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Women's gender roles affect their visual interest in different infant facial expressions

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ABSTRACT

The present study tested whether women's gender roles were associated with interest in infants and examined the influence of infants' facial expressions on women's interest in them. Eye movements were measured in childless female undergraduates through presentations of adult and infant faces with three kinds of expressions. Nulliparous women had general visual preferences toward infant faces. Moreover, neutral infant facial expressions gained most attentional bias than smiling and crying infant faces compared to adult facial expressions. We assumed that gender roles might affect individual differences in women's interest in infants; results showed that masculinity affected women's visual attentional bias toward infants. Further, masculinity had a consistent negative effect on viewing preference toward infants regardless of their expressions. Atypical gender roles thus play an important role in women's differing interests in and caregiving behavior toward infants. We believe a better grasp of gender role effects and infant facial expression influences can improve our understanding of women's interests toward infants.

1. Introduction

Harlow (1971, p. 6) once elucidated, "nature has not only constructed women to produce babies, but has also prepared them from the outset to be mothers." Among humans, as primary caregivers, women are equipped, through natural selection, with psychological and behavioral tendencies that provide adequate investment in the offspring. Thus, researchers hold that females are commonly interested in infants and tend to be more involved in infant care (Berman, 1980; Blakemore, 1979; Fullard & Reiling, 1976; Maestripieri, 1999). Furthermore, social and cultural norms have also traditionally obliged women to occupy the role of primary caregivers.

One important manifestation of women's numerous reactions to raising infants is that women have obvious preferential or attentional bias toward for infant faces. Cárdenas, Harris, and Becker (2013) reported that nulliparous women's interest in and attentional bias toward infants are tougher and steadier. Irrespective of age, women are seen to be more interested in infants in all visual and verbal tests (Maestripieri & Pelka, 2002). In another study, women demonstrated their motivation to extend the viewing of infant faces (Charles, Alexander, & Saenz, 2013).

For women in general, although a preference toward infant faces exist, there is likely to be considerable individual variability among them in their interest in infants and parenting motivation. Barber (2001) found that female roles of student and full-time worker are likely to delay the first birth to avoid childbearing and nurturing. Besides, many countries are becoming richer and better educated, thus leading to low fertility rate, and women in rich cities are opting for fewer children and remaining single (Karabchuk, 2016; Presser, 2017). Therefore, as for women, the primary caregivers, assessing individual differences and the influencing factors of interest in infants has more important research value.

In the context of the existing research, social and cultural influences on infants' caregiving may be as important as evolutionary or biological influences. Moreover, numerous studies focus on men's parenting from social perspectives. Russell (1978) found that men with less rigid gender role identity were more involved than traditional "masculine" men in the day-to-day care of their infants. The egalitarian attitudes of males have a positive association with fathers' participation in childcare (Deutsch, Lussier, & Servis, 1993). Bonney, Kelley, and Levant (1999) reported that men who have liberal gender role ideology held more

Abbreviations: DT, dwell time; FC, fixation counts; FF, first fixation location; SDT, special dwell time for infant faces; SFC, special fixation counts on infant faces; SFF, special first fixation location; MSDT, mixed special dwell time; MSFC, mixed special fixation counts.

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progressive feelings toward father roles. Moreover, primary caregiving homosexual fathers, who nurtured infants within a partnered relationship, without maternal involvement, had high amygdala activation similar to primary caregiving mothers (Eyal et al., 2014).

Thus, socialization, especially gender roles, may have an important effect on an individual's parenting roles (Aradhye, Vonk, & Arida, 2015; Charles et al., 2013). The shift from traditional to more egalitarian gender roles has influenced men's interest in infants and caregiving roles. However, only a few direct studies have examined the effect of gender roles on women's interest in infants.

With traditional gendered divisions of labor, women do more childcare activities in most societies and cultures. However, in today's rapid economic development, women are required to participate in the labor force. Bianchi, Robinson, and Milkie (2006) have asserted that gendered beliefs continue to forcefully influence family life today. Specifically, the shift from traditional to more egalitarian gender roles will influence women's work and nurturing roles. More masculine features are accepted by women, more positive attitudes toward female work roles but not toward caregiver roles. High masculinity alone is disadvantageous in coping with the stresses of motherhood in the first few months, but is advantageous for women in adjusting to the army (Dimitrovsky, Singer, & Yinon, 1989). Women who are more committed to work also tend to report less commitment to family (Friedman & Weissbrod, 2005). Dimitrovsky, Levy-Shiff, and Perl (2000) found that women high on femininity had a more positive experience through the early months of motherhood than women high on masculinity. Therefore, although traditional gendered beliefs maintain women's innate tendency toward infants, along with the transformation from traditional to more egalitarian gender roles, the different effects of gender roles on women's interest and behaviors toward infants have significant research value.

