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Modalities of Infant-Mother Interaction in Japanese, Japanese American Immigrant, and European American Dyads

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Abstract

Cultural variation in relations and moment-to-moment contingencies of infant-mother person-oriented and object-oriented interactions were examined and compared in 118 Japanese, Japanese American immigrant, and European American dyads with 5.5-month-olds. Infant and mother person-oriented behaviors were positively related in all cultural groups, but infant and mother object-oriented behaviors were positively related only among European Americans. In all groups, infant and mother behaviors within each modality were mutually contingent. Culture moderated lead-lag relations: Japanese infants were more likely than their mothers to respond in object-oriented interactions, European American mothers were more likely than their infants to respond in person-oriented interactions. Japanese American dyads behaved more like European American dyads. Interaction, infant effects, and parent socialization findings are set in cultural and accultural models of transactions between young infants and their mothers.

The general significance of children's relationships with adults who care for them, and infant-mother interactions in particular, for children's development has long been acknowledged (e.g., Freud, 1949; Vygotsky, 1981). Furthermore, Bowlby (1969) pointed to the fundamental dual functions of the infant-mother attachment relationship as a haven of emotional safety and a secure base for exploration. Almost from birth infants are motivated to connect with others through *person-oriented* interactions, and beginning in early infancy they also learn about the physical world through *object-oriented* interactions. These two modalities, and the contacts with caregivers that they generate and shape, are simultaneously culturally universal and community specific in the senses, first, that they characterize infant-mother interactions in all cultures but, second, vary in how they are manifest in different cultures. Here, we focus on the dynamics of person-oriented and object-oriented modalities of infant-mother interaction in three cultural groups: Japanese, Japanese Americans, and European Americans.

Developmental Significance of Infant-Mother Person- and Object-Oriented Interactions

Initially, infant-parent interactions are focused within the dyad, but by the middle of the first year the baby's scope of apperception and the parent's concerns have both expanded to

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include the surrounding environment (Bakeman & Adamson, 1984; Bornstein & Tamis-LeMonda, 1990; Legerstee, Corter, & Kienapple, 1990; Trevarthen & Reddy, 2007). Trevarthen and Hubley (1978) observed this developmental movement from primary to secondary intersubjectivity in mother-infant interactions longitudinally: person-oriented interactions being characteristic of younger infants with gradual incorporation of object-oriented interactions between the ages of 3 and 5 months to a predominance of object-oriented interactions from 6 months on. Thus, by the close of the first half year infants actively participate in interpersonal turn-taking exchanges as well as interactions that encompass properties, objects, and events as they visually, tactually, and orally explore the inanimate world. Moreover, face-to-face episodes and visual attention to objects during this period are each characterized by a rather singular focus, likely attributable to the "either/or" nature of young infants' concentration (Schaffer, 1989). Person-oriented behaviors for the infant focus attention on the dyad and engaging in interpersonal interactions by looking toward, displaying an alert and attentive expression to, or smiling at the caregiver, all of which reinforce an interest in interacting competently with people; for the mother's part, they correspondingly include physical and verbal strategies to engage the infant interpersonally (Emde, 1992; Stern, 1985). By contrast, object-oriented interactions turn outward from the dyad; for the infant they consist in extradyadic behaviors involving attention to and exploration of the environment and for the mother in corresponding physical and verbal strategies used to stimulate infant attention to properties, objects, and events in the physical surround (Bornstein & Tamis-LeMonda, 1990). More specifically, during middle infancy infants shift from a mutual focus of interest connecting with others (through person-directed interactions) to shared interests in the environment and learning about the physical world (through object-directed interactions with caregivers). To be able to study both these phenomena early in their development, at a time when both were functioning but still plastic to experience, we focused this investigation at 5–6 months of age.

Many investigators have operationally distinguished person- and object-oriented behaviors and interactions, whether they are called animate versus inanimate, affective versus informational, social versus nonsocial, or dyadic versus extradyadic (e.g., Bornstein, 2002; Goldfield, 1987; Legerstee, Corter, & Kienapple, 1990; Stern, 1985; Trevarthen & Reddy, 2007; Wachs & Combs, 1995). Person- and object-oriented interactions are each developmentally significant (Reddy, 2008) in the sense that together they help lay foundations for future child emotional, social, communicative, and cognitive competencies (e.g., Bornstein, 2002; Smith, Adamson, & Bakeman, 1988). Social sensitivity and responsiveness to children promote their interpersonal competencies (e.g., Bakeman & Brown, 1980; Chen, Liu, & Li, 2000; De Wolff & van IJzendoorn, 1997), and environment-centered interactions relate to the development of their instrumental competencies (e.g., Belsky, Goode, & Most, 1980; Olson, Bates, & Bayles, 1984).

Cultural Comparisons

Although these modalities of infant-mother interaction may be universal, they are also subject to cultural modification, and Japanese, Japanese Americans, and European Americans constitute appealing samples in which to study and compare the two modalities. Despite their similarities in terms of modernity, economy, and other macro-national indicators, groups from the two anchor cultures – metropolitan families in Japan and the United States -- tend to differ in psychocultural emphases especially with respect to family interaction (Azuma, 2005; Shwalb, Shwalb, Nakazawa, Hyun, Le, & Satiadarma, 2009). In the ensuing summaries, we emphasize between-culture contrasts, recognizing full well the variation that exists within each culture as well as modern homogenizing forces contemporaneously at work in both.

