Infants' Perception of Emotion from Body Movements
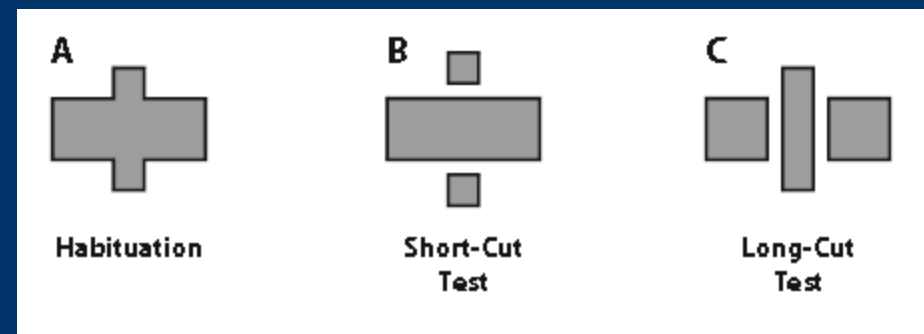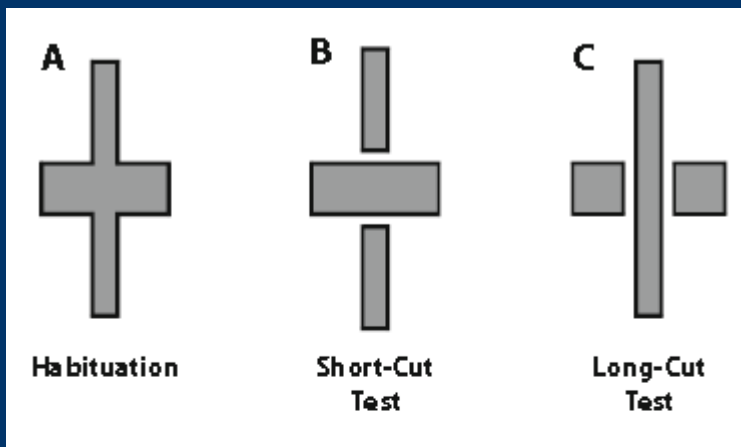
Nicole Zieber
Hard Data Café
April 5, 2013

Infant Social Perception

- Perceptual organization

Kangas, A., Zieber, N., Hayden, A., & Bhatt, R. S. (in press). Parts function as perceptual organizational entities in infancy. *Psychonomic Bulletin and Review*.

Kangas, A., **Zieber, N**., Hayden, A., Quinn, P. C. & Bhatt, R.S. (2011). Transfer of associative grouping to novel perceptual contexts in infancy. *Attention, Perception, & Psychophysics, 73*(8), 2657-2667.

Hayden, A., Bhatt, R. S., Kangas, A., & **Zieber, N**. (2011). Parts, cavities, and object representation in infancy. *Journal of Experimental Psychology: Human Perception and Performance, 37*(1), 314-317*.*

Bhatt, R. S., Hayden, A., Kangas, A., **Zieber, N**., & Joseph, J. E. (2010). Part perception in infancy: Sensitivity to the short-cut rule. *Attention, Perception, & Psychophysics, 72*(4), 1070-1078.

Infant Social Perception

- Perceptual organization
- Face processing
  - Configural & featural processing
  - Gender
  - Other-Race
  - Other-Species
  - Emotion

Kangas, A., **Zieber, N**. & Bhatt, R.S. (2012). *Processing of second-order facial information in infancy: The role of external features.* Poster presented at the 2012 biennial meeting of the International Society on Infant Studies, Minneapolis, Minnesota.

Zieber, N. & Bhatt, R. (2011). *The development of face expertise: The relationship between configural and holistic processing in infancy.* Poster presented at the 2011 biennial meeting of the Society for Research in Child Development, Montreal, Quebec.

Infant Social Perception

- Perceptual organization
- Face processing
  - Configural & featural processing
  - Gender
  - Other-Race
  - Other-Species
  - Emotion
- Body perception
  - Proportion change
 - Identity change
  - Body part organization

Zieber, N., Bhatt, R. S., Hayden, A., Kangas, A., Collins, R., & Bada, H. (2010). Body representation in the first year of life. *Infancy*, *15*(5), 534-544.

Zieber, N., Kangas, A. & Bhatt, R.S. (2012). *Is the head necessary to process body information in infancy?* Poster presented at the 2012 biennial meeting of the International Society on Infant Studies, Minneapolis, Minnesota.

