



## Why do mothers cradle babies on their left?

*J S Sieratzki, B Woll*

**Many explanations have been put forward for the observed preference of mothers to cradle babies on the left side. These include handedness, the importance of the maternal heartbeat, left breast sensitivity, socio-psychological factors, and advantages in monitoring the infant. We propose that protection and facilitation of affective communication is at the core of cradling; and explore the relation between left-cradling and the role of the right hemisphere in early mother-infant interaction. Left-cradling not only directs maternal communication to the infant's right hemisphere but also facilitates affective feedback to the maternal right brain. The underlying neuro-linguistic mechanisms proposed in this article may be important in the early course of child language development and may also serve to illuminate our understanding of the evolution of human language.**

The relationship between mother and infant is passionate and precious. Cradling is a manifestation of this connection. Most mothers have a preference for cradling on one side; they are usually unaware of this bias. There is a general preference to hold infants on the left (see figure 1),<sup>1-7</sup> which is also seen in artistic representations of mothers and infants (see figure 2).<sup>8</sup> The heritability<sup>7</sup> and the evolution<sup>9</sup> of left-cradling preference have been studied; conventional wisdom links it to right-handedness, but is this the true reason for the behavioural bias?

The American psychologist, Lee Salk, inspired by the cradling behaviour of a rhesus macaque mother, found that 83% of right-handed and 78% of left-handed human mothers cradled their infant on the left. Salk believed that handedness explanations offered by mothers were post-hoc rationalisations.

In Salk's opinion, the reason for left-cradling was the psychobiological imprint which the maternal heartbeat left on the fetus in utero and which not only programmed mother-infant behaviour but also explained the universal appeal of music. He observed less crying and better weight gain in newborns during exposure to recordings of a normal heartbeat. Based on Salk's theory, Huheey proposed an explanation for right-hand dominance; if mothers prefer to hold infants on the left, close to their heart, right-handed mothers could keep their dominant hand free and thus have an evolutionary advantage.<sup>10</sup> Later studies have, however, given little support to Salk's theory. The mother's voice, rather than her heartbeat, is the sound most preferred by the fetus and newborn.<sup>11,12</sup>

### Previous explanations

One theory connects cradling to the right-sided head-turning preference found in most newborns.<sup>13</sup> Ginsburg and colleagues<sup>2</sup> proposed that mothers would naturally accommodate their infants in a position in which the "head would face away from the mother's neck allowing the infant less surface blockage of nostrils and mouth and

allowing the mother more comfort while transporting her neonate". Consequently, newborns with right-turning preference would be carried on their mother's left, and those with left-turning preference would be carried on the right. Indeed, they observed that 65% of right-turning infants were held on their mother's left, while 74% of left-turning infants were held on their mother's right.

Because of its design, the results of this study can, however, apply only for infant carrying, which is less left-biased than cradling,<sup>4,5</sup> hence the relatively low percentage of left-sided holding in Ginsburg's study. Infant head-turning preference varies with position,<sup>13</sup> whereas a mother's cradling preference is relatively stable.

This explanation was first proposed in 1835 by Weber, who suggested that the left side of the body had a lower threshold for tactile perception. With a specially designed aesthesiometer, Weinstein<sup>14</sup> tested the tactile sensitivity of the left and right female breast and reported greater sensitivity on the left. Saling and colleagues<sup>3</sup> related left cradling to this sensory asymmetry but this theory was not confirmed by Saling's own further studies.<sup>15</sup>

A psychological explanation for cradling preference comes from an experiment by Weiland and Sperber.<sup>16</sup> They asked women to hold a pillow against their chest and found no side preference; when they were told to imagine that they were holding a threatened infant, however, more women held the pillow on the left. Taking into account other experimental observations, the authors proposed that maternal emotions may influence cradling preference.

De Chateau looked at the influence of age, sex, parity, sensitivity, and parenthood on cradling behaviour.<sup>4,5</sup> He found that 80% of newly delivered mothers and the infants' fathers held their infant on the left side independent of handedness, parity, and sex of the infant. From the age of 6 years, most females cradled on the left; whereas males had no obvious side preference. When they became fathers, however, 80% of men became left cradlers. De Chateau also found that right-cradling mothers were less sensitive to signals coming from fetus and infant, were more anxious, and required more support by community nurses.

Bogren<sup>6</sup> interviewed couples during pregnancy and after delivery and found that 80% of mothers and their partners held their infant to the left, irrespective of handedness.<sup>6</sup> Both men and women who cradled on their

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Figure 1: **Four recently delivered mothers of Hammersmith Hospital, London, UK**

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left had stronger attachment to and identification with the parents of their own sex, and those who cradled on the right to the parent of the opposite sex. Right-cradlers also more often had psychological problems before pregnancy and were more anxious about pregnancy, delivery, and health of the child. A preference for cradling on the left may thus be related to femaleness and parenthood but further psychological connections are difficult to define.