In Japan it is traditionally believed that infants and mothers need to establish *amae* -- an indigenous Japanese concept of relatedness, one special meaning of which denotes empathic closeness and interdependence of the infant with the mother (Behrens, 2004, 2010). *Amae* is an everyday Japanese word and prominent construct used to characterize family relationships. Doi (1973, p. 75) referred to *amae* as "an attempt psychologically to deny the fact of separation from the mother" and, similar to the Mahlerian (1968) concept of symbiosis, claimed that *amae* fosters "a sense of oneness between mother and child." Modern authorities have observed that Japanese mothers tend to maintain close physical proximity to their infants who rarely experience separations from them (e.g., Behrens, 2004; Behrens, Hesse, Main, 2007; Fogel, Stevenson, & Messinger, 1992). Japanese infants are constantly within their mothers' reach, and co-sleeping and co-bathing from birth are conventional, normative, and virtually universal practices (e.g., Takahashi, 1986). *Amae* can be purely affective in nature or may involve instrumental motives (Behrens, 2004), but is an interpersonal process normally observed in interactions (Kumagai & Kumagai, 1986; Maruta, 1992). An *amaeru* is an *amae*-taker, and an *amayakasu* is an *amae*-giver. In the infant-mother relationship, the mother may *amayakaseru* (let or accept the child *amaeru*), or the mother may *amayakasu* (encourage and invite the child to be physically close to her; Lebra, 1976; Taketomo, 1986). Doi (1973) regarded the mother-child relationship as the prototype of *amae* relationships which Japanese experience throughout their lifetimes. Mizuta, Zahn-Waxler, Cole, and Hiruma (1996) reported that Japanese children show more *amae* behaviors than American children (even though attachment behaviors did not differ between the two groups), and Vereijken, Riksen-Walraven, and Van Lieshout (1997) reported that Japanese children's *amae* behaviors were closely associated with their dependency. In brief, a principal goal of Japanese mothers is to socialize their children in relatedness with themselves and others (Morelli & Rothbaum, 2007; Shand & Kosawa, 1985), and this cultural orientation is reflected in an emphasis on such person-oriented sensitivities as dependence, empathy, indulgence, accommodation, compliance, and propriety in interpersonal relationships (Azuma, 2005; Kojima, 1986; Singelis, Triandis, Bhawuk, & Gelfand, 1995; Trommsdorff, 1995).

In U.S. European American culture, dependence in children is normally discouraged, and from an early age children are encouraged to act autonomously in terms of individuation, expressiveness, and exploration as central to their wholesome development (e.g., Bellah, Madsen, Sullivan, Swindler, & Tipton, 1985; Triandis, 1995). American mothers value, promote, and foster independence and self-actualization in their offspring (Morelli & Rothbaum, 2007; Tamis-LeMonda & McFadden, 2009) and engage in activities designed to teach their children to know, understand, and gain control over their environment through object-oriented activities such as those where properties, objects, or events in the environment are the focus of attention and instrumental action (Bornstein, 2002). When Harkness et al. (2007) coded transcripts of home interviews for 9 themes of child development and 34 related caregiving practices in 5 cultures, U.S. mothers stood alone in focusing on cognitive processing, supplemented by general concerns with stimulation of the infant's development.

A deeper way these contrasting philosophies and orientations have been captured and understood is in terms of sociocultural models, that is through sets of global cultural assumptions parents hold. As parents function appropriately in their cultural context, their everyday practices are thought to be shaped by and to instantiate these models. Japanese have inherited Confucian-based beliefs that original human nature is uniform and that babies are separate entities from their caregivers (Hara & Wagatsuma, 1974). On these bases, an understanding prevails that phenotypic differences reflect childhood experiences constructed largely by parents (and teachers) to proactively shape children's character and intellect (Lin & Fu, 1990). So, to foster culturally valued dependence, mothers must work proactively to

mold their infants' interests and actions. Caudill (Caudill & Plath, 1966; Caudill & Weinstein, 1969) observed that Japanese mothers of 3- to 4-month-olds frequently initiated a sequence in which the mother touched or moved her sleeping infant or rearranged the baby's blanket, often waking the baby up in the process; she then comforted the baby to facilitate a return to sleep. Caudill interpreted this observation in terms of the Japanese mother's developmental goal of an interdependent child, where mothers actively intercede and treat going to sleep as something to be regulated interpersonally, contra promoting autoregulation preferred by European Americans. (The fact that Caudill worked with families with younger infants that did not allow a fuller investigation of person- and object-oriented interactions was a second reason we focused on 5- to 6-month-olds.)

By contrast, personal choice is closely bound up with how individuals think of themselves in European American culture and constitutes a dominant psychological consideration in the literature on U.S.-born children (Tamis-LeMonda & McFadden, 2009). Choice is an unspoken value that underlies children's everyday interactions with others from their first days of life. U.S. American parents view infants as intentional agents and respond to infants' behavior as though their babies are already making choices about what to say and what they want. U.S. parents conceptualize "their young infants as thinking persons capable of learning a variety of things about their environments and organizing their behavior accordingly" (Harkness et al., 2007, p. 20). This interpretation is one in which the infant drives social exchanges, and the parent's role is to divine the baby's intentions and to respond accordingly. By acting contingently and positively, mothers encourage greater child self-control (Eisenberg, Cumberland, & Spinard, 1998; Malatesta, Culver, Tesman, & Shepard, 1989). U.S. mothers allow their children more input into the socialization process than do Japanese mothers, perhaps as a way of promoting their children's autonomy (Power, Kobayashi-Winata, & Kelley, 1992).

Undergirding U.S. caregivers' reliance on responsiveness is their emphasis on children's autonomy, children's responsibility for clarifying their needs, and the value of children's explicit signals. Underlying Japanese caregivers' reliance on anticipation is their emphasis on children's dependence, caregivers' responsibility for clarifying children's needs, and the value of caregivers' assumptions about children's needs. Since the formative series of comparisons of Japanese and European American middle-class families by Caudill and Weinstein (1969), the developmental literature has produced a steady stream of papers that in one or another way accord with these contrasting cultural *cum* developmental themes. For example, Clancy (1986) described a Japanese mother coaxing her daughter to do what she was told by offering to help the child and doing the task along with the child. To motivate children U.S. mothers, in comparison, relied on ego-enhancing strategies such as praise and reference to the child's accomplishments. Likewise, U.S. American mothers' emphasis on information-oriented speech helps to prepare infants to become autonomous individuals capable of meaningful self-expression and understanding of the world separate from the mother. By contrast, the affect-oriented vocalizations that are preferred by Japanese mothers more or less match those of their infants, reflecting and reinforcing notions of intersubjectivity, that the infant is merged with the mother, and that the infant needs to be comforted and lulled more than to become a separate or even co-equal partner (Bornstein et al., 1992; Morikawa, Shand, & Kosawa, 1988). Rothbaum, Kakinuma, Nagaoka, and Azuma (2007) highlighted Japanese mothers' desire for children's behavior to be more accommodating where U.S. mothers wanted their children to maximize their own potential. It seems, therefore, that socialization patterns in Japan emphasize interdependence and mothers' shaping infant behavior, whereas those in the United States emphasize independence, infants' taking the lead, and mothers responding.

