

## Maternal Singing in Cross-Cultural Perspective

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Mothers were recorded as they informally sang a song of their choice, once to their infant and once in the infant's absence. Paired excerpts from different mothers were then presented to adult listeners, who were required to identify the infant-directed song in each pair. In Experiment 1, with singers and listeners of North American origin, infant-directed excerpts were identified with a high level of accuracy. Mothers in Experiment 2, all of Indian descent, sang Hindi songs in both contexts. Listeners of Indian and North American origin identified the infant-directed excerpts significantly better than chance, with women outperforming men and native Hindi speakers outperforming native English speakers. These findings document a distinctive style of singing to infants, some aspects of which are recognizable across cultures and musical systems. Cross-cultural differences in singing style and the relations between infant-directed song and speech are discussed.

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It has been well established that there is a distinctive style or register for speaking to infants (Ferguson, 1964; Fernald, 1984; Sachs, 1977). This style of speaking, variously termed baby talk, motherese, or, simply, infant-directed speech, is not limited to the primary caregiver but extends to other adults, male and female (Rheingold & Adams, 1980), and even to young children (Anderson, 1986; Dunn & Kendrick, 1982; Sachs & Devin, 1976; Shatz & Gelman, 1973; Tomasello & Mannle, 1985; Weeks, 1971). Similar speech adjustments have been documented across numerous languages and cultures (Ferguson, 1964; Fernald et al., 1989; Grieser & Kuhl, 1988; M. Papoušek, Papoušek, & Symmes, 1991), raising the possibility, indeed likelihood, that such adjustments are universal. Prosodic contours in speech, notably the patterns of pitch and loudness over time, are believed to reflect the emotional state of the talker (Knower, 1941; Williams & Stevens, 1972). Presumably,

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the caregiver's emotions are influenced by feelings about the infant and by the infant's behavior. The prosody of the caregiver's speech, with its higher pitch, simple repeating pitch contours, and slower tempo (Fernald & Simon, 1984; Jacobson, Boersma, Fields, & Olson, 1983; M. Papoušek et al., 1991; Stern, Spieker, & MacKain, 1982), has a distinct impact on the infant listener, enhancing attention (Cooper & Aslin, 1990; Fernald, 1985; Fernald & Kuhl, 1987), as well as positive affect (Fernald, 1992; Werker & McLeod, 1989).

Infant-directed behaviors are not restricted to the vocal domain. Caregivers exhibit multimodal adjustments that include visual, tactile, and vestibular components (Beebe, Feldstein, Jaffe, Mays, & Alson, 1985; H. Papoušek & Papoušek, 1987). It is likely, then, that infant-directed speech represents but one aspect of a broad repertoire of caregiving behaviors.

Although singing to infants in the course of caregiving is prevalent across cultures (Trehub, Unyk, & Trainor, 1993; Unyk, Trehub, Trainor, & Schellenberg, 1992), it has largely escaped the attention of developmental psychologists. Nevertheless, singing to infants could be expected to reflect and convey the emotional state of the singer just as speech does. Anthropological and ethnomusicological sources have revealed a number of potential parallels between song and speech to infants. For example, repetitive rhythms and contours as well as elongated vowels characterize lullabies from Vietnam (Cong-Huyen-Ton-Nu, 1979), Norway (Kortsen, 1970), Colombia (List, 1973), and Afghanistan (Sakata, 1987), and from aboriginal communities in Panama (McCosker, 1974) and North America (Hilger, 1952; Sands & Sekaquaptewa, 1978). However, the universality of such features remains to be established.