### **Hemispheric asymmetries: monitoring the infant**

While both hemispheres interact in the processing of emotions, emotional gestures and facial expressions are faster and more accurately recognised through the left visual field (right hemisphere), and the left side of the face has more emotional expressivity<sup>17-19</sup> (the left visual half-field is projected to the visual cortex of the contralateral hemisphere<sup>20</sup>).

Manning and Chamberlain<sup>9</sup> proposed that a preference for cradling on the left began when cerebral lateralisation developed during evolution. They found that up to 80% of chimpanzees, gorillas, and orangutans in zoological parks were left-cradlers. This observation could not be accounted for by their limited handedness, which argues also against socioergonomic explanations of left-cradling in humans. Manning and Chamberlain suggested that left-cradling in great apes could derive from early right-hemispheric specialisation for monitoring of emotions, focusing in particular on monitoring of facial expressions, and to a lesser extent voice intonation.

The existence of left-cradling bias in apes has been called into question by a recent study finding that chimpanzees exhibit a slight right-sided bias.<sup>21</sup> Furthermore, Manning and Chamberlain's theory about monitoring of facial expressions was not supported in the experiments of Lucas and colleagues.<sup>22</sup> Using dolls instead of infants, and female students instead of mothers, they found no significant differences in visual perception of affective signals between left-cradlers and right-cradlers but proposed that other dominant right hemisphere functions, especially spatial recognition and control of immediate attention, could tilt the cradling balance to the left.

### **Communicating with the infant**

Left-cradling seems to offer a number of practical and instrumental advantages, but the role of the right hemisphere is crucial in relation to the most precious needs of mothers and infants. After the trauma of birth the infant needs reassurance, and the mother wants nothing more than to provide this. To make the link, the mother offers her feelings through touch, gestures, facial expressions, and particularly through sounds. These sounds compose a melody without many or any words which shows a remarkable similarity in tune across cultures.<sup>23-25</sup> The mother's voice is known to the infant; her melody is tuned to the infant's needs and responses.<sup>12,24,25</sup> All this originates from a deep-seated maternal instinct—even deaf mothers vocalise to young deaf infants, although neither can hear the sounds.<sup>26</sup>

Language is produced by the interaction of both hemispheres but each hemisphere controls different aspects of language: the left hemisphere controls word content, grammar, and syntax; the right controls intonation and affective intent (prosody).<sup>18,27</sup> Focal right brain injuries impair patients' abilities to

