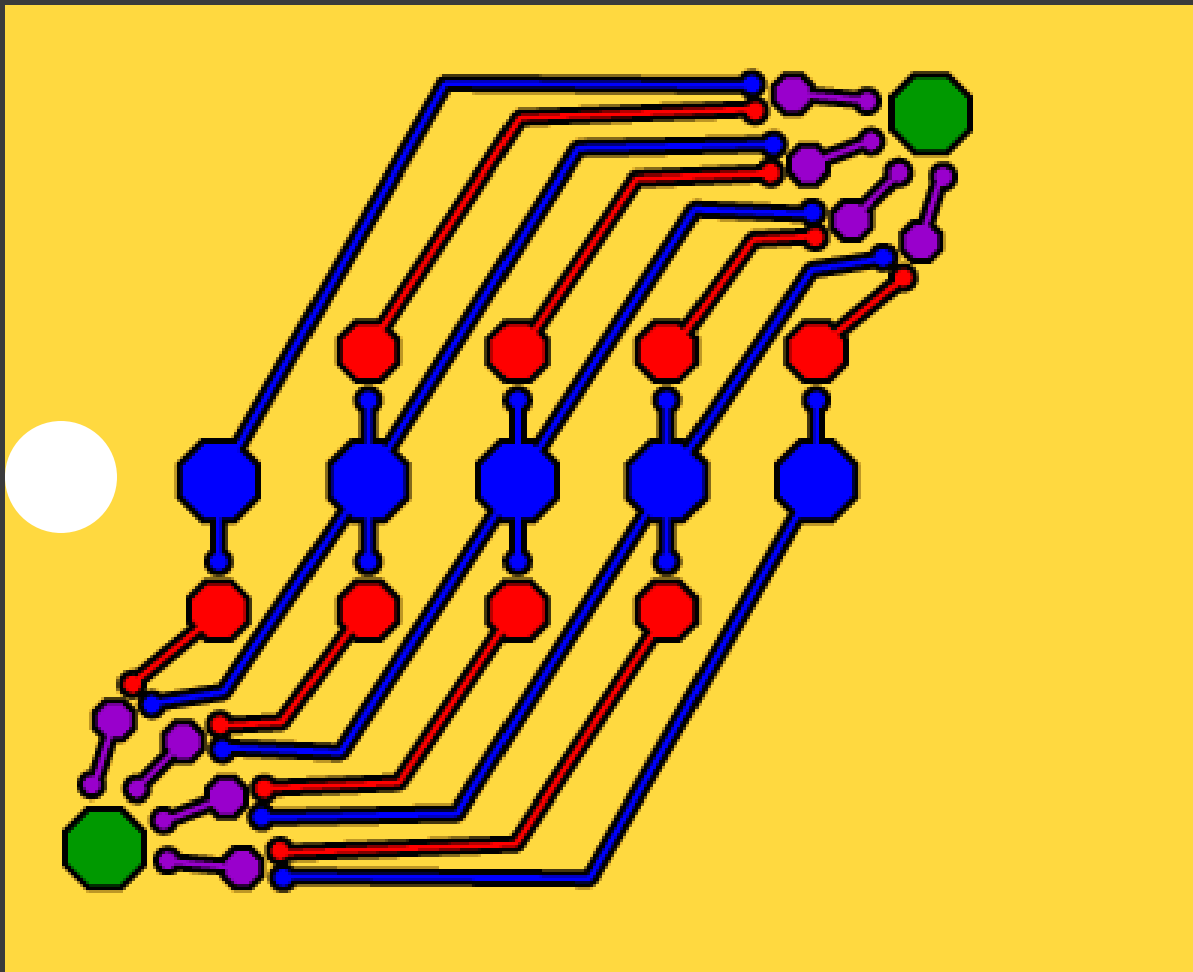
Movement perception

Movement perception

- ⦿ How does brain perceive movement and interpret its direction?
 - Brain interprets
 - Shrinking objects as receding
 - Enlarging objects as approaching

- ⦿ Can movement perception be used to recognize objects?

Movement detection circuit



(Wolfe et al. 2008)