In a nutshell, U.S. American parents typically wish to promote autonomy in their children, and they organize parent-child interactions to foster child autonomy in consonance with individualism and self-actualization generally associated with and appreciated by U.S. American culture. U.S. American mothers respond to their infants' initiations. Japanese mothers want to see their children as an extension of themselves and work with their children to consolidate and strengthen *amae* (mother-child mutual dependence) in accord with collectivity and an emphasis on interpersonal sensitivity deemed critical in Japanese society. Japanese mothers encourage and lead their infants in interactions. Although demographically similar, Japanese and American parents adhere to contrasting sociocultural models and childrearing assumptions and goals which they express in contrasting ways when actually parenting. When different patterns of behavior signal different meanings in different cultures, such constructions exemplify cultural specificity (Bornstein, 1995).

Acculturation Comparisons

For this study, we hypothesized that these contrasting cultural models would be evident in the microstructure of everyday infant-mother interactions in Japan and in the United States. We also wanted to know how mothers in the interesting position of moving from one of these two contrasting cultures (Japan) to the other (America) eventually negotiate interactions with their infants. If cultural models help to shape parenting, then it ought to follow that modalities of interaction are (at least somewhat) plastic to cultural experience. Alternatively, cultural models laid down early in life might be refractory to change. Very little comparative research on Japanese, Japanese American immigrant, and European American mother-infant interactions exists. Caudill and Frost (1972, 1974), as part of Caudill's larger research program, undertook such a comparison, but they observed third-generation (Sansei) Japanese American mothers and their fourth-generation (Yonsei) infants, and they did not happen to study person- and object-oriented modalities in infant-mother interaction. Nonetheless, they found that Sansei mothers behaved more similarly to European American mothers than to mothers in Japan, supporting conclusions that parenting differences found between mothers in Japan and the United States are cultural in origin and that parenting practices are susceptible to experience and may themselves "migrate" with emigration. Research on mothers and their older toddlers at play has also shown that first- and second-generation (Issei and Nisei, respectively) Japanese American mothers' behavior emulates that of European American mothers in some ways (Cote & Bornstein, 2005).

Although early acculturation research with Japanese American and Asian families suggested that family interactions, and socialization in particular, might resist cultural change (Masuda, Matsumoto, & Meredith, 1970; Nagata, 1994), researchers have since learned that acculturation varies with domain (e.g., behaviors seem to acculturate more rapidly than beliefs) and generation level (Acculturation Collaboration, 2012). Thus, our comparison of immigrant mothers to the United States with dyads in their culture of origin and in the majority group in their culture of destination permitted addressing the attractive question of "What happens to individuals, who have developed in one cultural context, when they attempt to live in a new cultural context?" (Berry, 1997, p. 6).

Examining such cultural variation in psychological phenomena helps to test and refine developmental theories (Cooper & Denner, 1998; Norenzayan & Heine, 2005). As well, issues of acculturation in child development and parenting are of compelling practical contemporary concern because of the increasing numbers of immigrant children in the world today (Bornstein & Cote, 2006; Lansford, Deater-Deckard, & Bornstein, 2007), about whom still too little is known. This is especially the case in the United States where a quarter of residents under 18 are immigrants or immigrants' children (Hernandez, Denton, & Macartney, 2008) and for Asians in the United States whose representation in the population

is expected to triple by 2050, when approximately 50% will be foreign born (Passel & Cohn, 2008).

Two Approaches to Infant-Mother Interactional Analysis

The traditional approach to analyzing infant-mother interaction has applied correlation to infant and mother behaviors (e.g., Bornstein & Tamis-LeMonda, 1990). On the one hand, infant and mother person-oriented behaviors, and infant and mother object-oriented behaviors, might covary regardless of culture. On the other hand, mother and infant behaviors might be coordinated only in domains that are culturally valued or emphasized person-oriented interactions for Japanese dyads and object-oriented interactions for European American dyads). Because we examined dyads so close to the beginning of life, our first hypothesis favored the universalist position over the culturalist approach to unpackaging interaction via bivariate correlation tells us about the relative standing of dyads in a group on a pair of variables.

Although informative, correlation is relatively mute about contingencies in individual dyads nor does it gain any purchase on causality. It is sometimes assumed that behaviors that are correlated are also contingent, but correlational studies are false proxies for examining contingencies in interaction. Moreover, exclusive reliance on tests of simple association sells short an understanding of lead-lag or causal relations that are believed to structure infant-mother interactions. Our design and analyses were geared to redress this shortcoming. We supplemented correlation with sequential analytic tools to investigate whether, which, and whose behaviors tend to lead and lag temporally when infants and mothers interact. Sequential analyses lay bare the underlying structure of interactions. Human mothers and infants may be universally motivated to build temporally coherent and coordinated sequences that characterize their moment-to-moment interactions (Gratier, 2003). We expected the behavior of one partner in a dyad to be contingent on a similar behavior in the other partner in the dyad (Cote, Bornstein, Haynes, & Bakeman, 2008; Hunt, 1979; Wachs & Chan, 1986). Thus, our second hypothesis was that infant and mother person- and object-oriented behaviors would be contingent, also regardless of cultural group.

To explore infant-mother interactions in greater depth in order to attribute directionality, we undertook additional analyses of their sequential dependencies. As reviewed above, research has identified specific qualitative Japan-U.S. cultural differences in child-mother interaction patterns. In further support of those differences, Morikawa, Shand, and Kosawa (1988) conducted comparative log linear categorical analysis of utterances in infant-mother dyads. Japanese mothers were more likely than European American mothers to establish mutual gaze or produce utterances when infants were gazing away from their mothers than when they were gazing at their mothers. The ultimate intent of Japanese mothers was interpreted to control infants' activities and levels of alertness. In the same vein, in their examination of event sequences observed in infant-mother dyads in Tokyo and New York City, Bornstein and colleagues (Bornstein, Azuma, Tamis-LeMonda, & Ogino 1990; Bornstein, Toda, Azuma, Tamis-LeMonda, & Ogino 1990) determined that Japanese mothers attempted to change their infants' focus of attention, whereas European American mothers tended to encourage their infants to continue to focus on whatever had already captured the baby's attention. Later, Messinger and Freedman (1992) learned that Japanese sojourner mothers (who had lived in the United States for 3 years or less, spoke Japanese at home, and planned to return to educate their children in Japan) were more likely to assist their toddlers with a shape-fitting task even before the toddlers had made an autonomous attempt to perform the task, an anticipation interpreted to encourage interdependence. In contrast, European American mothers encouraged their toddlers' independence by awarding toddlers greater autonomy in the task, including allowing toddlers to leave the task before they had

attempted or completed it. Overall, Japanese mothers were more behavior-control oriented and European American mothers more response-reward oriented.