Zieber, N., Kangas, A., Hoch, A. & Bhatt, R.S. (2012) *Infants emerging body knowledge*. Poster presented at the 2012 biennial meeting of the International Society on Infant Studies, Minneapolis, Minnesota.

Infant Social Perception

- Perceptual organization
- Face processing
  - Configural & featural processing
  - Gender
  - Other-Race
  - Other-Species
  - Emotion
- Body perception
  - Proportion change
  - Identity change
  - Body part organization
- Emotional body processing
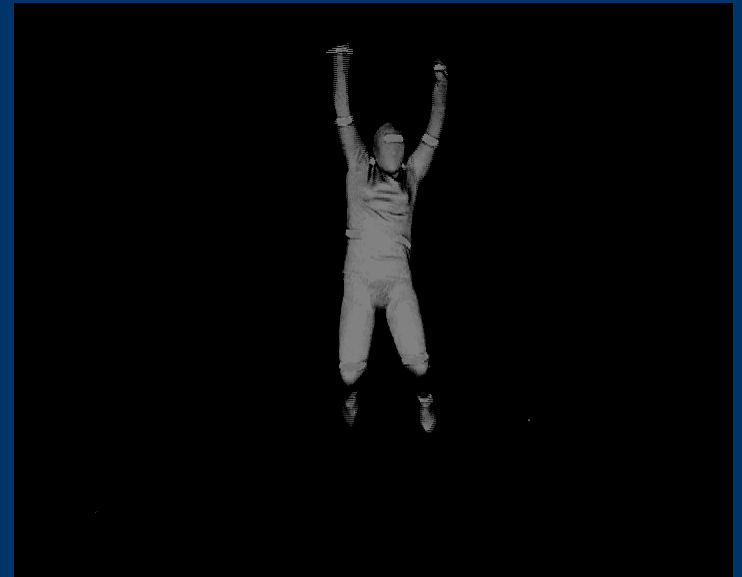
Zieber, N., Kangas, A., & Bhatt, R.S. (in press). Infants' perception of emotion from body movements. *Child Development*.

The Significance of Emotion Perception

- Evolutionarily adaptive
- Promotes and fosters relationships
- Aids in assessing and understanding others' intentions/motive
- Allows for rapid detection of a potential threat
- Helps to motivate/initiate a response

The Significance of Emotion Perception

- Adults use a variety of cues to recognize emotions.

- Adults accurately recognize basic emotions in facial expressions, vocal expressions, and body postures or movement.

- Research has found even young infants recognize basic emotions conveyed by facial or vocal expressions.

"Basic Emotions"

- Happiness
- Sadness
- Anger
- Fear
- Surprise
- Disgust
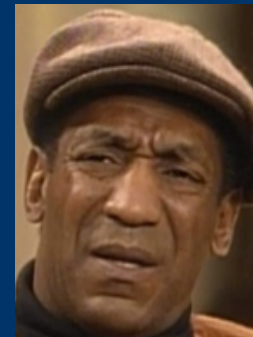
(Ekman, 1972)

How do infants perceive emotion?

- **When do infants perceive emotion in faces?**
  - Newborns may *discriminate* some facial expressions.

    (Field et al., 1983; Field et al., 1982)

  - 3- to 5-month-old infants *discriminate* basic expressions.

    (Barrera & Maurer, 1981; Schwartz, Izard, & Ansul, 1985)

  - Between 5-7 months of age, infants demonstrate *recognition* of facial expressions.

    - (Ludemann & Nelson, 1988; Nelson & Dolgin, 1985)

- **At what age are infants sensitive to emotion in voices?**
  - Young infants prefer infant-directed (ID) speech.

    (Fernald, 1985)

  - 5-month-old infants discriminate a change in vocal affect.*

    (Walker-Andrews & Grolnick, 1983)

- **What about bodies? Can infants perceive emotion conveyed in body movements?**

How do infants perceive emotion?

- Procedures utilized in infant research

  - Habituation

  - Paired-comparison

  - Spontaneous preference

Atkinson, Dittrich, Gemmell, & Young, 2004

- Actors were given instructions to enact each of 5 emotions (happiness, sadness, anger, fear, and disgust).

- Stimuli were edited to clips (ranging from 4.2 to 6s in length) that demonstrated the peak expression of the emotion.

- Participants completed a forced-choice task for displays.

- The final stimulus set included exemplars that were identified with 85% or greater accuracy (chance performance = 20%).

