

LEARNING ABOUT OURSELVES, FROM CHILDREN: WHY A GROWING HUMAN BRAIN NEEDS INTERESTING COMPANIONS

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A Different Psychology of Education?

About 30 years ago developmental psychologists could not believe it when they were offered proof that newborn infants express states of mind and respond like persons (Maratos, 1973, 1982; Meltzoff and Moore, 1977). It was a rediscovery, of course, but the new evidence was clear. And it was in accord with demonstrations that very young infants, under 3 months, could take part intelligently in expressive exchanges of 'proto-conversation' with an attentive and affectionate mother (Bateson, 1971, 1975; Trevarthen, 1979). Many stuck to a hard line and refused to accept new evidence for behaviours that the famous modern developmental psychologists Freud, Piaget and Skinner had thought were impossible in such immature and inexperienced humans. But, newborns are actively seeking for experience and for communication. This effort must be doing something that is important for cognitive development, and for learning and education.

Some neonatal expressions are obviously adapted to elicit parental care for internal needs — states of behavioural arousal and sleep, comfort, feeding and protection from environmental dangers. Other expressions of playful communication (smiling, gaze approach/avoidance, coo vocalisations and many hand gestures) transmit emotions of 'interest' and 'pleasure' to social contact (Trevarthen and Aitken, 2001). Once we abandon reductive assumptions based on prejudices that the newborn must be a reactive sensory-motor system without coherence of intention, a different 'sociable' infant appears. Emotional expressions of newborns — smiles and coos of recognition, frowns of annoyance, and hand movements that signal changing states of alertness, distress or interest, and readiness for making communication — announce, for a sympathetic other person, the infant's state of openness to the world, and his or her estimation of risks associated with changing intentions. In these ways of behaving a healthy and alert baby, looking to the future, shows social initiative. He or she has selective, self-regulating reaction to a partner's intimate responses. This fits the common sense feeling of every parent, as well as the advice of the wisest paediatricians, that the baby is a person looking for live company in a happy family and a friendly community (Gomes-Pedro, et al., 2002).

Why is a baby human being so complicated at birth? Why is it not enough that the baby cries for help and knows how to suck at the breast? The answer seems to be this: being conversational is what it takes for a young person to begin learning what other people know and do, and this is the behaviour a fond parent expects, and enjoys. It is the human adaptation for cultural learning.

Cultural learning is what sets human beings apart. All our different communities have built up historically contrived systems of meaning and belief, including languages whose oldest words go back hundreds of generations. The transmission of all this knowledge and skill depends on motives and passions of 'companionship' different from those involved in primary regulation of a child's attachments for care. Thus a mother's play with her infant is a 'cradle of thought' (Hobson, 2002), a debating place for ideas about acting and experiencing. She can be much more than an 'external regulator' of what the baby's body needs and a protector from emotional stress. Importantly, the mother's role as playmate and companion in meaning can be taken over by any other sympathetic person, even a child, whom the baby has learned to trust as a friend. A mother has a unique closeness to her baby in early weeks, but other persons can become playmates who share discoveries. A 6-month-old can negotiate interests, intentions and feelings with two same age peers, with no adult help (Selby and Bradley, 2003). Infants are sociable in the community before they walk or talk, and they can use imitation to set up communication (Fiamenghi, 1997). This is the beginning of friendships in learning that form naturally long before the child is ready for classroom instruction. Play among toddlers is imaginative, creating invented worlds and 'myths' of adventure that range far beyond present circumstances (Nelson, 1996), acting out sharable ideas (Trevarthen and Logotheti, 1987). It is also very amusing and attractive to adults who are drawn in to give support to the infants' creativity, and maybe to teach new tricks.