Taken together these observations suggest that Japanese mothers' speech and behavior tend to be organized with the intention to directly alter infants' physical and emotional conditions. Japanese mothers' anticipations and attempts to change their child's focus of attention accord with a goal to draw the infant toward the mother and foster culturally valued interdependence. By contrast, European American mothers' responsiveness to their infants' expressed interests appears consonant with their desire to encourage their infants' autonomy and independence. Comparing cultures, we expected to observe differences in sequences of interactants' behaviors. Specifically, our third set of hypotheses was that, presumably in an effort to foster mother-infant dependency, Japanese mothers would lead their infants (be less responsive to their infants than infants would be to their mothers) particularly with respect to person-oriented interactions, because they are more culturally valued than object-oriented interactions. In contrast, in an effort to promote their infants' autonomy, European American mothers would be more responsive to their infants than infants would be to their mothers, particularly with respect to the modality of interactions that they wished to promote more, object-oriented interactions. There is no research to date on sequences in infant-mother interactions among Japanese American immigrants; however, based on the literature reviewed above we expected Japanese American dyads to behave more like European American dyads than Japanese dyads, with additional consequential implications for understanding cultural models.

Method

Participants

Altogether, 118 dyads participated: 46 Japanese mothers and their infants; 32 Japanese American immigrants (Issei) to the United States and their U.S. born (Nisei) infants; and 40 European American mother-infant dyads living in the United States. Sociodemographic information for participants appears in Table 1. All infants were firstborn, term, healthy, and approximately 5.5months old at the time of the study. Approximately equal numbers of families with girls and boys participated in each group. All mothers in the study were married to the baby's father and lived in two-parent nuclear families. Because sociodemographic and ecological differences are often confounded with culture in studies of acculturation (Rudmin, 2003), the sociodemographic status and ecological context of participants were controlled: All families were urbanite and broadly middle-class. The Japanese sample was from Tokyo, and the Japanese American immigrant and European American samples were from the same U.S. East coast metropolitan area. Mothers in all groups were similar in education and work status.

Japanese families were indigenous Japanese. Japanese American immigrant families were demographically representative of immigrants from Japan living in the U.S. metropolitan area (Whoriskey & Cohen, 2001; Wilson & Pan, 2000), and they were representative of Japanese American immigrants to the United States (who for the past 20 years have been educated, from the urban middle-class, and primarily immigrating for economic reasons; Levinson & Ember, 1997; U.S. Census Bureau, 2001). Japanese American immigrant mothers came to the United States as adults, $M = 27.92$ years ($SD = 3.66$); they had lived in the United States for $M = 5.48$ years ($SD = 3.13$); and they tended toward biculturalism, $M = 2.02$ ($SD = .38$) as measured by a 5-point *Japanese American Acculturation Scale* (Bornstein & Cote, 2006). European American mothers were at least fourth-generation. We included European American infant-mother dyads because most research on infant and mother behavior in developmental science has been conducted with European American samples (Tomlinson & Swartz, 2003) such that European Americans provide a familiar reference

point, because they are currently the majority cultural group in the United States (Tilton-Weaver & Kakihara, 2008; U.S. Census Bureau, 2008), and because they constitute an apt cross-cultural anchor in the 3-culture acculturation design we employed. We do not conceive of European American dyads as normative nor believe that assimilating cognitions or practices to the majority group is necessarily the desired or desirable endpoint for immigrant families.

Families were recruited using methods common to developmental science research (mass mailings, newspaper birth announcements, advertisements in newspapers, and hospital birth notifications). We focused on infant interactions with mothers for two reasons: Mothers tend to be infants' primary caregivers in both Asian (Chao & Tseng, 2002) and U.S. (Barnard & Solchany, 2002; Bornstein, 2002) families, and mothers are believed to be the principal transmitters of culture across generations (Greenfield, Suzuki, & Rothstein-Fisch, 2006). This study is concerned with cultural socialization patterns.

Procedures

Infants and mothers were videorecorded at home at a time when the infant was awake and alert, and the only people at home were the infant, the mother, and a female researcher. The mother was asked to ignore the researcher insofar as possible and to carry on with her typical routine. After the recommended period of acclimation (McCune-Nicolich & Fenson, 1984; Stevenson, Leavitt, Roach, Chapman, & Miller, 1986), infant and mother were videorecorded continuously for at least 50 min. Infants in all groups were awake for virtually the entire (99.8–100%) observation, $F(2, 115) = 0.50$, *ns*. At the end of the visit, all mothers completed a demographic questionnaire, and Japanese American immigrant mothers also completed an acculturation questionnaire. All questionnaires were written in English and rendered into Japanese by bilingual/bicultural Japanese developmental scientists using standard forward- and back-translation procedures (Brislin, 1986; Peña, 2007).

Behavioral Coding

Infant and maternal behaviors in the 50-min videorecords were independently coded from the videotapes by trained and reliable coders using a coding program based on mutually exclusive and exhaustive behavioral codes. Onsets and offsets of the following behaviors were coded to the nearest 0.1 s, resulting in timed event-sequential data that allows for sequential analysis. Infant and maternal behaviors were coded separately from each other. Infant looking was coded as one of the following: (a) at the mother, (b) at an object, or (c) at something else or indeterminate. Analyses focused on infant person-oriented (code a) and object-oriented behavior (code b). Maternal behavior was coded as physically and/or verbally encouraging infant attention to one of the following: (a) mother herself, (b) an object, or (c) something else or none of the above. Analyses focused on maternal person-oriented (code a) and object-oriented behavior (code b). (Mothers' physical and verbal encouragement were not distinguished because they tend to co-occur; e.g., Bornstein, Toda, Azuma, Tamis-LeMonda, & Ogino, 1990.) Four frequency measures were the rate (number of times) per hour the participant engaged in a behavior (infant person-oriented, infant object-oriented, mother person-oriented, mother object-oriented; Bakeman & Gottman, 1997).