Experiment 1

Method

- <u>Participants</u>:
  - 32 6.5-month-old infants (M = 198.97 days)

- <u>Stimuli</u>:
  - 3s videos clips of emotional or neutral body expressions

    (Atkinson et al., 2004;

    Atkinson et al., 2007)
 - 4 pairs of happy/neutral actions (2 male, 2 female)
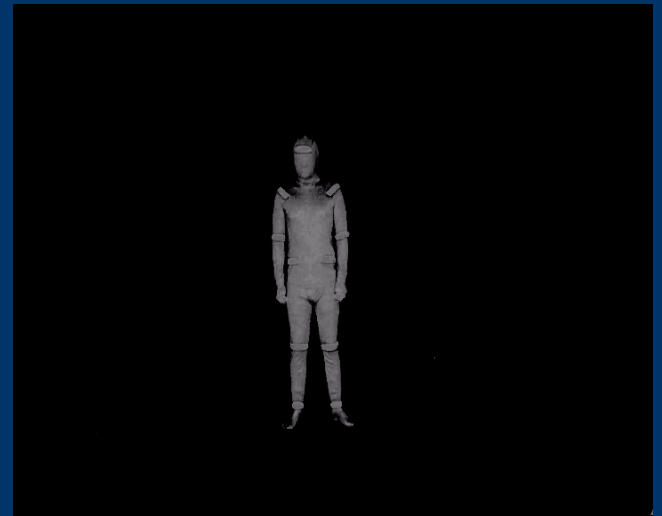
Pilot Study

Method

- <u>Procedure</u>:
  - Paired-comparison looking procedure
  - 2, 15s test trials
  - Infants were assigned:
    - Upright or Inverted
    - One of 4 actor pairs (2 male, 2 female)
  - Dependent measure = preference score for emotional body
    - $\frac{(\text{looking to happy (sec) T1} + \text{looking to happy(sec) T2})}{\text{total looking time (sec) T1 \& T2}} * 100$
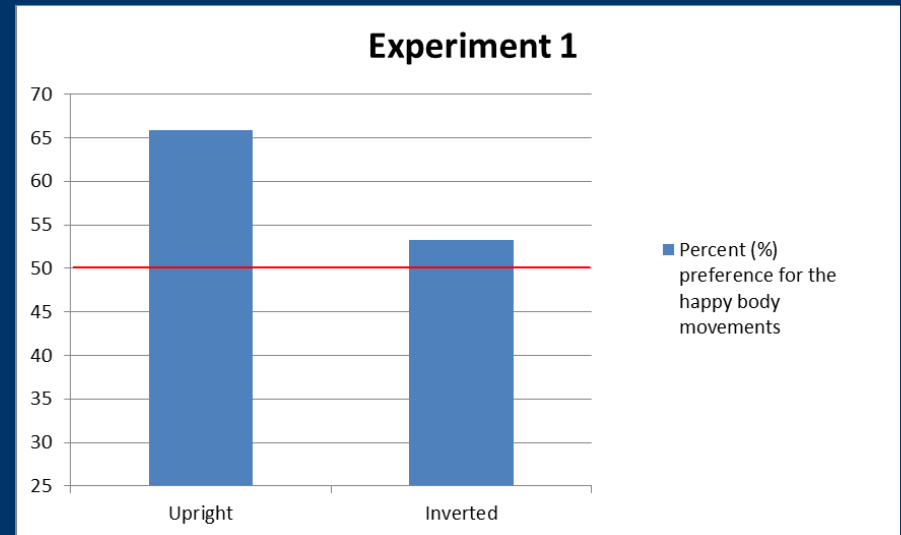
Stimuli for Pilot Study
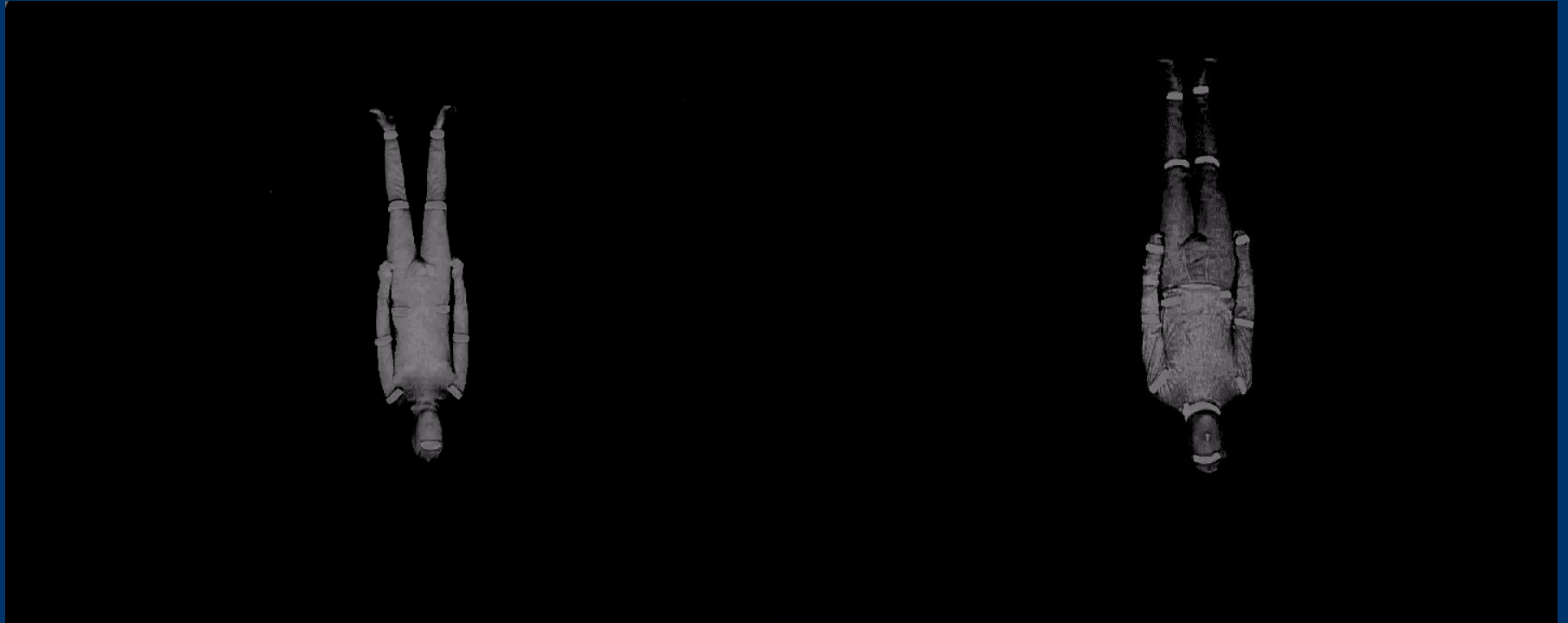
Pilot Study