On the assumption that lullabies exemplify at least some universal and, therefore, potentially recognizable features, Trehub, Unyk, and Trainor (1993) attempted to establish whether lullabies from foreign cultures and musical systems were perceptually distinct from nonlullabies within the same culture. They paired 30 recordings of foreign lullabies with recordings of comparison songs matched on culture, tempo, and general singing style, asking adult listeners to identify the lullaby in each pair. Listeners' selection of lullabies was significantly better than chance, but far from perfect (about 67% correct). Nevertheless, listeners performed no better on songs of European origin than on those from totally foreign musical systems, indicating that musical knowledge or familiarity was irrelevant to the task. To eliminate the possibility that simple cues in the lyrics such as onomatopoeia and repetitive syllables (e.g., *la la*) were primarily responsible for listeners' success in lullaby recognition, the researchers low-pass filtered the songs, rendering the lyrics unintelligible. Their finding of similar performance under these circumstances indicated that aspects of the melody (e.g., contour) and features of the performing style (e.g., voice quality or tone of voice) likely provided the relevant cues.

A musicological analysis of these lullabies and comparison songs (Unyk et

al., 1992) indicated that songs with a greater proportion of descending contours and those with simpler contours (i.e., fewer changes in pitch direction) were more likely to be judged as lullabies. It is notable that these are the principal features of soothing infant-directed speech (e.g., Fernald, 1989; Fernald & Simon, 1984). In contrast to arousing speech to infants, which is characterized by an expanded pitch range and rise or rise-fall contours, soothing speech is characterized by a narrow pitch range and sustained or falling contours (M. Papoušek et al., 1991).

To date, stylistic features of infant-directed speech have not been assessed directly. In most descriptive studies (e.g., Fernald et al., 1989; M. Papoušek et al., 1991), caregivers have been free to alter their speech content in relation to infant and adult listeners so that content and prosodic form have been confounded. For example, prosodic frames may necessarily differ for the semantically meaningful and phonologically complex speech to adults and the analogous speech to noncomprehending infants. In the Trehub, Unyk, and Trainor (1993) study of lullabies, stylistic features of infant-directed singing were also inaccessible. Not only was there a similar confounding of song structure and performing style but the lullabies and comparison songs typically involved different performers and an unknown performing context. With respect to contextual factors, it is likely that an infant's presence and state would have some impact on the singer and, consequently, on features of the resulting song. The infant's presence, which seems to be critical for the full complement of infant-directed speech adjustments (Fernald & Simon, 1984; M. Papoušek, Papoušek, & Haekel, 1987), may be similarly essential for the realization of a lullaby with appropriate tone of voice (e.g., gentle) and dynamic quality (e.g., lulling).

In this investigation, we explored some aspects of the infant's contribution to maternal singing. This was accomplished by recording a number of mothers as they sang a song of their choice, once directly to their infant and once in the infant's absence. The use of the identical song in both contexts would highlight potential differences in performing style. Paired excerpts from different mothers were then presented to adult listeners, who were required to identify the infant-directed song in each pair.

## EXPERIMENT 1

### Method

**Subjects.** The participants were 20 adults (10 men and 10 women) from 18 to 29 years of age. Half of the participants had no formal training in music; the others reported music lessons spanning a few months to over 8 years.

**Materials.** Excerpts of singing were collected in the homes of 16 mothers of North American origin who had infants 4 to 13 months of age. Mothers

were told that we were interested in properties of very informal singing and that we were gathering casually sung materials from a variety of sources. Half of the mothers were asked to sing a song of their choice to their infant, and to do so in their usual manner. The remaining mothers were asked to sing a song as they might typically sing while alone. Only after completing these initial songs were mothers instructed to sing the same song again in the contrasting condition (i.e., without the infant if the infant was originally present). The experimenter left the room before each recording session, leaving the mother to start and stop the recording equipment at her convenience. After both recordings were completed, mothers were interviewed regarding their singing habits. Only those mothers who typically sang to their infants (all but 2) were included in the final sample of 14 mothers.

A composite tape was created from these recordings consisting of paired excerpts from each mother, one with their infant present and one without. Identical portions of the songs were used, these portions being limited to recordings free of extraneous noise and of infant vocalizations. The order of the infant-directed excerpt (first or second) was randomized.

**Procedure.** Listeners were tested individually in a quiet room containing an audiotape player (TEAC V-300), amplifier (Realistic SA10), and two loudspeakers (Radio Shack NOVA-6). They were told (via standardized written instructions) that they would hear 14 pairs of excerpts of singing, one sung to an infant, the other without an infant present. For each pair, they were to identify the infant-directed excerpt on a standardized answer sheet. After completing the task, they were asked to note the criteria used in making their judgments.