Coders were natives or bilingual natives of the cultural groups and unaware of the study hypotheses. They were trained to reliability ($\kappa > .60$) on a standard set of videorecords, and reliability was regularly checked to guard against coding drift. Coders achieved and maintained interrater reliability (Fleiss, 1981) using ~20% of the videorecords; κs for each cultural group and code = .64 to .78 (agreements 86% to 99%). For object-oriented

interactions, two additional coders determined that infant and mother were referring to the same object (κs ≥ .77 on 25% of records).

Approaches to Analyzing Infant-Mother Interaction

Most research that has examined sequences in infant-mother interactions has used time-sampling coding techniques and analyzed the sequence of infant and mother behaviors, without regard to the timing of those behaviors (i.e., event sequences), or coded the duration of interactions, without regard to how long partners take to respond to one another (and thus to become involved in the interaction). In contrast, we coded the onset and offset times of each infant and mother behavior separately; this strategy allowed us to examine sequences of infant and mother behaviors with regard to the timing of interactions at a microanalytic level. This approach permits granular assessments of infant-mother transactional processes as well as stronger inferences about temporally causal relations. Compared to event or state sequences, timed event sequences are not as constrained and thus better capture the complexity of real-life interactions because they preserve onset and offset times between partners' behaviors (Bakeman & Quera, 1995).

Timed event sequential data allow investigation of the extent to which infants versus mothers lead and respond to their partners. For each dyad's behavioral sequence, we calculated an odds ratio (OR, a measure of effect size) of lead-lag interactions. Following procedures described as time-window sequential analyses (Bakeman, 2004; Bakeman, Deckner, & Quera, 2005; Yoder & Tapp, 2004), we assessed 4 sequential dependent variables (DVs): (a) person-oriented interaction where the infant responds to the mother, the OR that the infant looked at the mother within 3 s of the onset of the mother's encouraging the infant to attend to her; (b) person-oriented interaction where the mother responds to her infant, the OR that the mother encouraged the infant to attend to her within 3 s of the onset of her infant looking at her; (c) object-oriented interaction where the infant responds to the mother, the OR that the infant looked at an object within 3 s of the onset of the mother encouraging her infant to engage that same object; and (d) object-oriented interaction where the mother responds to her infant, the OR that the mother encouraged her infant to engage an object within 3 s of the onset of her infant looking at the same object. Previous parametric research (Gratier, 2003; Van Egeren, Barratt, & Roach, 2001) has determined that 3-s time windows quantitatively capture contingencies in infant-mother behavior in natural settings.

Separately for each dyad, 0.1-s time units were tallied in 2-by-2 tables for each behavioral sequence (a–d above), and an OR was computed for each table (see Bakeman, Deckner, & Quera2005, p. 415). ORs > 1 indicate that bouts of the target behavior had a greater likelihood of beginning within 3 s of the onset of the given behavior than at other times, whereas ORs between 0 and 1 indicate less likelihood. Thus, the OR lends itself to ready interpretation (Bakeman et al., 2005): For example, an OR = 7.92 for infant response in a person-oriented interaction means that the odds of an infant looking at the mother within 3 s of the mother encouraging her infant to look at her are 7.92 times greater than the odds of an infant looking at her when she did not so encourage. Values for ORs were computed using the Generalized Sequential Querier program (Bakeman & Quera, 2009).

Results

Preliminary Analyses and Covariates

Data were investigated to determine whether they conformed to requirements for parametric statistical tests, and transformations were applied as necessary (patterns of results were similar with and without transformations). Analyses reported are for untransformed data with the exception of sequential analyses; because the distribution of ORs is positively

skewed (ORs range from zero to positive infinity with a mean of 1; Wickens, 1993), cube-root transformations of ORs were analyzed. If fewer than five occurrences of the given behavior were counted during an entire dyadic observation, the value of the OR was regarded as missing for that dyad because there was not a sufficient sample of behavior from that dyad to draw conclusions about behavioral contingency (Bakeman et al., 2005). Across the 4 sequential DVs combined, data for fewer than 6% of dyads were insufficient. Infant and mother age, maternal education, number of hours per week mothers worked, number of rooms in the home, and proportion of time mother was in view of the infant were screened as covariates in all analyses; the number of small manipulable objects (toys and household objects) within the baby's reach was also screened as a covariate for all analyses involving object orientation. Covariates (identified below) were used only if they correlated significantly ($p < .05$) with the DV within a cultural group and if the effects of the covariates in an analysis were significant. When covariates were necessary, conservative regression analyses were performed to assess the amount of variance in the DV accounted for by the covariate and residuals were used covariate (see Pedhazur, 1997, pp. 174–178).

Covariation in Infant-Mother Interactions

Correlations were calculated to investigate the first hypothesis, whether members of dyads who engage in a given behavior more frequently have partners who engage in the complementary behavior more frequently, separately for each cultural group. In accord with expectations, infants' and mothers' person-oriented behaviors were positively correlated in all groups: Japanese, $r(44) = .41$, $p < .01$ (residualized infant person-oriented behavior controlling proportions of time mothers were in view of their infants and number of rooms in the dwelling); Japanese American immigrant, $r(30) = .56$, $p < .001$ (residualized infant person-oriented behavior controlling number of hours per week mothers work); European American, $r(38) = .45$, $p < .01$ (residualized mother person-oriented behavior controlling proportions of time mothers were in view of their infants).

Infants' and mothers' object-oriented behaviors were also positively correlated, but only for European Americans: Japanese, $r(43) = -.11$, *ns* (residualized infant object-oriented behavior controlling number of objects in the infant's immediate environment and infant age, and residualized mother object-oriented behavior controlling number of objects in the infant's immediate environment and proportions of time mothers were in view of their infants); Japanese American immigrant, $r(24) = -.12$, *ns* (residualized infant object-oriented behavior controlling number of objects in the infant's immediate environment and proportions of time mothers were in view of their infants, and residualized mother object-oriented behavior controlling number of rooms); European American, $r(38) = .36$, $p < .05$ (residualized mother and infant behavior controlling number of objects in the infant's immediate environment).