Results

- Infants showed a significant preference for the happy body
  - in the upright condition

    M = 65.87%; p < .001*

  - but not in the inverted condition.

    M = 53.21%; p > .05

Experiment 1

Percent (%) preference for the happy body movements

Multimodal Expressions of Emotion

- The pilot study demonstrated infants prefer to view emotional over neutral body actions.
- However, are infants able to discriminate two distinct emotions?

- Previous research has found infants demonstrate affective knowledge at a younger age (3.5-4 months of age) when dynamic, multimodal emotional expressions are used.
  - Kahana-Kalman & Walker-Andrews, 2001; Montague & Walker-Andrews, 2002
  - Montague & Walker-Andrews, 2001
  - Flom & Bahrick, 2007

Intermodal Preference

(Spelke, 1976)
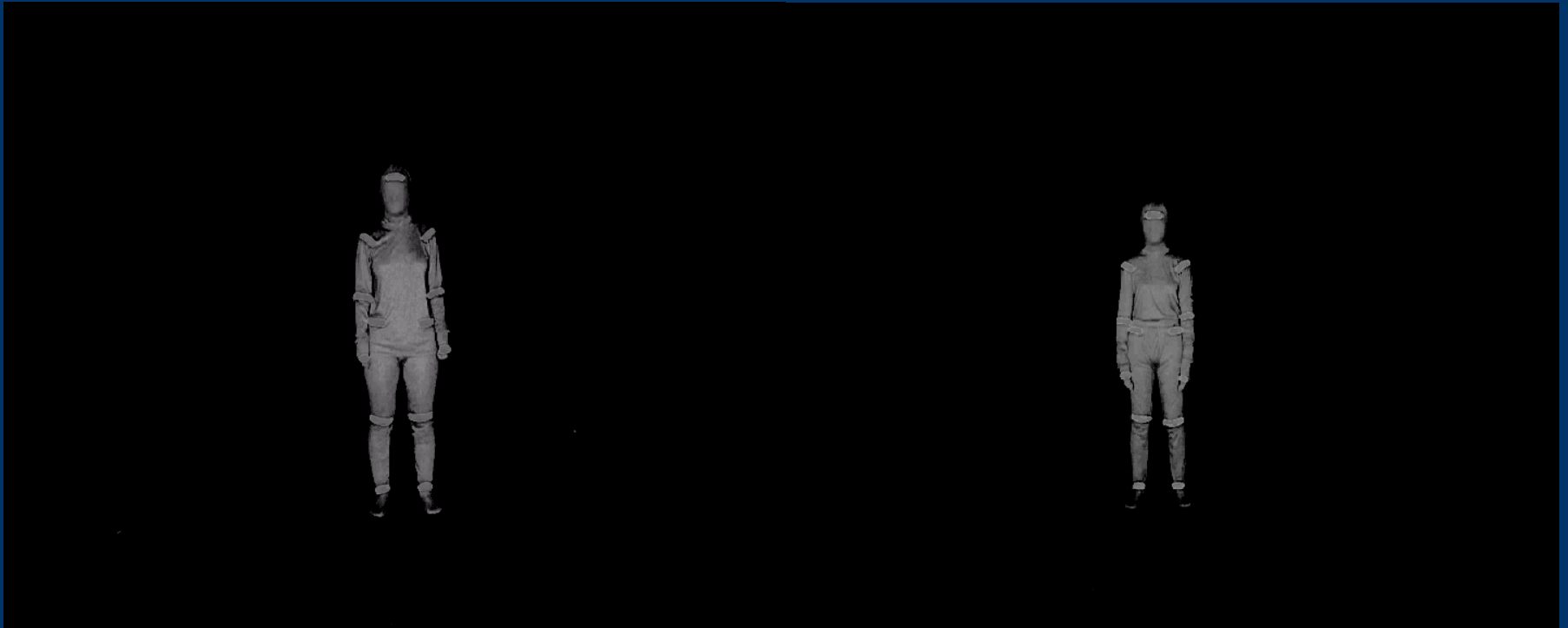
Experiment 1

Method

- <u>Participants</u>:
  - 32 6.5-month-olds (M = 194.16 days)
- <u>Stimuli:</u>
  - 3s videos of four happy/angry pairs (2 male, 2 female)
  - Audio clips of four vocalizations (2 happy, 2 angry; 2 male, 2 female)

    (Sauter et al., 2010)

  - 3s video clips repeated 5 times (15s test trial)
  - Audio clips also repeated 5 times (started with the repetition of the video clip)

