

Computational Analysis of Motionese: What can infants learn from parental actions?



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Motivation



Motionese

Parents significantly *modify their actions* when interacting with infants versus with adults.

- Higher proximity/interactiveness/enthusiasm etc. [Brand et al., 2002; 2007]
- Decomposition of actions [Rohlfing et al., 2006]

Our Questions

- How does it help infants to learn the actions?
- What visual information is highlighted enough to attract the infants' attention?

Our Approach

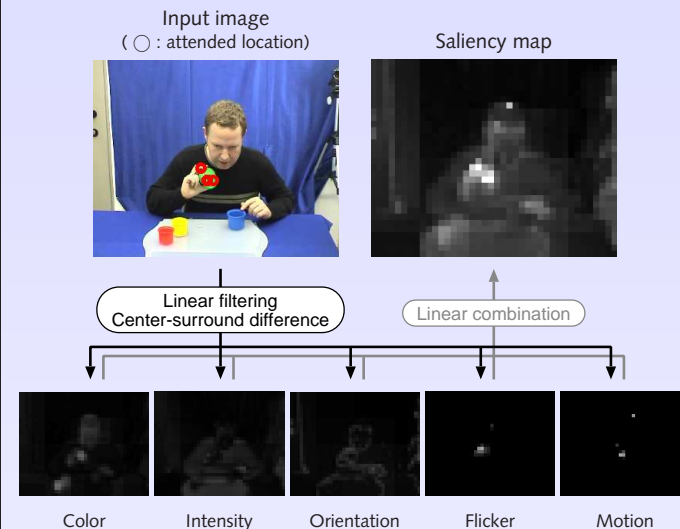
- To apply an *infant-like attention model* to the analysis of motionese

Visual Attention of Infants

- Little semantic knowledge about actions
- High dependency on primitive features

→ *Saliency*-based visual attention
[Nagai et al., 2007; 2008]

Saliency Model



Procedure

1. To extract five features (color, intensity, orientation, flicker, and motion) by linearly filtering the input image
2. To calculate the center-surround difference for each pixel
3. To linearly combine the c-s difference maps
4. To attend to the locations with higher saliency [Itti et al., 1998]

Experiment

Participants: 15 parents (5 fathers & 10 mothers) of 8- to 11-month-old infants (M=10.56, SD=0.89)

Design: Parents demonstrating a stacking-cups task to

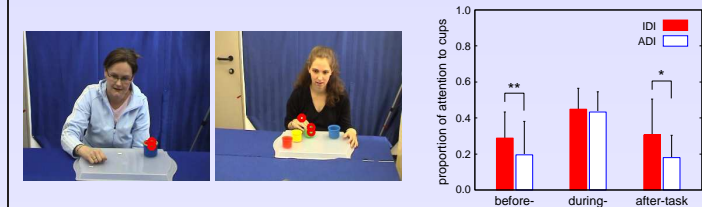
- an infant (IDI condition)
- an adult (ADI condition)

Analysis: Comparing the image locations attended to by the saliency model in IDI with in ADI

Results: Effects of Motionese

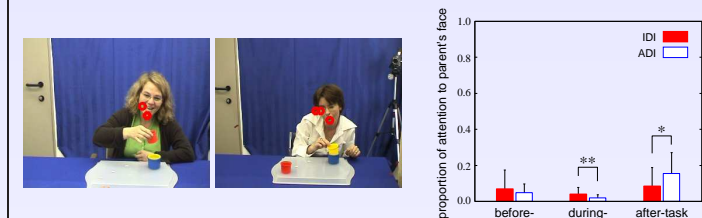
(a) Highlighting initial and final state of objects

- Taking a long pause before/after the task
- Generating additional movement with the cups before the task



(b) Frequent social signals indicating significant events

- Suspending the cup-handling movement just before/after putting down the cups
- Talking to & smiling at an infant to alert him/her to the event



(c) Emphasizing property of objects

- Suppressing the body movement & showing the cups