Types of movement

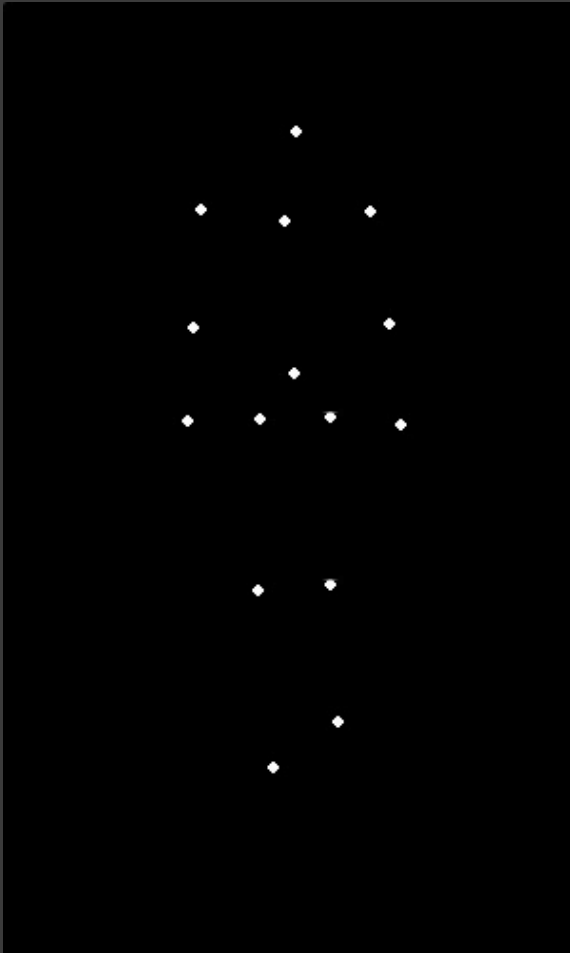
- ⦿ Real movement
 - object is physically moving
- ⦿ Apparent movement
 - Stroboscopic effect
 - Phi phenomena
- ⦿ Induced movement
- ⦿ Movement aftereffect



Motion and Object recognition













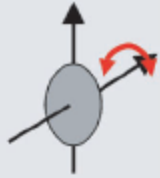
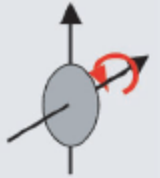
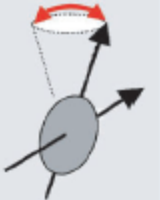
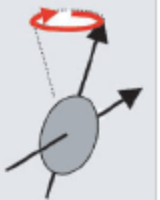
- Is motion an alternative route to recognition?
- Is motion integrated with static cues into an object's representation in memory?

Point-light walker



(Johansson, 1973)

Motion in object recognition

Prototype	A	B	C	D
Shape				
Colour				
Path				
Action				

(Newell et al. 2004)

Facial motion



Fig. 1. Projections of human facial movements onto synthetic heads used as stimuli by Hill and Johnston. Subjects can discriminate individuals on the basis of facial motion information alone. Reproduced with permission from Ref. [f].

(O'Toole et al. 2002)

How does the visual system represent moving objects?

- ⦿ Elementary components
- ⦿ Events
- ⦿ A sequence of images
- ⦿ An interpolation process between object views within the object's motion path

Event perception

Events

- ⦿ World is continuous multimodal assault on our senses
- ⦿ We perceive discrete events
- ⦿ Event vs. activity: eating vs. going to a restaurant
- ⦿ Event: segment of time at a given location that is perceived to have beginning, and end.

Event perception

- ⦿ Extended analogy of object perception
 - Partonomy
 - Like objects, events have parts
 - Taxonomy
 - Like objects, events belong to categories
- ⦿ Objects can be reexamined; events can be experienced only once

How do we segment events?



Fig. 2. Example of event boundaries. These frames from a movie of a woman pitching a tent show the six coarse-grained event boundaries selected most frequently by a group of younger and older adults (Zacks, Speer, Vettel, & Jacoby, 2006, experiment 2). These boundaries marked the ends of events that could be described as (a) put down the tent, (b) spread it out, (c) insert the front tent pole, (d) stake out the ends of the tent, (e) stake out the sides, and (f) attach the rain fly.

(Zacks et al. 2007)

Breakpoints

⦿ Locations

- New action
- New object
- New actor
- New setting
- New goal

⦿ Natural place for a cut

Breakpoints

⦿ Bottom-up processing

- Most physical features changes (sensory features)

⦿ Top-down processing

- Goals, plans, intentions, experience, expectations (conceptual features)

Event segmentation

- ⦿ Automatic
- ⦿ Guides memory and learning
- ⦿ Use specialized neural mechanisms identify boundaries

Applications to visual design

Interfaces to teach procedures or scientific processes

						
Take out the saxophone.	Clean the saxophone.	Attach the saxophone neck.	Attach the saxophone neckstrap.	Attach the saxophone mouthpiece.	Attach the saxophone reed.	Put down the saxophone.
						
Open the saxophone case.	Pick up the cleaning cloth.	Pick up the neck.	Put on the saxophone neckstrap.	Pick up the saxophone mouthpiece.	Wet the reed in your mouth.	Close the saxophone case.
						
Take out the saxophone body.	Wipe the saxophone body with the cleaning cloth.	Insert the neck into the saxophone body.	Adjust the fit of the neckstrap.	Attach the mouthpiece to the neck.	Place the reed on the flat part of the mouthpiece and slide the ligature over it.	Put the saxophone down on the case.
						
Take out the mouth.	Put the cleaning cloth in the case.	Tighten the neck screw.	Attach the neckstrap to the saxophone.	Put the mouthpiece cover in the case.	Tighten the ligature screws.	Leave the room.

(Zacks & Tversky, 2003)

Other applications

- ① Summarize large database of video or multimedia (Christoffersen et al. 2007)
- ① Helpful in scheduling interruptions in the context of tasks such as piloting, driving, or operating machinery

References

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