Sauter, Eisner, Calder, & Scott, 2010

- Non-verbal vocalizations of emotion were created for 10 emotions with male and female English speakers.

- Recognition was significantly better than chance for all emotions.

- A subsequent study found the "basic" emotions (happiness, anger, sadness, fear, surprise, disgust) were also accurately recognized by participants from culturally isolated Namibian villages

  (Sauter, Eisner, Ekman. & Scott, 2010)

Experiment 1
Inverted Stimuli

Experiment 1

Method

- <u>Procedure:</u>
  - Intermodal preference technique
  - 2, 15 sec trials
  - Infants are assigned to:
    - Upright or Inverted condition
    - One of four happy-angry actor-pairs (2 male, 2 female)*
  - DV = preference score for the congruent emotional body (calculated in the same manner as Experiment 1)

Experiment 1

Results

- Infants showed a significant preference for the congruent body emotion

- in the upright condition
  M = 57.95%; $p < .001^*$

- but not in the inverted condition.
  M = 49.07%; $p > .05$

Experiment 2A

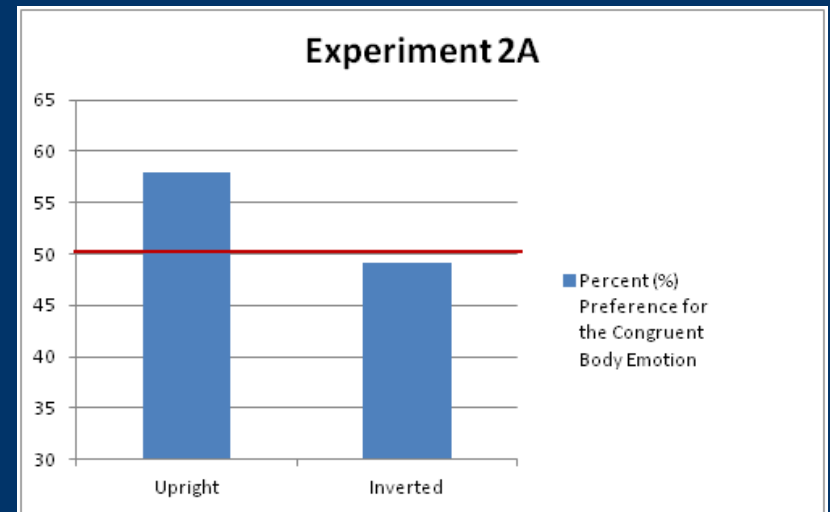Percent (%) Preference for the Congruent Body Emotion

Table 1: Experiment 1

Table 2.