The belief that a baby is not by nature actively and selectively conscious of people, that a human sociability has to be formed by learning, appears to receive a measure of hard scientific validation by new evidence offered by brain scientists who, with technical ingenuity (but with very narrow sampling of the brain's potential when freely in command of the body's field of action), demonstrate a great 'plasticity' of certain cerebral tissues in young animals. Obviously the fabric of the human mind must begin very receptive, it has so much to learn. And yet, what the newborn *intends* to know, how he or she *wants* to know, remains mysterious, apparently outside the range of the concepts and methods available for developmental cognitive neuroscience. Motives are not 'plastic'. The brain mechanisms of an infant's intrinsic motivation for conscious appraisal of the shared world, and for engaging with other persons' motives in order to learn more, are almost unknown, and certainly they are neglected by mainstream infant psychology.

In a sense, the experimental psychology of development has missed the point. For three decades, the cognitive psychology of infancy has been busily and confidently occupied with theorising about rather abstract questions: How very young single human minds assimilate and organise information received from the environment. How a baby reacts to an objective (usually visible) world of physical events and objects. How babies solve problems concerned with categorising and comparing the experiences of things. Verification of theories about how single infant heads think about forms and transformations of the material world is sought by experiments with the babies sitting in university laboratory tests. For both practical and logical reasons, these tests must limit data collection to the counting of new investigative choices or reactive movements of the infants when they respond to predefined kinds of event, and to evidence of changes that demonstrate habituation or learning. Such experiments are approved as 'rigorous' and 'valid'

and it is considered essential that they be well 'controlled'. Emotions, usually inferred from photographs of faces, are described as categories of mind state that arise after rational appraisal of the threats or benefits of experiences to the individual. At first an infant's feelings must just be related to inner bodily state, because it is taken for granted that is all a baby can know about. Emotional states in the first year or two are assumed to be adapted for the to regulating the physiological or information-processing functions of that individual, and perhaps, after a few months, to some learned ways that other people can affect these functions. The idea that a newborn baby could be immediately sensitive to another person's emotions and expect to be able to interact with them by his or her own expressions is, from this perspective, just too hard to grasp.

It is not difficult to see the historical reasons behind this restriction of interpretation, topic and method in infant psychology. For most of the past century psychological science has been concerned that it could not obtain direct information on causal processes of the mind, and was fearful of its very credentials as a science.

But, nevertheless, it is difficult for a biologist to accept the blindness of what must be the basic science of human nature to alternatives that are so obvious in an evolutionary perspective as well as to common sense. Human mental states are made evident in human behaviour. Infants show many behaviours that are obviously for communicating mental states with mental states of other persons. All social animals have innate capacities for communicating interests and emotions. Is it not reasonable to expect the human being to be born with motivating principles that guide experience to a collaborative awareness of what is going on in other person's minds, and that these will cause the child to learn culturally created meanings?

Born to Find Someone Who Communicates Interest and Affection

The facts are these. Within minutes of birth an awake baby can listen to changing sounds and turn to locate them in space, can feel the difference between her/his own parts moving and a different object that touches or moves against her/him. A newborn can see patterns in light, is curious to track a moving object, especially one moved by a person (Figure 1 A), and is highly responsive to the odour and sound of the mother, identifying her as a person different from others. And all these innate abilities, now proved in many careful studies of babies' reactions, are adapted to learning through communication with a known person.

Newborns can also imitate simple expressions of face, hands or voice, and expect to get a response from the person they are attending to (Figure 1 B). It seems that they are ready for picking up the motives of other persons from details of their expressions, and this is now confirmed by a very original study carried out by a young Hungarian doctor and psychologist, Emese Nagy. Dr. Nagy not only invited newborns to imitate attitudes, expressions and gestures, she patiently tested the infant's communicative *initiative* by withholding her presentations of expression after she had gained imitation, tempting the infant to 'provoke' an imitation from her. This was successful (Nagy and Molnár, 2003). Recordings of the infant's heart beat proved that the baby was in two quite different states of expectancy when imitating or when 'provocating'. Just before the time of imitating, the heart accelerated, indicating an intention in the baby to be active in a new



Figure 1: Active newborns, alert to the world and ready for communication.