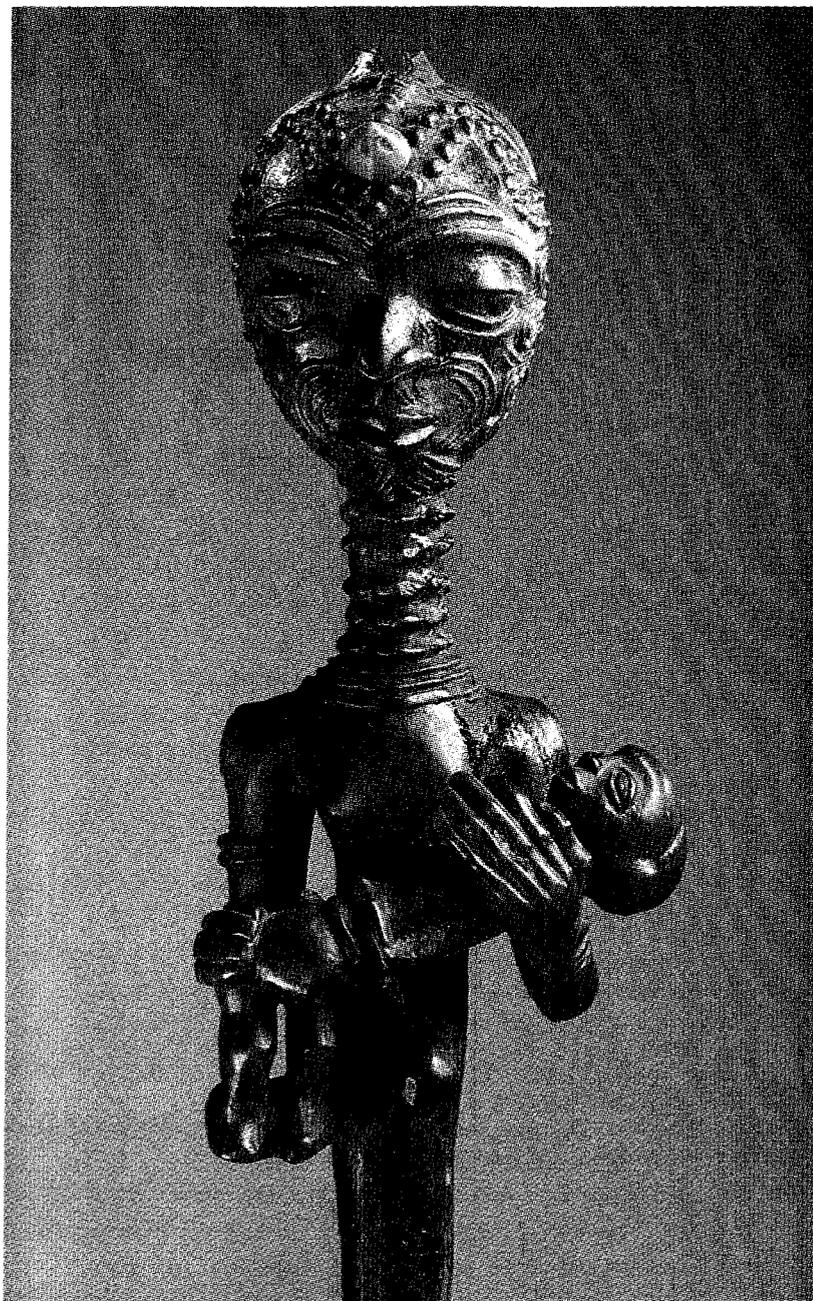


Figure 2: **Statuette portraying mother and child, linked to fertility cults, notably the "bwanga bwa tshibola"**

Bena Luluwa, Zaire 19th–20th century. Reproduced with permission from the Brooklyn Museum, New York, USA.

recognise (auditory affective agnosia) and produce (aprosodia) affective intonations.<sup>27</sup> Surprisingly perhaps, 70% of left-handed people have the same brain lateralisation for word and affective features of language as right-handed people, with a further 15% having mixed dominance.<sup>20</sup>

Listening experiments with neonates and adults have shown differences in accuracy and speed of response to left-ear and right-ear stimuli.<sup>28,29</sup> The right ear is better at recognising the structural aspects of speech; the left ear is better at recognising music and the melodic aspects of language, in particular, affective intonation.<sup>18,20,27,29-31</sup> The different perceptive abilities are explained by the cross-over of auditory fibres: while acoustic signals travel via both ipsilateral and contralateral pathways, the contralateral contains more fibres, is stronger, more efficient, and more important for perception; it also inhibits or blocks the signal travelling via the weaker ipsilateral pathway.<sup>20,28</sup> In the left-cradling position, maternal affective signals are given to the infant's free left ear and processed by the right hemisphere, the hemisphere which is more advanced in maturation at this stage of development,<sup>18</sup> and destined for the reception and processing of prosody.<sup>27</sup> Interestingly the Talmud suggests that "a woman who begins to nurse her son should start on the left side, as the source of all understanding is from the left side".<sup>32</sup>

## Conclusion

But the advantage for the infant, while significant, does not by itself wholly explain the mother's drive. The core of cradling is protection and facilitation of communication with the infant. We believe that the unique prosody of a mother speaking to an infant exemplifies the right hemisphere's dominance over early mother-infant interaction. Along the right hemisphere affect-communication vector, left-sided cradling facilitates the flow of auditory and visual communication between mother and infant and channels somato-affective feedback and infant sound to the mother's right hemisphere, which in turn tunes the melody of the mother's voice—the lullaby will not sound the same, and will not feel the same with the baby on the other side.