Contingencies in Infant and Mother Interactions

One-sample *t*-tests (Table 2) were performed separately for each cultural group to determine whether pairs of behaviors were contingent (i.e., whether the ORs differed significantly from 1; Wickens, 1993). In accord with our second hypothesis, all pairs of behaviors were significantly contingent ($p < .05$) with moderate to large effect sizes (Cohen's $ds \geq .42$).

Lead-Lag Relations in Infant and Mother Interactions

Two MANCOVAs (one for person-directed and one for object-directed interactions) each with two between-subjects factors (Cultural group, Gender) and one within-subjects factor (the odds that the infant would respond to the mothers' behavior within 3 s with the complementary behavior, and the odds that the mother would respond to the infant's behavior with the complementary behavior within 3 s [ORs as described above]; this factor

is referred to below as Partner) were performed for sequential analyses because they allowed us to investigate cultural variation in infant-mother interaction to determine partner responsibility for the interaction within dyads (hypothesis three). The Cultural Group × Partner interaction supersedes Cultural Group and Partner main effects, and the Cultural Group × Partner interaction was the a priori focus of this analysis; therefore, the only *F*-tests presented below are for Cultural Group × Partner interactions and simple effects that decompose these interactions (Keppel, 1991). (There were no significant main effect of Gender or Cultural Group × Partner × Gender interactions.) A sensitivity analysis indicated that our sample size (N=118) provided adequate power (.80) to detect small to moderate effect sizes (fs = .14 and .16, respectively) for the Culture×Partner interactions in person- and object-oriented MANCOVAs, with $\alpha = .05$.

Person-oriented interactions—Controlling for mothers' education, the Cultural Group × Partner interaction emerged as significant, $F(2, 99) = 8.69$, $p < .001$, $\eta^2_p = .15$. Within dyads, analysis of simple effects indicated that European American and Japanese American immigrant mothers were more likely than their infants to respond in person-oriented interactions (mothers follow), $F(1, 99) = 31.43$, $p < .001$, $\eta^2_p = .24$, and $F(1, 99) = 10.01$, $p < .01$, $\eta^2_p = .09$, respectively; no differences were found for Japanese dyads.

Object-oriented interactions—Controlling for the number of objects in the environment and the proportions of time the mothers were in view of their infants, the Cultural Group × Partner interaction emerged as significant, $F(2, 103) = 4.24$, $p < .05$, $\eta^2_p = .08$. Within dyads, analysis of simple effects indicated that Japanese infants were more likely than their mothers to respond in object-oriented interactions (mothers lead), $F(1, 103) = 9.33$, $p < .01$, $\eta^2_p = .08$; no differences were found for European American or Japanese immigrant mother-infant dyads.

Discussion

This study contributes to our knowledge of child development in three main ways. First, it re-visits and deepens our understanding of two developmentally central foci of exchange in early life -- interactions focused on people and on objects. Second, it assesses and compares those interactions and deconstructs their dynamics through analyses of group- and individual-level correspondences and sequences. Third, it evaluates these modalities of infant-mother interaction in three interlinked cultural groups – one culture of origin, one acculturating culture, and one culture of destination. We studied Japanese, Japanese Americans, and European Americans. As Caudill once theorized, by holding technological levels and socioeconomic factors generally constant, a Japan--America comparison is better suited to identifying the influence of cultural beliefs and behaviors in psychological development than studies comparing peoples at disparate levels of technology and socioeconomic organization (LeVine, 2010). By investigating these developmentally significant interactions in these novel, complementary, and comprehensive ways in these particular cultural groups, this study transcends the common reliance on self-report instruments and simple comparisons of observations that typify the study of cultural variation and acculturation. It contributes to our understanding of which infant-mother interactions are culture-general and which community-specific as well as how interactions reflect acculturation in immigrant families (Bornstein & Cote, 2006). Social interaction links culture with individual behavior (Bronfenbrenner & Crouter, 1983), and sociocultural theory highlights the importance of interpersonal experiences in adults' transmission and children's internalization of cultural values.

Correspondence and Contingency in Infants and Mothers

With respect to the first hypothesis, we found that infant and mother person-oriented behaviors were consistently positively related. Specifically, mothers who encouraged their infants to look at them more had infants who looked at them more in all cultural groups. In addition European American mothers who encouraged their infants to look at objects more had infants who looked at objects more. Thus, 4 of 6 results support a universalist correlational hypothesis that mothers and their young infants are coordinated and attuned to one another and to the focus of one another's interest (Bakeman & Adamson, 1984; Bornstein & Tamis-LeMonda, 1990). As to the person- versus object-orientation difference, by 5 months infants and mothers have a long history of person-oriented interactions, whereas object-oriented interactions are only just consolidating (Bakeman & Adamson, 1984). Their longer shared history may explain why person-oriented behaviors, but not object-oriented behaviors, were positively related in all three cultural groups. The finding of significant positive relations between infant and mother object-oriented behaviors only for European American dyads might reflect the alternative culturalist hypothesis that object-oriented behaviors are significant among European Americans (Bornstein, 2002).

If our analyses had ended with correlation, we would conclude that infant-mother person- and object-oriented interactions tend to be coordinated. However, even if dyads distribute themselves in how they engage in mutually low and high levels of interactions in a modality, correlation does not speak to whether their behaviors are synchronized and occur contingently on one another in real time. Contingency analyses and correlational analyses inform one another, but contingency analyses add temporal and so quasi-causal information about moment-to-moment processes in interactions that transcend correlational analysis (Bakeman & Gottman, 1997; Van Egeren, Barratt, & Roach, 2001).

In support of our second hypothesis, all of the sequential analyses we investigated demonstrated that infant and mother behaviors of like modality are mutually contingent in real time. That is, in all three cultural groups when a mother encouraged her infant to look at her or at an object, the odds were significant that her infant would begin looking at her or at the object within a few seconds, and vice versa. Even if mothers who engaged in high levels of object-oriented behavior did not have infants who engaged in high levels of the corresponding behavior (as was true of Japanese and Japanese Americans), contingency analyses indicated that, when these mothers specifically encouraged their infants to look at an object, the odds were significant that their infants would respond by looking at that object within 3 s and vice versa. Two behaviors can be correlated but not contingent, just as they can be contingent but uncorrelated, as our data demonstrate. The tendency to reach conclusions about temporal contingency when there is or is not a positive correlation between two interactive behaviors is seductive, but either kind of conclusion can be erroneous.