Previous studies have used multiple techniques to detect adults' attentional bias and viewing interest toward infants. However, only neutral infant faces were used as stimuli without investigating the influence of infants' expressions. In fact, facial expressions are a primary mode of infant communication that can release innate caretaking behavior and affective identity from adults (Lorenz, 1943). Furthermore, our previous studies that used three kind of expressions (smiling, neutral, and crying) showed that neutral infant faces stimulate the strongest parental motivation, got the most attentional bias, and activated larger brain responses compared to neutral adult faces (Ding, Zhang, & Gang, 2016; Jia et al., 2017; Li et al., 2016).

Accordingly, we used eye-tracking technology to investigate the effects of nulliparous women's gender roles on interest in and visual interest toward infants' different facial expressions. To date, no studies have investigated this aspect using eye-tracking technology. We believe that the eye-tracking method provides a more objective and accurate measure of visual interest toward infants than self-report, observational methods or physiological tests, such as dot probe paradigm or key press. Thus, this study aimed to

1. verify that women have a general visual preference for infant faces;
2. verify that neutral facial expression may bring about strongest attentional bias toward infants;
3. understand whether more femininity predicts more visual interest, and more masculinity indicates less visual interest toward infant faces; and
4. explore whether there are interactions between gender roles (femininity and masculinity) and expressions among childless women.

2. Methods

2.1. Participants

Voluntary female participants ($N = 149$) were recruited via our university's campus network. Participants were aged 18–29 years ($M = 21.68$, $SD = 1.72$); they were unmarried and nulliparous; 85% were ethnically Han. The entire sample reported having normal or corrected-to-normal vision. Each participant received 15 yuan as payment.

Written consent was obtained when all the participants came to the study. Participants were told that they could withdraw from the study at any time without giving any reasons. The Ethics Committee of our university (No. 2014179) approved the study and consent procedure.

2.2. Gender role

The Bem Sex Role Inventory (BSRI) (Bem, 1974) categorizes individuals into four gender role identities: masculine, feminine, androgynous, and undifferentiated. It can also be scored as a continuous variable appropriate for both sexes. In this study, we tended to use the latter method. The BSRI contains 60 items: masculinity scale, femininity scale, and neutral personality characteristics, each containing 20 characteristics. Responses are given on a seven-point Likert scale, ranging from 1 “not at all characteristic of me” to 7 “very characteristic of me.” A higher score indicates greater identification with the scale. The present study used the Chinese version of the BSRI translated by Yang et al. (Robinson, Shaver, & Wrightsman, 1997). In this study, internal consistencies were 0.873 for masculinity and 0.784 for femininity.

2.3. Stimuli

The eye-tracking procedure included adult and infant facial stimuli (144 pictures), with one of three expressions: smiling, neutral, and crying. The infant faces (3–6 months of age, gender neutral; 24 for each expression, 72 total) and the adult photos (half men and half women; 24 for each expression, 72 total) were selected from the Chinese Infant Affective Face Picture System (Cheng, Zhang, Guan, & Chen, 2015b) and the Chinese Affective Face Picture System (Gong, Huang, Wang, & Luo, 2011), respectively.

All faces were standardized with identical orientation and similar inter-pupil distance. Only the facial outline was visible. The hair, ears, and background were removed. All images were presented in grayscale, and the size and luminosity were matched. Any non-face area of the image region (260×300 pixels) was filled with a black background (RGB: 0, 0, 0). Infant stimuli did not differ from adult stimuli in intensity ($t(71) = 0.59$, $p = 0.56$). Face pairs were similar in facial expression intensity.

2.4. Procedure

E-prime was used to program the task. The faces were presented on a 19.7-in. CRT monitor placed 70 cm from the participant. The display resolution was set to 1024×768 pixels with a refresh rate of 85 Hz. Monocular eye movements were recorded (right eye, Pupil-CR tracking mode) at a sampling rate of 250 Hz using EyeLink II (SR Research Ltd., Mississauga, Ontario, Canada). Participants were asked to hold their heads with a chinrest.

Upon arrival, we stated the following to the participants, “we are interested in learning about the characteristics of interpersonal communication and how people look at faces. Questionnaires are used to test distinction of communication, and eye movements reflect how you look at faces. You don't need to do anything; just look at the faces freely.” Their participation was confirmed by written consent. Participants were asked to complete a demographic questionnaire and the BSRI.

Thereafter, participants completed an eye-tracking free-viewing task (see Fig. 1). Each participant needed to calibrate the eye tracker and validate the eye positions before the experimental trials. For calibration, participants fixated on a sequence of nine points on the display until the average visual angle tracking error was <0.4 degrees. Validation assessed the accuracy of the system in predicting gaze position from pupil position by using an identical random sequence of nine