- A. A boy in India, 20 minutes old, tracks a red ball moved by a nurse with all his body; eyes and ears, mouth, hands and foot.
- B. Shamini was born in Hyderabad. At about 30 minutes after birth her mother greets her with a smile, then she imitates 'tongue protrusion' and 'mouth opening'. (Photos A and B by Kevan Bundell)
- C. Medical doctor and psychologist, Emese Nagy in Szeged, Hungary, tests a newborn baby's initiative in an imitation game. The baby has a band round his chest to record heart rate. He imitates when Emese (whose face is seen in a mirror) holds up two fingers. Heart rate recordings show he does so intentionally, and with interest in getting a response for his effort.

way. With provocation there was a heart rate deceleration starting just before the baby moved, signalling a receptive focussing of attention, waiting for a response (Figure 1 C). Thus Nagy showed, in agreement with observations of the Greek psychologist Giannis Kugiumutzakis, that a newborn baby can seek two-way imitative communication with a 'respectful' partner, exhibiting intentional preparation of complementary expressive and receptive conscious states. Kugiumutzakis (1993) had shown that neonatal imitations have two characteristics that prove they really are communicative:-

- a) They are *voluntary*, in the sense that a goal-directed effort by the baby shapes them towards the form of the 'model' by successively improved approximations.
- b) They are *selective*, matching 'special' forms of conversational expression that can be part of a communicative exchange with invention in it.

It seems clear now that babies have the essentials of a whole 'self' with conscious awareness; they have a capacity for coherent purposefulness, all parts moving efficiently together, seeking experience. Most of all, they seek joyful, responsive human company.

A Parent Gives Intimate Attention and Responds with Affection

Any person who wants a close and affectionate contact with a newborn infant has to display behaviours of gentle, playfully happy kinds that are unconsciously controlled and cannot be learned (Stern, 1990; Murray and Andrews, 2000). The similarities that appear in mothers' vocalizations to very young babies in different cultures, like the features observed when men or children attempt to talk with a baby, too, are evidence both for the universal needs of the newborn and for what Hanus and Mechthild Papousek (1987; H. Papousek, 1994; M. Papousek, 1996) called 'intuitive parenting' motivation to meet these needs. The rhythmic emotional 'codes' in infant and adult express the same kinds of impulse. Their affective expressions are adaptive to one another as sympathetic complements that confirm mutual awareness. The Papouseks (1977) argued this is the foundation for the cognitive 'head start' of cultural learning.

Who it is that addresses an infant is always important, as well as how they do so. Experiments that measure the preferential orienting of newborns to voices have proved that some foetuses have already learned in utero to identify their mother's voice before they were born. A newborn human can be alert to the face of a sympathetic caregiver speaking, drawing comfort from the expression of affection carried by the eyes and the loving voice.

Sympathy Neurons: How the Human Brain and Body are Made for Life in a Community

A few years ago, physiologists recording from cells in the cortex of awake monkeys while the monkeys were busily grasping different shapes and kinds of object found neuronal "mirroring" elements. These appear to anticipate the evolution of imitations that make learning of human speech and language possible (Rizzolatti and Arbib, 1998). Cells in prefrontal cortex were active both when the monkey carried out a particular hand movement, and when the monkey sees or hears someone else making a similar movement for the same purpose. Apparently the monkey's 'picking up' nervous system 'resonates' with the action produced by an equivalent part of the human motor brain. The 'goal' of both the monkey 'self' and the human 'other', what the movement was intended to do, involved activation of the same cell in the monkey's brain.

It has become clear that the cells from which 'mirroring' effects have been recorded are part of widely distributed systems through the brain, that both move and feel with another subject. It might be better to call these the neural mechanisms of *sympathy*, which is a Greek word meaning 'moving and feeling with'. They reflect states of intention, awareness and feeling, not just shapes of movement, and they require a radical re-conception of the 'social brain' as an organ for sympathetic engagement between motives

in physically separate moving bodies (Porges, 2003). Brains are mechanisms for sharing states of mind behind ways of moving.