In themselves the pervasive and robust sequential patterns we unearthed point to a species-general tendency for infants and mothers to engage in shared interactions. Experimental studies have shown that young infants are sensitive to the temporal organization and rhythmic qualities of stimulation and that they can anticipate the occurrence of stimuli within short time frames (DeCasper & Sigafoos, 1983; Nazzi, Bertoncini, & Mehler, 1998). Furthermore, the experience of anticipatory control appears to be enjoyable and stimulating for infants (Gergely & Watson, 1999). This evidence supports the view that mothers and infants build temporally coherent and coordinated sequences that characterize their moment-to-moment interactions (Gratier, 2003).

Cultural Moderation of Contingency in Person- and Object-Oriented Interactions

In examining sequences of behavioral interactions, we used a within-dyad design that allows comparison and identifies lead-lag roles to partners in the interaction. Although mothers are often thought to lead in exchanges with infants because they are the more mature or advanced partner in the dyad (Kochanska & Aksan, 2004; Vygotsky, 1978), infants play an active role in eliciting maternal behaviors that are meaningful and relevant to their developmental needs (Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008). Past research has seldom explored within-dyad differences in these terms, however. Half of our third set of hypotheses supported expected cultural moderation of directions of dyadic responsiveness in infant-mother sequences. On the basis of traditional and prevailing cultural models, we hypothesized and found that Japanese mothers would lead in interactions (more than their infants do) and European American mothers would respond in interactions (more than their infants do), but we did not anticipate the ways in which contingency would interact with behavioral domain. Japanese mothers led and Japanese infants responded in object-oriented interactions (and not person-oriented interactions as we expected); European American and Japanese American mothers followed their infants in person-oriented interactions (and not object-oriented interactions, as we expected). It may be that there are no differences in Japanese mother and infant responsiveness in the person-directed modality because this is a culturally valued mode of mutual interaction whose synchronicity has been emphasized and honed since early infancy (Azuma, 2005; Bornstein, Azuma, Tamis-LeMonda, & Ogino, 1990). Similarly, European Americans generally value object-directed interactions (Bornstein, Toda, et al., 1990), so perhaps with 5.5 months experience these mothers and infants share easier give-and-take or equal lead-and-follow patterns of interacting with objects.

We adopted Ward's (2001) culture learning approach to study culture and acculturation of infant-mother interactions by examining behaviors that are known to occur but vary across cultures. One way in which Japanese and European American mothers' contrasting socialization goals are reflected in their parenting is in their differing emphases on initiating and responding in interactions with their infants. Perhaps in line with the aim to foster interdependence in the infant-mother dyad, Japanese mothers tend to anticipate and direct their infants. Perhaps in line with their aim to foster independence, European American mothers respond to their infants. Japanese mothers anticipate and try to meet their infants' needs (sometimes before they are expressed), thereby blurring the self-other distinction and linking self-regulation with desired relational harmony. Japanese caregiving techniques engender in the child union with the mother. Mothers in the United States are contingently responsive to their infants in interactions. This way, U.S. mothers might encourage control and promote individual effectance and personal agency (Eisenberg, Cumberland, & Spinard, 1998; Malatesta, Culver, Tesman, & Shepard, 1989). The cultural model that presumably underlies Japanese mothers' anticipations of their infants is the desire to emphasize children's interpersonal dependence and their own agency vis-à-vis children's needs. The cultural model underlying U.S. mothers' responsiveness is presumably their investment in children's independence and agency.

Japanese and European American dyads behaved differently in some ways (that accord with their respective traditional cultural models), but they behaved similarly in other ways. Some cross-cultural similarities in dyadic interaction could reflect universally shared developmental processes (Norenzayan & Heine, 2005). It is also true, however, that Japan is a modernizing and partially Westernizing society, and social historical convergence of the two societies to one another could account for similarity in some Japanese-U.S. mother-infant dyadic processes.

To better understand how immigrant mothers reconcile models of their culture of origin with those of their culture of destination in socializing their young infants, we followed a comparative (group-level) approach. We compared person- and object-oriented interactions of Japanese American immigrant mothers (to the United States) and their infants to infant-mother dyads in their culture of origin (Japan) and infant-mother dyads who were members of the dominant (European American) cultural group in their culture of destination (the United States). In some cases, Japanese American immigrant infants and their mothers behaved more like European Americans in their culture of destination than like Japanese dyads from their culture of origin. Specifically, European American and Japanese American immigrant mothers were more likely than their infants to respond in person-oriented interactions and for object-oriented interactions mothers were no more likely to respond in the interaction than were their infants.

Later-generation immigrant Japanese mothers' behaviors have previously been found to be more similar to those of European American mothers than to mothers in Japan (Caudill & Frost, 1972), and our findings extend this pattern to a first-generation Issei sample. Any similarity of Japanese American immigrant dyads' interactions to those of European American dyads suggests that parenting practices acculturate. Okimoto (2001, p. 196) also observed that Japanese mothers in the U.S.A. seemed "to leave decisions up to the[ir] toddler." This finding echoes other research that suggests that, in acculturation, parenting behaviors change (and do so more quickly or readily than beliefs; Bornstein & Cote, 2006), at least among middle-class immigrant mothers. Acculturation provides a kind of natural experiment for investigating changes in parental cognitions and practices, early forms of cultural learning, and the mechanisms by which parents and infants might share culturally embedded experiences. (Asian) immigrant families maintain traditional parenting beliefs and values but behave in the ways of their adoptive culture (Bornstein & Cote, 2004). In a parallel way, Gratier (2003) studied vocal interactions of mothers and their 2- to 5-month-old infants from India, France, and the United States. The vocal interactions of immigrant dyads living in the United States showed signs of change from culture of origin to culture of destination. Similarly, children of assimilated and integrated Korean immigrant mothers behave more like self-assertive, individually oriented European American children than do children of marginal and separated Korean immigrant mothers (Farver & Lee-Shin, 2000). It may be, too, that mothers who choose to immigrate are especially ready or willing to adopt aspects of their new culture, including some parenting practices.