### **Results and Discussion**

No mother sang a lullaby or soothing song to her infant. Rather, most selected children's play songs, typically traditional ones such as "Frère Jacques" (2 mothers) or "Twinkle, Twinkle Little Star" (2 mothers). Perhaps this was simply appropriate to the state (awake, alert) of most infants. Curiously, most mothers selected a similar song when singing alone first. In only two instances did mothers sing an "adult" song; one was "Row, Row, Row Your Boat," a common round song that is often featured on children's records, and the other, a folk song. The overwhelming selection of children's songs implies that mothers likely sang such songs more frequently than conventional popular or folk songs.

Listeners correctly identified the infant-directed excerpts 91% of the time, which significantly exceeded chance performance,  $t(19) = 17.1, p < .0001$ . An analysis of variance (ANOVA) comparing performance between male and female listeners and across different mothers revealed no differences among mothers but superior performance of women over men (95% vs.

86.4% correct) that approached conventional levels of significance,  $F(1, 18) = 3.7, p = .07$ . A multiple regression analysis revealed that age and level of formal musical training on the part of listeners were unrelated to the accuracy of identification. Listeners reported the singer's tone of voice as the principal cue governing their choices.

In a preliminary analysis of stylistic features, the duration (i.e., number of seconds) and starting pitch of each infant-directed and comparison excerpt were measured. The duration of excerpts sung to infants ( $M = 26.1$  s,  $SD = 11.3$ ) significantly exceeded that of comparison excerpts ( $M = 25.2$  s,  $SD = 10.4$ ),  $t(13) = 2.84, p < .01$ , indicating that mothers sang somewhat more slowly when singing the identical material to their infants. These slower renditions often involved more sustained vowels and more gliding from one pitch level to another; such features are prominent in infant-directed speech (Fernald & Simon, 1984). There were no differences, however, in starting pitch level.

In short, male and female adults readily identified infant-directed singing, maintaining a high level of accuracy across singers and songs. Moreover, the irrelevance of musical training coupled with the high performance level implies that the distinguishing characteristics of infant-directed singing are intuitively obvious, at least to adult listeners from the same culture.

## EXPERIMENT 2

Although adults accurately identified infant-directed singing, it is unclear whether they were assisted in this regard by knowledge of cultural caregiving practices. If the infant's presence induced some universal adjustments in maternal singing style, then listeners unfamiliar with a particular culture would have some basis for identifying such singing. With respect to infant-directed speech, a number of common modifications have been identified in structurally different languages (Ferguson, 1964; Fernald et al., 1989; Grieser & Kuhl, 1988; M. Papoušek et al., 1991; Watson-Gegeo & Gegeo, 1986). It is generally assumed, moreover, that such speech is identifiable cross-culturally, although this has not been evaluated empirically. In the case of songs, some similarities have been noted in adults' perception of lullabies from different cultures (Trehub, Unyk, & Trainor, 1993; Unyk et al., 1992), but there has been no attempt to evaluate the impact of the infant's presence on features of lullaby performance. To test the hypothesis that at least some stylistic aspects of infant-directed singing are culture-independent, we recorded mothers of Indian descent, some in India and some in North America, as they sang songs in their native language (Hindi) with their infant present or absent. North American listeners who were unfamiliar with Indian language and culture were required to identify the infant-directed excerpt in each pair. A group of native speakers of Hindi also completed the identification task.

## Method

**Subjects.** The listeners were 40 adults; 20 were native speakers of Hindi (10 men and 10 women) affiliated with the local East Indian community. The other 20 were locally born and reared adults (10 men and 10 women), all native speakers of English. The listeners were 18 to 49 years of age, with approximately half (58%) having no formal training in music.