*Infants' Look Durations to the Videos and Mean Preferences for the Congruent Body Expression in Experiments 2A & 2B.*

	Orientation	N	Mean Looking Time (sec)	Mean Looking Time (sec)	Preference (%) M	(SE)
Experiment 2A: *6.5-month-olds*						
			Congruent	Incongruent		
Happy versus Angry	**Upright**	14	15.86	11.99	**57.95****	(2.07)
	Happy	6	16.21	12.04	**62.04****	(2.02)
	Angry	8	15.50	11.96	**54.88***	(2.94)
	Inverted	16	13.59	13.86	49.07	(4.98)
	Happy	8	11.75	16.35	41.48	(7.27)
	Angry	8	15.43	11.36	56.65	(6.09)

****$p < .001$, 1-tailed; compared to 50% chance performance.
***$p < .07$, 1-tailed; compared to 50% chance performance.

Discussion

- Yet is it possible infants were merely matching based upon some type of common information specified across the two modalities that is unrelated to affective meaning?

- Infants are highly sensitive to information that is redundantly specified across modalities (such as tempo, rhythm, synchrony), and this type of information is highly salient even to young infants
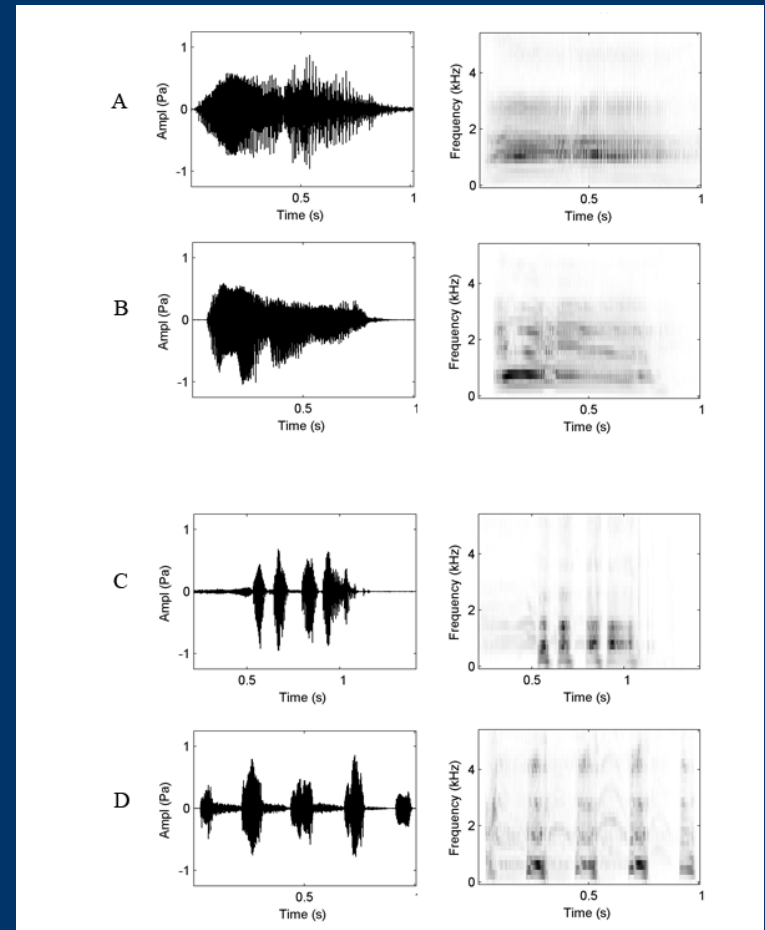
Discussion