Caveats and Conclusions

Our results were obtained from observations of primiparous middle-class mothers and infants in the particular cultural groups and countries that we studied, and so might generalize only to similar populations. Our results for immigrants also apply only to mothers from Japan who immigrated to the United States in their late-twenties, on average, and were not refugees; we also can only speculate about whether reciprocal processes would obtain in U.S. American mothers immigrating to Japan and to American infants being reared in Japan. It may be, too, that behaviors of infants and mothers are more coordinated in the middle class than in lower social classes where families experience additional stresses, or that behaviors of mothers and their firstborns are more coordinated than are those of multiparous mothers and later-born infants.

Central to a concept of culture is the expectation that different peoples possess different ideas and behave in different ways with respect to childrearing, and parenting cognitions and practices are known to vary across cultures (Bornstein & Lansford, 2009). Common cultural messages are embedded in diverse daily parent-child interactions (Quinn & Holland, 1987). Cultural influences on parenting (and child development) begin before children are born, and they shape fundamental decisions about which behaviors parents should promote in

their children and how parents should interact with their children (e.g., Benedict, 1938; Whiting & Edwards, 1988). For example, an investigation of knowledge of developmental timetables in new mothers of Australian versus Lebanese extraction arrived at the conclusion that cultural differences influenced parental expectations more than many other prominent personal or sociodemographic factors (Goodnow, Cashmore, Cotton, & Knight, 1984). In a larger sense, parenting contributes vitally to the "continuity of culture" by helping to define culture and the transmission of culture across generations. Parents and other caregivers in a cultural community share action plans and cultural models concerning the processes and goals of early development (Harkness & Super, 2002). Ogbu (1995) proposed a cultural-ecological theory in which individual competence is defined, not in universal terms, but within children's cultural (and historical) contexts. Here, we found that from early life, cultural norms and values shape social processes, and culture promotes or constrains specific aspects of social functioning (Chen & French, 2008).

The United States and Japan are both child-centered, modern, and developed societies, but Japanese and European American parents appear to harbor some different near- and far-term childrearing goals and to express them in different ways. Our research shows that it is a mistake to assume that parenting and children's development in any one culture automatically apply to other cultures. This research also adds to our knowledge of parenting and child development in a group of Asian immigrant families to the United States. As the numbers of immigrants to the United States and around the world wax, it is imperative to learn more about them so that immigrant parents, children, and families thrive.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Sociodemographic Characteristics of the Participants

	Japanese (n = 46)	Japanese American Immigrant (n = 32)	European American (n = 40)	F
Infant age (days)	161.89_a (9.16)	171.84_b (13.60)	163.25_a (5.38)	$F(2, 115) = 11.17$, $p < .001$, $\eta^2_p = .16$
Infant gender (girls:boys)	23:23	15:17	17:23	χ^2 (2, N = 118) = 0.48, *ns*
Mother age	29.03_a (2.90)	31.95_b (3.22)	29.43_a (4.95)	$F(2, 109) = 5.84$, $p < .01$, $\eta^2_p = .01$
Mother education	5.58 (0.88)	5.75 (0.76)	5.73 (0.99)	$F(2, 112) = 0.42$, ns, $\eta^2_p = .01$
Hours mothers work per week (all mothers)	14.30 (20.57)	7.06 (14.51)	16.92 (17.99)	$F(2, 84) = 2.96$, *ns*, $\eta^2_p = .07$
Employed mothers: Nonemployed	8:9	9:23	20:20	χ^2 (2, N = 89) = 3.76, *ns*
Hours employed mothers work per week outside the home	35.75 (16.26)	25.11 (17.48)	33.85 (7.82)	$F(2, 32) = 1.88$, *ns*, $\eta^2_p = .11$
Proportion of time mother was in view of the infant during the observation	.92 (.18)	.95 (.09)	.96 (.06)	$F(2, 115) = 1.21$, *ns*, $\eta^2_p = .02$

Notes. M (SD) unless otherwise specified. ANOVAs with one between-subjects factor (Cultural Group) were performed separately for each sociodemographic characteristic and were followed by t-tests with Bonferroni's correction, $p < .05$; different subscripts indicate significant group differences. Maternal education was scored on the 7-point Hollingshead (1975) index. Because differences exist between countries in the frequency, quality, and content of schooling, bicultural researchers adjusted mothers' years of schooling so that the scales were equivalent to the Hollingshead (1975) index. Sample sizes for some analyses differ due to missing data.

Table 2

Untransformed Odds Ratios for Sequential Interactions

		Japanese	Japanese American Immigrant	European American
Person-oriented interactions				
Infant responds	*M*	7.92	5.20	5.05
	SD	(7.83)	(5.06)	(9.07)
	95% CI	5.45–10.39	3.28–7.13	1.98–8.12
	t	$t(40) = 7.62$, $p < .001$, $d = 1.19$	$t(28) = 4.71$, $p < .001$, $d = .87$	$t(35) = 5.08$, $p < .001$, $d = .84$
Mother responds	*M*	7.56	10.57	12.24
	SD	(7.11)	(13.38)	(17.59)
	95% CI	5.32–9.81	5.49–15.66	6.29–18.19
	t	$t(40) = 7.92$, $p < .001$, $d = 1.24$	$t(28) = 5.49$, $p < .001$, $d = 1.02$	$t(35) = 8.46$, $p < .001$, $d = 1.41$
Object-oriented interactions				
Infant responds	*M*	2.71	2.04	1.61
	SD	(1.97)	(2.41)	(1.27)
	95% CI	2.11–3.32	1.16–2.92	1.20–2.02
	t	$t(42) = 6.74$, $p < .001$, $d = 1.01$	$t(30) = 2.98$, $p < .01$, $d = .52$	$t(38) = 2.80$, $p < .01$, $d = .47$
Mother responds	*M*	1.86	1.90	2.27
	SD	(1.30)	(1.82)	(4.54)
	95% CI	1.46–2.27	1.23–2.57	0.80–3.74
	t	$t(42) = 4.04$, $p < .001$, $d = .64$	$t(30) = 2.86$, $p < .01$, $d = .52$	$t(38) = 2.64$, $p < .05$, $d = .42$

Note. Untransformed odds ratios not controlling for covariates. One sample *t*-tests compared the transformed odds ratio in that cell to 1.00 (transformed).