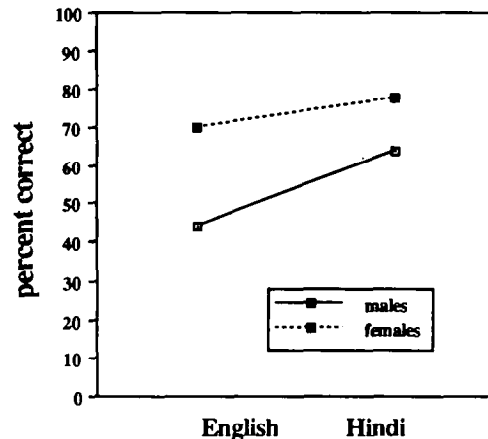
**Materials.** We recorded 12 mothers, all native speakers of Hindi, as they sang Hindi songs with their infant present in one instance and absent in the other (as in Experiment 1). Five of the mothers were recorded in India; the remaining 7 were recorded locally by the same individual and with the same procedures and equipment. A composite tape of 12 pairs of matched excerpts was prepared.

**Procedure.** As in Experiment 1, subjects were tested individually in a quiet room. They were told that they would hear 12 pairs of excerpts of singing, one excerpt in each pair sung to an infant, the other without an infant present, and that they were required to identify the infant-directed excerpt in each pair. After hearing all 12 pairs, they were asked to list the criteria used in making their choices.

## Results and Discussion

There was considerable difference in the sung materials of East Indian mothers compared to the North American mothers of Experiment 1. East Indian mothers chose, in order of decreasing frequency, religious songs, lullabies, and children's play songs. The religious songs were slow and soothing, their religious nature only being evident to Western listeners from translations of the lyrics. Measurements of the duration and starting pitch of each excerpt failed to reveal any difference between infant-present and infant-absent excerpts.

Overall, excerpts were correctly identified 64% of the time, which significantly exceeded chance levels,  $t(39) = 4.89$ ,  $p < .001$ . Figure 1 shows performance levels for male and female listeners of North American and Indian origin. To assess the influence of cultural origin and sex of listeners, as well as the potential influence of song pairs (i.e., mothers), an ANOVA ( $2 \times 2 \times 12$ ) with repeated measures on excerpts, was conducted. A significant effect of culture was evident,  $F(1, 36) = 10.75$ ,  $p < .003$ , with listeners of Indian origin (71% correct) outperforming native North American listeners (57% correct, not significantly different from chance). In addition, women (74% correct) significantly outperformed men (54% correct),  $F(1, 36) = 21.38$ ,  $p < .0001$ . In fact, male listeners of North American origin (44% correct) performed at chance levels, but female listeners of North American origin (70% correct) significantly exceeded chance levels,  $t(9) = 4.13$ ,  $p < .003$ . The



**Figure 1.** Performance of native speakers of English and Hindi on the identification of Hindi infant-directed songs.

effect of excerpt (i.e., mothers) was not significant, nor were there any significant interactions. A multiple regression analysis failed to reveal any relations among age, formal musical training, and the accuracy of identification.

The superiority of female over male listeners across cultures may reflect women's greater experience with infants, their greater insight into infant-appropriate adjustments, or their sensitivity to the nuances of same-sex singers. The reduced accuracy of performance of listeners of North American origin on Hindi (57% correct) compared to English songs (Experiment 1, 91% correct) and their poorer performance compared to native Hindi listeners (71% correct) imply that knowledge of culture-specific caregiving practices or musical style plays a role in the identification of infant-directed singing. It is worth noting, however, that listeners of Indian and North American origin reported the use of similar criteria in making their judgments. Both groups of listeners mentioned "tone of voice" more frequently than any other criterion.

An ANOVA comparing native speakers of English on English songs (Experiment 1) with native speakers of Hindi on Hindi songs (Hindi listeners, Experiment 2) revealed significantly lower performance for Hindi listeners,  $F(1, 36) = 34.4, p < .0001$ , and significantly lower performance for men, regardless of culture,  $F(1, 36) = 11.49, p < .002$ , but no significant interactions. It is possible that the predominantly soothing songs of Hindi-speaking mothers offered less scope for modification than did the predominantly playful songs of English-speaking mothers. The superiority of female over male listeners on same-culture materials confirmed and extended the advantage first observed for non-Indian listeners on Indian materials.

