



# Infants' Categorization of Dynamic Faces: Changes from 6 to 10 Months

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## Introduction

This research investigated 6- and 10-month-olds' categorization of dynamic emotional expressions.

**Categorization of static emotional expressions**  
 Infants between 4 and 9 months of age categorize a variety of emotional expressions on static faces.

(Bonstein & Arterberry, 2003; Nelson & Dolgin, 1985; Nelson, Morse & Leavitt, 1979; Serrano, Iglesias & Loeches, 1992)

**Questions exist: Are younger infants processing emotional expressions or distinguishing facial features?**  
 Categorization of static facial expressions may reflect processing of individual salient features rather than the emotions that are conveyed by configural relations among features.

(de Haan & Nelson, 1998; Caron, Caron & Myers, 1985; Nelson, 1985)

When required to categorize positive or negative emotional valence rather than specific emotional expressions, 10-month-olds, but not 7-month-olds categorized emotional valence.

(Ludemann, 1991)

**Practical considerations: Using moving faces may provide a valid assessment of infants' facial expression categorization.**  
 Moving faces may recruit attention to multiple facial features and relations among features

(Spence, Touchstone, O'Toole, under review)

Features and distances between features change over time. The peak of an expression may appear only briefly, unlike peak expressions displayed on static images.

(Ambadar, Schooler & Cohn, 2005;

Valstar, Pantic, Ambadar & Cohn, 2006)

**Neurological evidence supporting use of dynamic faces**

The Superior Temporal Sulcus (STS) is activated by facial and biological motion, implied motion, and socially relevant information. The Fusiform Face Area (FFA) is activated by facial features during facial identity tasks.

(Adolphs, 2002; Allison, Puce & McCarthy, 2000; Haxby, Hoffman & Gobbini, 2000; Puce, Allison, Benton, Gore & McCarthy, 1998)

Moving faces may preferentially activate the neural system responsible for processing socially-relevant facial motions.

(Spence, Touchstone & O'Toole, under review)

## Methods

**Participants**  
 6-month-olds ( $n = 72$ )  
 10-month-olds ( $n = 42$ )

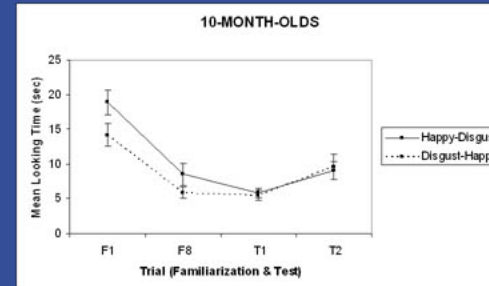
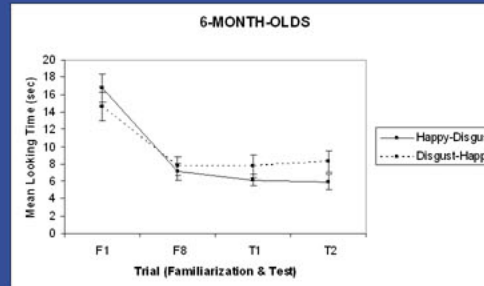
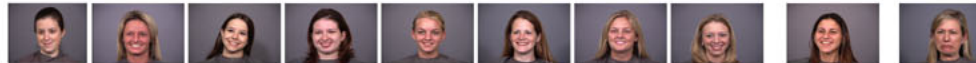
**Stimuli**  
 Video clips (3 s each) of happy and disgust facial expressions portrayed by adult females included the transition of faces from neutral to the peak of the expression and then back to neutral.

### Procedure

Six- and 10-month-old infants ( $n = 114$ ) were familiarized to 8 female faces portraying either dynamic happy or dynamic disgust expressions. Subsequently, babies were shown 1 novel face portraying the same emotion seen during familiarization (within emotion) followed by 1 novel face portraying the opposite expression (between emotion).

**Familiarization:**  
 Each face viewed only once

**Test Trials**  
 Within Emotion (T1)      Between Emotion (T2)



## Results

### Six-Month-Olds

- Six-month-olds habituated to faces during familiarization,  $F(1, 71) = 54.95, MSe = 54.06, p = .000$
- Six-month-olds *did not* categorize emotional expressions,  $F(1, 71) = .04, MSe = 16.33, p = .834$
- No effects of emotion were witnessed,  $F(2, 140) = .681, MSe = 18.85, p = .51$

### Ten-Month-Olds

- Ten-month-olds habituated to faces during familiarization,  $F(1, 41) = 58.11, MSe = 31.61, p = .000$
- Ten-month-olds *did* categorize emotional expressions,  $F(1, 41) = 11.26, MSe = 24.65, p = .002$
- No effects of emotion were witnessed,  $F(2, 80) = 1.07, MSe = 26.69, p = .348$

## Discussion

Categorization of dynamic facial expressions occurred at 10 months of age, but not at 6 months.

Because dynamic faces activate the neural system responsible for processing socially relevant facial motions, the age effect suggests development of expression processing during this age range.

These results are consistent with Ludemann's report that categorization of emotional expressions *per se* occur during the latter part of the first year.

Dynamic expressions may recruit more information-processing resources relative to processing of static expressions and tax 6-month-olds' performance.

The use of dynamic expressions provides unique insight into infants' emotion processing and suggests that robust expression categorization occurs only in the latter part of the first year of life.

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