Functional brain imaging with human subjects is beginning to explore the neural basis of sympathetic emotions that enable us to share the quality and vitality of consciousness as it comes to life in our separate bodies (Decety and Chaminade, 2003). More than in any other species, brain and behaviour development in humans makes no sense if the individual is considered in isolation, or if the impress of stimulation on 'plastic' neural circuitry, or the influx of information into a *computational* mechanism, is taken as the principle process driving development. We intuitively get into other persons' minds by actively sensing the impulses to action in their brains that enable them move the way they do (Trevarthen, 2001a). One finding is particularly startling. When a 6 week old baby looks at a picture of a woman's face, this excites all the brain parts that, nearly two years later, will begin to acquire the skills of recognising a partner who is talking to us and for making and hearing speech in a particular language — including a 'face recognition' area, and areas for 'talking' and for 'hearing speech' (Tzourio-Mazoyer, et al., 2002). The baby is already trying to find 'common sense' with the other person by 'reading their mind'.

Babies certainly communicate with caregivers to receive assistance with the regulation of their state of physical *well-being*. Afterall, a baby is weak and dependent on loving care. But babies also communicate to share motivation for action and learning (Stern, 1974; 2000). Older and younger brains are linked by emotional systems in the processes of care, and also in the quest for skill and understanding (Schoore, 1994; 2003a, b). Human beings have a very elaborate system of socio-emotional signalling which has evolved to use special muscles of the eyes, middle ear, face, and vocal system to focus interest, make contact, express emotional states of relationship, and exchange information (Porges, 2003). Hands have become part of this social signalling system, too, and they are constantly active in social *encounters* from infancy (Trevarthen, 1986). It all serves to enable individuals, of all ages, to share what Margaret Donaldson (1992) calls 'purposes and concerns'.

Clever work by Jaak Panksepp and colleagues on 'laughter' in rats, attempting to identify its neurochemistry, has brought the wonderful realisation that 'joy' from tickling by playful companions may be good for the brain and for friendship between the playmates (Panksepp and Burgdorf, 2003). This study is part of a growing body of research that encourages belief in the importance of shared exuberance and pleasure in cognitive functions of the mammalian brain, in development of social collaboration, and in learning.

The power of a child's brain to find motivation and confidence from sensitive communication with other persons gives a lifetime opportunity for compassion, and for assisting those in whom feelings and thoughts have become dysregulated by inherited or acquired damage to motives for companionship — for therapy. Activating beneficial states in brainstem and the right limbic cortex, which have been identified as the most important components in the regulation of states of self-awareness and of sympathetic communication, must be the principle effect of therapy aimed to restore healthy psychosocial life. The emotions brought about offer the means for recovery from dysregulation of the self (Trevarthen, 2001b; Schoore, 2003a, b).

From birth to the beginning of language the child makes expressive moves to show impulses of thought that gain in meaning by being shared. These developments in the child's eagerness for communicating have profound effects on the behaviour of an affectionate, firmly 'attached' parent. The child is 'educating' the adult how to discover meanings that make sense, and joy, for both of them. Memories and ideas are built in communication, in increasingly rich narratives and games of imaginative 'mimesis' — the telling of imagined or remembered experiences by moving the body in a dramatisation (Goldin-Meadow and McNeill, 1999; Donald, 2001). All parts of the body, and all the modalities of sense, can play a part in this 'mind and memory sharing'.

Babies Need to Chat, Taking Turns to Show Interest and Pleasure

Visual life before birth must be almost zero, but, as the imitation studies show, newborns can see, and in a few weeks a baby is watching the other's eyes with clear focus, and obviously reacting to their direct regard. By 2 months baby and parent create a lively 'protoconversational' form of communication, the most obvious developments being a marked increase in the accuracy of the baby's eye-to-eye contact and a quickening of all responses (Trevvarthen, 1977, 1980). Now the baby can be attracted to play a part in an exchange of expressions that resembles the body movements, gestures and vocal intonations of adult face-to-face conversation — it is conversation stripped of words (Figure 2 A). Sight of others, and how they express themselves, is not the only way a baby can get into communication, of course. Well supported, a totally blind baby, or one that is both deaf and blind, can develop happily and well, seizing other ways of sensing a partner and engaging with them. The communication is carried by any awareness of the impulse by which a person can express their mind (Trevvarthen, 1993; Trevvarthen and Aitken, 2001).