### GENERAL DISCUSSION

The findings of Experiments 1 and 2 concur in revealing a distinctive style of singing to infants, one that is recognizable not only within a culture but also across different cultures and musical systems. Thus, adults go beyond singing to infants with distinct musical forms such as lullabies (Trehub, Unyk, & Trainor, 1993; Unyk et al., 1992), embellishing a variety of forms such as play songs, religious songs, and lullabies with perceptible vocal adjustments.

The specific nature of these infant-directed song adjustments is still unclear. Although English-speaking mothers sang more slowly than usual to their infants, this was not the case for Hindi-speaking mothers. Moreover, the predominant selection of arousing songs by English-speaking mothers and soothing songs by Hindi-speaking mothers made it impossible to disentangle the influences of song structure from those of interactional style.

With respect to infant-directed speech, a number of cross-cultural differences have been noted in addition to the similarities. For example, North American mothers exhibit more extreme intonational changes compared to parents who speak British English, French, German, Italian, Japanese, or Mandarin Chinese (Fernald et al., 1989; Grieser & Kuhl, 1988; M. Papoušek et al., 1991). Fernald (1992) contended that this reflects enhanced affective expressiveness on the part of North American mothers. Alternatively, it may reflect the greater value accorded by some cultures to soothing over arousing interactions (Caudill & Weinstein, 1969; Dixon, Tronick, Keefer, & Brazelton, 1981; Toga, Fogel, & Kawai, 1990). The latter view is consistent with more soothing vocal and tactile interactions by Japanese than by North American mothers (Toda et al., 1990) and with the prevalence of falling pitch contours in Mandarin Chinese speech to infants (Grieser & Kuhl, 1988).

The finding that North American mothers sing arousing songs to their infants, whereas mothers of Indian origin sing soothing songs, parallels the aforementioned cross-cultural differences in infant-directed speech. These differences in song selection may well reflect more general differences in caretaking practices. In India and in the local East Indian community, it is common for mothers to remain with their infants until they fall asleep, singing or comforting them in other ways. Infants typically sleep in the same room as their parents, often in the very same bed. On the other hand, mothers of North American origin generally use a crib and separate room for their infants, often leaving the room before the infant falls asleep. When interviewed, moreover, most North American mothers reported that they rarely sang lullabies or lullaby-like songs to their infants. In other words, their songs to infants served a predominantly playful or attentional function. Some mothers reported that they sang during feeding or dressing interactions to minimize infant restlessness and to expedite their immediate caretaking goals. Others reported the efficacy of singing in promoting positive affect on the part of infants.



The superior performance of North American born listeners on English compared to Hindi songs indicates that cultural knowledge, whether of singing or caretaking, exerted a facilitative effect. Cultural facilitation was also evident in the superior performance of Hindi-speaking over English-speaking listeners on Hindi songs. There were indications, however, that something more than cultural knowledge was involved. Better performance of North-American-born than Indian-born listeners on materials from their own culture implies the English infant-directed songs incorporated more transparent modifications. It is possible that soothing songs offer less scope for performance variations than do playful songs and this might also be the case for soothing versus playful speech (Trehub, Trainor, & Unyk, 1993).

The consistently higher level of performance achieved by female compared to male listeners from both cultures may stem from a number of factors. North American and Indian women characteristically have more experience caring for infants than do men. Thus, they may be more sensitive to age-appropriate caretaking behavior in general and to infant-directed singing in particular. In addition, female listeners may have been able to capitalize on the greater similarity between their own vocal qualities and those of the female singers compared to the prevailing situation for male listeners. Moreover, the female listeners may readily empathize with female singers and their presumed emotions in the context of an infant. If such same-sex factors are relevant, then male listeners should be more astute judges of male infant-directed singing. This issue could be evaluated empirically in future research.

Finally, these findings indicate that infants contribute, simply by their presence, to the singing style of their mothers. In future research, it should be possible to establish whether this influence extends to fathers, siblings, and others, and how the infant's age, sex, and state alter features of the resulting song.

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