- Infants are sensitive to emotion portrayed in body movements.
- 6.5-month-old infants match emotional vocalizations to emotional body movements.
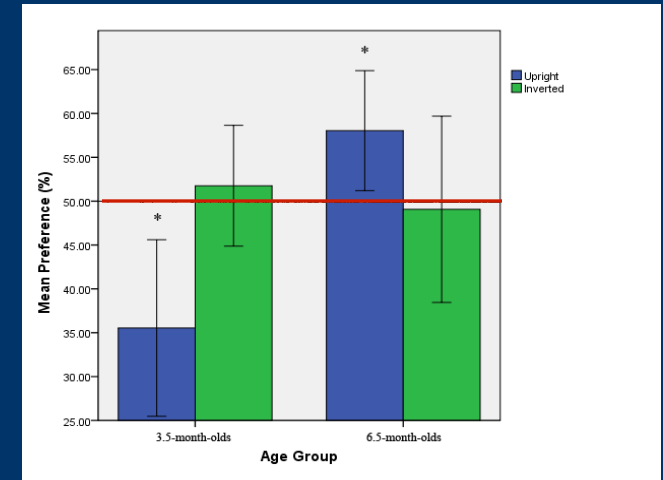
- This might indicate discrimination based on affect without recognition of affective meaning.
- This may be specific to the pairing of two emotions that vary greatly in their social-signal value.
- Either way, the inversion effect found suggests that infants' preference is based on affective information redundantly specified across modalities.
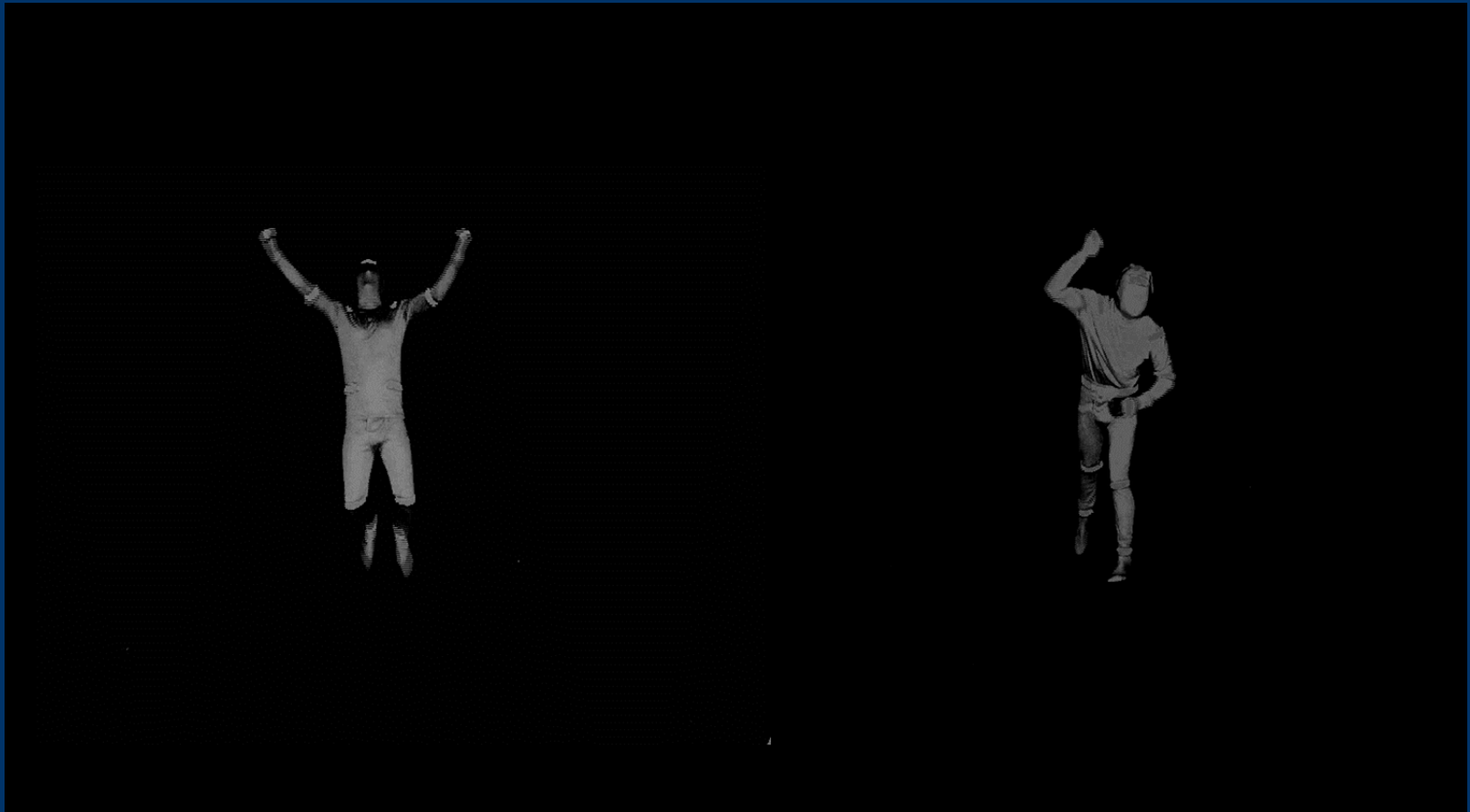
Experiment 2

Method

- <u>Participants:</u>
  - 32 6.5-month-old infants

- <u>Stimuli & Procedure:</u>
  - The stimuli and procedure were the same as in Experiment 1, with the exception that static images of emotional body postures were viewed rather than videos of emotional body expressions.

