



## Infant responses to maternal still-face at 4 and 9 months

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### ABSTRACT

This study investigated developmental changes in infant responses to maternal still-face (SF) situations. Infants (21 males and 25 females) of Japanese mothers were observed in a face-to-face SF paradigm, comprising four phases (normal/SF/normal/SF), at two infant ages (4 and 9 months). The infants' facial expression, gaze direction, and vocalization were coded in both SF and normal interaction conditions. The results indicated that infants at both ages showed a decrease in displaying positive facial expression and gazing at their mothers during SF conditions. The 4-month-old displayed emotional expression and directed their gaze toward their mothers more frequently than the 9-month-old. However, the 9-month-old vocalized more often in SF situations, attempting to elicit responses from their mothers. The "carry-over" effect was observed only in 9-month-old. The results were discussed in the context of developmental changes in infants' social skills to cope with an emotionally stressful situation.

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### 1. Introduction

The still-face (SF) situation, where parents stop interacting with their infants and keep their faces neutral without talking to their infants while maintaining eye contact, has been used to investigate infants' responses to sudden changes in the emotional expressions of their parents (as a review, Adamson & Frick, 2003). The SF situation is one of the most robust procedures for testing infants' understanding of natural interaction patterns.

When mothers become still-faced, infants respond with behaviors involving decreased positive affect (i.e., smiling or laughing) and increased negative affect (i.e., fussing or crying), or by averting their gaze. On the other hand, they try to elicit their mother's attention by positive affect and vocalization (Moore, Cohn, & Campbell, 2001; Tronick, Als, Adamson, Wise, & Brazelton, 1978; Weinberg & Tronck, 1994). These behaviors reflect the self-regulation of emotion as well as infants' social expectations and sensitivities to the emotional expressions of others. Thus, the way in which infants respond to others' SFs may change, depending on their social-cognitive and emotional development. However, a large amount of research on the subject comprises cross-sectional studies; few longitudinal studies that trace developmental changes in infants' responsiveness to the SF procedure have been conducted. One of the purposes of this study is to examine age-related changes in strategies to cope with the emotionally stressful experience of a SF situation. We observed infant responses to the SF at 4 and 9 months, because it is during these periods that infants rapidly develop the social skills for emotional expression and responsiveness in face-to-face interactions, followed by the acquisition of the skills for triadic interactions (Tomasello, 1995).

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A majority of the studies on the SF response retain the structure employed by Tronick et al. (1978): three, 90- to 180-s periods of mother–infant interaction. First, the mothers interact with their infants normally; next, they expose the infants to the SF situation; and finally, they put them back in a regular social interaction. In addition to the original procedure, we created another SF situation after the second normal interaction in order to compare infant responses, not only between the SF and normal interactions but also between the two SF situations. Although other methodological elements (e.g., the age of the infants, the length of the session, coding procedures) varied considerably across studies, most research on this paradigm has focused only on the still-face episode after the normal interaction. We expected that focusing on the differences between two SF periods, as well as between SF and normal interaction periods, would provide us with an idea of the extent to which infants at each age are sensitive to the emotional expression of others as well as the extent to which they can regulate their emotional states and tolerate a frustrating situation. Although some researchers (e.g., Rochat, Striano, & Blatt, 2002; Striano, 2004) had repeated the SF episodes in the different conditions, no study on the SF effect has been conducted exposing the infants to the two SF episodes in the same procedure.

In addition, in a large number of previous studies, the results on sex differences with regard to the SF effect are inconsistent. Toda and Fogel (1993) scarcely found any sex differences, while Mayes and Carter (1990) and Stoller and Field (1982) found that girls displayed more distress than boys. On the other hand, Braungart-Rieker, Courtney, and Garwood (1999) and Cohn and Tronick (1983) indicated that girls were more positive than boys. We also compared male and female infants' responses to the SF procedure from the point of view of sex differences in emotional expression and self-regulation (Weinberg, Tronick, Cohn, & Olson, 1999).

With the exception of some reports on Chinese (Kisilevsky et al., 1998) and African-American infants (Segal et al., 1995), most studies on the SF situation have examined responses in samples of Caucasians. Compared with North Americans, Japanese and Chinese adults discourage the expression of strong emotion in babies (Fogel, 1993; Kuchner, 1989). Consequently, by the end of the first year, Chinese and Japanese infants smile and cry less than American infants do (Camras et al., 1998). Our study deserves attention as research on the maternal SF responses of non-Caucasian, Japanese infants.

## 2. Methods

### 2.1. Participants

Infants and mothers were recruited from hospitals in two areas of Japan (Mie and Osaka prefectures), and videotaped in laboratory playrooms when the infants were 4 and 9 months old. Out of the 70 participants (34 males and 36 females), 8 failed to complete the entire session because they cried continuously (at 4 months,  $n = 2$ ) or fussed (at 4 months,  $n = 2$  and at 9 months,  $n = 4$ ). The data of 16 participants could not be used because of experimental errors at either 4 or 9 months. The remaining 46 mother–infant dyads (21 males and 25 females) were included in the final sample. All the mothers were from middle or higher household income families, and had at least graduated high school. All the babies were full-term infants who had no medical complications. Twenty-two infants had more than one sibling.

This research was conducted in accordance with the Japan Science and Technology agency (JST) ethical committee in the treatment of participants.

### 2.2. Procedures

Observations were conducted in a laboratory playroom (2.75 m × 2.75 m) with a one-way mirror. The playrooms in the two prefectures were identical and each was equipped with seven VTR cameras, a microphone, and an infant seat in the center of the room. Mothers were seated on the floor in front of their infants, who were in the infant seat. Mother and infant were videotaped via synchronized cameras. The experiment was conducted while the infants were alert (i.e., eyes open and attention directed toward external stimuli).

In the normal interaction condition, each mother was asked to interact with her infant in a normative manner, just as she did at home. In the SF condition, the mothers were asked to freeze their face while gazing at their infants and stop talking without any movement. The procedure was as follows: (1) interaction in the normal interaction condition (NI1) for 30 s; (2) in the SF condition (SF1) for 1 min; (3) another normal interaction condition (NI2) for 30 s; (4) another SF condition (SF2) for 30 s. The order of these conditions was the same for all the participants.

An experimenter behind the infant seat signaled to the mothers when to shift conditions by waving his/her hand.

### 2.3. Measures

Infant behaviors were coded in three separate dimensions through the videotapes: (1) facial expression, which was coded on two dimensions (positive/negative); (2) gaze at mother; (3) vocalization.

These behaviors were coded by the 5-s one-zero time sampling method and the percentages of the occurrences were calculated for each condition.

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