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## References

- Salk L. The role of the heartbeat in relations between mother and infant. *Sci Am* 1973; **228**: 24-29.
- Ginsburg HJ, Fling S, Hope ML, Musgrove D, Andrews C. Maternal holding preferences: a consequence of newborn head-turning response. *Child Dev* 1979; **50**: 280-81.
- Saling M, Cooke W. Cradling and transport of infants by South African mothers: a cross-cultural study. *Curr Anthropol* 1984; **25**: 333-35.
- De Chateau P, Andersson Y. Left side preference for holding and carrying newborn infants II: Doll-holding and carrying from 2 to 16 years. *Dev Med Child Neurol* 1976; **18**: 738-44.
- De Chateau P. Left-side preference in holding and carrying newborn infants. *Acta Psychiatr Scand* 1987; **75**: 283-86.
- Bogren LY. Side preference in women and men when holding their newborn child: psychological background. *Acta Psychiatr Scand* 1984; **69**: 13-23.
- Manning JT, Denman J. Lateral cradling preferences in humans (*Homo sapiens*): similarities within families. *J Com Psychol* 1994; **108**: 262-65.
- Finger S. Child-holding patterns in western art. *Child Dev* 1975; **46**: 267-71.
- Manning JT, Chamberlain AT. The left side cradling preference in great apes. *Animal Behaviour* 1990; **39**: 1224-27.
- Huheey JE. Concerning the origin of handedness in humans. *Behav Gen* 1977; **7**: 29-32.
- Palmqvist H. The effect of heartbeat sound stimulation on the weight development of newborn infants. *Child Dev* 1975; **46**: 292-95.
- Fifer WP, Moon CM. The role of mother's voice in the organization of brain functions in the newborn. *Acta Paediatr Suppl* 1994; **397**: 86-93.
- Thompson AM, Smart JL. A prospective study of the development of laterality: neonatal laterality in relation to perinatal factors and maternal behavior. *Cortex* 1993; **29**: 649-59.
- Weinstein S. The relationship of laterality and cutaneous area to breast-sensitivity in sinistrals and dextrals. *Am J Psychol* 1963; **76**: 475-79.
- Kaplan Solms KL, Saling MM. Lateral asymmetry and tactile sensitivity. *Percept Mot Skills* 1988; **67**: 55-62.
- Weiland JH, Sperber Z. Patterns of mother-infant contact: the significance of lateral preference. *J Gen Psychol* 1970; **117**: 157-65.
- Davidson RJ, Sutton SK. Affective neuroscience: the emergence of a discipline. *Curr Opin Neurobiol* 1995; **5**: 217-24.
- Hellige JB. Hemispheric asymmetry: what's right and what's left. Cambridge-London: Harvard University Press, 1993.
- Borod C, St Clair J, Koff E, Alpert M. Perceiver and poser asymmetries in processing facial emotion. *Brain Cogn* 1990; **13**: 167-77.
- Kupfermann I. Localization of higher cognitive and affective functions: the association cortices. In: Kandel ER, Schwartz JH, Jessell TM, eds. Principles of neural science, 3rd ed. Norwalk: Appleton and Lange, 1991: 823-38.
- Dieneske H, Hopkins B, Reid AK. Lateralisation of infant holding in chimpanzees—new data do not confirm previous findings. *Behav* 1995; **132**: 801-09.
- Lucas MD, Turnbull OH, Kaplan Solms KL. Laterality of cradling in relation to perception and expression of facial affect. *J Gen Psychol* 1993; **154**: 347-52.
- Fernald A, Taeschner T, Dunn J, Papousek M, De Boysson-Bardies B, Fukui I. A cross-language study of prosodic modifications in mothers' and fathers' speech to preverbal infants. *J Child Lang* 1989; **16**: 477-501.
- Cruttenden A. Phonetic and prosodic aspects of baby talk. In: Galloway C, Richards BJ, eds. Input and interaction in language acquisition. Cambridge: Cambridge University Press, 1994: 135-52.
- Trehub SE, Trainor LJ, Unik AM. Music and speech processing in the first year of life. *Adv Child Dev Behav* 1993; **24**: 1-35.
- Woll B, Kyle JG. Communication and language development in children of deaf parents. In: von Tetzchner S, Siegel LS, Smith L, eds. The social and cognitive aspects of normal and atypical language development. New York: Springer, 1989: 129-45.
- Ross ED. Nonverbal aspects of language. *Neurol Clin* 1993; **11**: 9-23.
- Code C. Dichotic listening. In: Code C, Ball M, eds. Experimental clinical phonetics: investigatory techniques in speech pathology and therapeutics. Beckenham: Croom Helm, 1984: 166-86.
- Bertoncini J, Morais J, Bieljac-Babic R, MacAdams S, Peretz I, Mehler J. Dichotic perception and laterality in neonates. *Bram Lang* 1989; **37**: 591-605.
- Bryden MP, Free T, Gagne S, Groff P. Handedness effects in the detection of dichotically presented words and emotions. *Cortex* 1991; **27**: 229-35.
- Shipleigh-Brown F, Dingwall WO, Berlin CI, Yeni Komshian G, Gordon-Salant S. Hemispheric processing of affective linguistic intonation contours in normal subjects. *Brain Lang* 1988; **33**: 16-26.
- Sefer Hassidim. Tsavaat Rabenu Jehuda Hahassid; statement 54 (edited in the 12th century by Jehuda Hahassid and referring to *Brachot* p 10). Jerusalem: 1983.