Experiment 2 Stimuli

Infants Match Emotional Vocalizations to Static Body Postures

- In the upright condition, infants preferred to view congruent body posture.
  - M = 56.24 (SE = 2.00); $t(15) = 3.12$, $p < .007*$
- In the inverted condition, infants' preference was not different than chance (50%).
  - M = 45.34 (SE = 3.18); $t(15) = -1.46$, $p > .05$
- Performance in the upright significantly different than performance in the inverted.
  - $t(30) = 2.90$; $p < .007*$
- Orientation (upright, inverted) x Vocalized Emotion (happy, angry) ANOVA
  - Main effect of orientation; $p < .008*$
  - No other significant effect or interaction.

Individual Means & Standard Error

- Upright
  - Happy Mean = 57.25 (2.91)
  - Angry Mean = 55.25 (2.90)
- Inverted
  - Happy Mean = 42.80 (4.23)
  - Angry Mean = 47.89 (4.86)

6.5-month-old Infants' Preference for the Congruent (Static) Body Posture
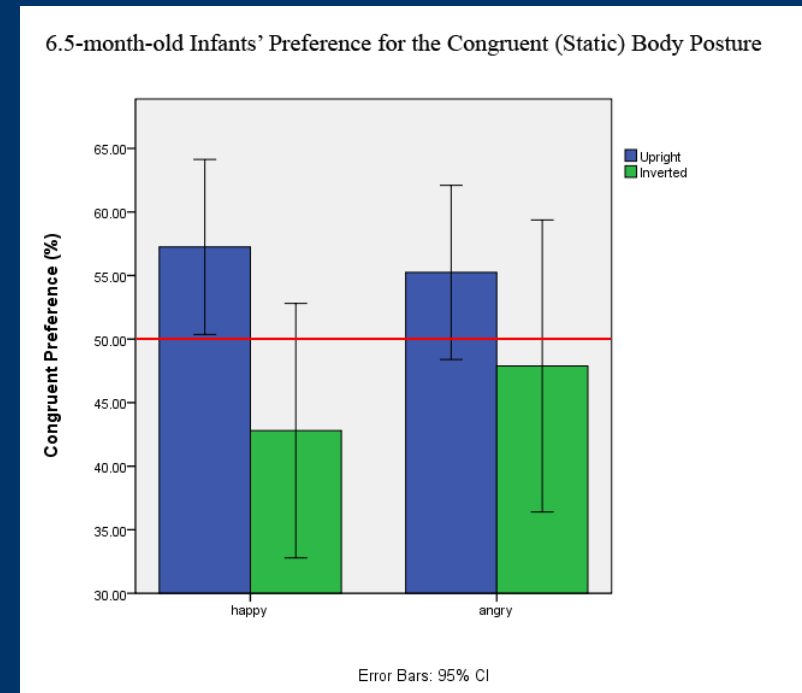
Experiments 1 & 2

Table 1

Infants' Mean Preferences (and Standard Errors) for the Congruent Body Expression.

	Orientation	Mean (%) Preference	N	*t*	df	*p*
Experiment 1						
Dynamic Body	**Upright**	**57.95 (2.07)**	14	3.83	13	< .001**
Movements	**Inverted**	49.07 (4.98)	16	-0.19	15	> .05
Experiment 2						
Static Body	**Upright**	**56.25 (2.00)**	16	3.12	15	< .01*
Postures	**Inverted**	45.34 (3.18)	16	-1.46	15	> .05

* $p < .01$ significantly different from 50% (chance) performance, 2-tailed.
* $p < .001$ significantly different from 50% (chance) performance, 2-tailed.

General Discussion

- Infants are sensitive to emotion portrayed in body movements, and match emotional vocalizations to emotional body movements.

- Additionally, 6.5-month-old infants match emotional vocalization to static images of emotional body postures.

- This suggests infants' performance is based upon affective information specified in both the static body postures and the emotional vocalizations.

Implications for Future Research

- What meaning do infants extract from these displays?

- Would they demonstrate affective responsiveness appropriate to emotions conveyed by bodies?

- Do static images of emotional bodies provide enough information for infants to discriminate emotions?

- Would the utilization of facial and bodily emotion cues in future research studies allow even younger infants to demonstrate affective knowledge?

Thanks.

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- Dissertation Committee: Dr. Melody Carswell, Dr. W. John Curtis, & Dr. Lee Blonder
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