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Cross-cultural evidence for multimodal motherese: Asian Indian mothers' adaptive use of synchronous words and gestures

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ABSTRACT

In a quasi-experimental study, 24 Asian Indian mothers were asked to teach novel (target) names for two objects and two actions to their children of three different levels of lexical mapping development: prelexical (5–8 months), early lexical (9–17 months), and advanced lexical (20–43 months). Target naming ($n = 1482$) and non-target naming (other, $n = 2411$) were coded for synchronous spoken words and object motion (multimodal motherese) and other naming styles. Indian mothers abundantly used multimodal motherese with target words to highlight novel word–referent relations, paralleling earlier findings from American mothers. They used it with target words more often for prelexical infants than for advanced lexical children and to name target actions later in children's development. Unlike American mothers, Indian mothers also abundantly used multimodal motherese to name target objects later in children's development. Finally, monolingual mothers who spoke a verb-dominant Indian language used multimodal motherese more often than bilingual mothers who also spoke noun-dominant English to their children. The findings suggest that within a dynamic and reciprocal mother–infant communication system, multimodal motherese adapts to unify novel words and referents across cultures. It adapts to children's level of lexical development and to ambient language-specific lexical dominance hierarchies.

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Introduction

Caregivers' infant-directed communication is multisensory and contains a wide array of auditory, visual, and sometimes even tactile information (see reviews by Jouanjean-L'Antoune, 1997; Massaro, 2004). Caregiver naming in particular typically conveys coordinated temporal information that scaffolds infants' attention to otherwise arbitrarily related words and referents. In Western cultures, mothers name objects and actions and simultaneously use "showing" gestures as they move objects in their infants' line of sight (Masur, 1997; Messer, 1978; Zukow-Goldring, 1997). During naming of objects and actions in close proximity to their infants, mothers sometimes also touch the infants with an object they are holding. This synchronous auditory, visual, and sometimes tactile naming is called *multimodal motherese* (Gogate, Bahrick, & Watson, 2000). Cross-cultural studies of infant-directed multisensory communication could further underscore its diversity, salience, and role in infants' perception, attention, and initiation into the world of communication. In the current cross-sectional study, we examined whether multimodal motherese is a widespread naming style that highlights novel word–referent relations for infants.

Gogate and colleagues (2000) found empirical evidence for a dynamic and adaptive mother–infant communicative system that promotes word learning. Caucasian and Hispanic American mothers were asked to teach the names of two novel objects and actions. Mothers of *prelexical infants* (5–8 months) taught novel words by spontaneously using multimodal motherese more often when naming target referents (names they were asked to teach their infants) than non-target referents, suggesting that multimodal motherese highlights novel word–referent relations. Preverbal infants are typically unable to learn novel word–referent relations without such highlighting (Gogate, 2010; cf. Fulkerson & Waxman, 2007). For example, 7- and 8-month-old infants failed to learn such relations when the syllables were spoken out of phase with object motions (Gogate, 2010). Multimodal motherese is not restricted to explicit teaching contexts (Björkenstam & Wiren, 2012; Tamis-LeMonda, Song, Smith Leavell, Kahana-Kalman, & Yoshikawa, 2012). Caucasian and Hispanic American mothers naturally use multimodal motherese during play with their 6- to 8-month-old infants, using toys even when not explicitly asked to teach names for novel objects (Gogate, Maganti, & Laing, 2013).

In addition, mothers promote their children's lexical learning by tailoring their use of synchrony to their children's level of lexical development. Gogate and colleagues (2000) found that Caucasian and Hispanic American mothers of prelexical infants (5–8 months) used synchrony more often than mothers of *lexically advanced* children (21–30 months). Furthermore, mothers used synchrony during action naming much later in development for *early lexical* infants and toddlers (9–17 months). In contrast, mothers' synchrony use during object naming declined from the prelexical period to the early lexical period. Together, these findings raise the question as to whether mothers' tailoring of multimodal motherese to their children's lexical development and to different lexical categories is a cross-cultural phenomenon-. More evidence is needed to address whether Gogate and colleagues' earlier findings generalize to non-Western cultures.

Cross-cultural examinations are essential for understanding the underlying mechanisms by which multimodal motherese orients infants throughout the world to communicating adults. One way in which it orients preverbal infants is by scaffolding their joint attention. When American mothers named objects while moving them in synchrony more often during play with their 6- to 8-month-olds, a greater number of infants switched gaze from their mothers to the objects and learned the word mappings, indexed on a post-play test (Gogate, Bolzani, & Betancourt, 2006). For the word mapping novice (preverbal infant), the repeated use of synchrony between the spoken word and the 'showing' gesture (i.e., looming or shaking but not sideway or upward motion) with an object unified the word and the object, making that relation *perceptually foreground* while rendering other potential referents that are not moved to the background (Gogate et al., 2006; Matatyaho & Gogate, 2008; Matatyaho-Bullaro, Gogate, Mason, Cadavid, & Abdel-Mottaleb, 2014). Thus, synchrony narrowed the potential referents for a given name. On hearing a word from their mothers, young infants responded to the mothers' synchronous 'showing' gesture with an object by switching their gaze to it and learning the novel word–referent relation (Gogate et al., 2006). Preverbal infants remember syllable–object