The behaviours of protoconversation have been analysed in great detail now, and researchers are impressed with the infant's sensitive responses and fine appreciation of timing (Trevvarthen, 1993, 1999; Trevvarthen, Kokkinaki and Fiamenghi, 1999). The attention of the infant to a partner's voice and face expression, shown by a 'knit brow and jaw drop' expression of *fixed orientation*, is followed promptly by recognition of positive, affectionate elements in the sight and sound of a partner's feelings. The rhythms of a *parent's inviting* vocalizations, touching and movements of the head, eyebrows and mouth evoke first a *smile of recognition* then an animated 'utterance'. At the climax of expression the 6- to 8-week-old assumes an attitude of *declamation*, vocalizing, gesturing and changing head posture in a coordinated assertion of communicative purpose, frequently removing orientation from the partner, who has been closely attended to until this moment, as if 'carried away' by the ideas being expressed. The adult, seeing this, is stimulated to give an encouraging, praising kind of *reply* that matches the level of affect of the infant's 'utterance', interpreting it with a parallel emotional form or 'affect attunement' that gives back or complements the feeling (Stern, 2000). Then the infant re-orientates to the adult and observes 'thoughtfully' what they are expressing, before being excited again to smile and make another utterance (Figure 2 B). For some moments the baby really seems to be 'thinking', watching the partner with a quiet unsmiling face. Each phase of the 'chat' is characterised by particular initiatives and emotional responses



Figure 2: Babies in communication, second or third month, enjoying 'protoconversations'.

A. Laura at home in Scotland when she was 3 months old is attentive to her mother's talking. Her 3-year-old sister wants to join in, and father proudly watches from the side. At 6 weeks, in the University of Edinburgh Laura smiles and coos at her mother, whose reactions can be seen in a mirror. (Photos by Penelope and John Hubley and Colwyn Trevarthen)

B. Hande is Turkish, photographed in Holland with her delighted and playful father when she was 11 weeks old. She is very intent about taking her turn, watching her father's face, smiling, moving hand, mouth and tongue with a serious face as if talking, looking away while she focuses on her 'message'. Photos from a video by Saskia van Rees of the "Body Language Foundation" (www.stichtinglichaamstaal.nl).

in interaction with the other person's mind. Shifts in interest are growing in the baby's consciousness that will lead to shared exploration and use of places and things.

Communicative Musicality: The Rhythm of Moving in Protoconversation and Nursery Songs

A mother greets her newborn with ecstatic cries in falling pitch, and gentle fondling, unable to look away from her baby. She touches hands, face, body with rhythmic care, and holds the infant close to her so they can greet one another. Her speech is a kind of singing, with high gliding gestures of pitch and repetition of regular gentle phrases on a graceful beat, leaving places for the infant to join in with coos, smiles and

gestures of the hands or whole body (Fernald, 1989). Every move of the baby elicits a reaction from her. These exchanges are intricately coordinated like a gentle ballet, a duet that brings out matching rhythms and phrasing in mother and infant (Powers, 2001). And not only mothers are affected in this way. The example of a ‘conversation’ of coos between a father and a two-month premature newborn that has been subjected to acoustic analysis by an Australian musician and acoustic expert, Stephen Malloch (1999) illustrates the essential features of a syllabic beat, phrasing and sympathetic coordination of emotion. In this case it is likely that the father’s voice was transmitted to his daughter by vibration as much as by air-born sound as she rested one ear against his chest.

The beautiful quiet games of expression that engage an affectionate parent with an alert young baby start the process of sharing experience that will carry the child’s curiosity and eagerness to learn into a world of meaning that other people have created, and by which they direct their lives (Figures 2 and 3).

In the 1970s and 80s psychologists and developmental linguists found fascinating evidence of musical talents in babies (Papousek, 1996; Trehub, 1990). Hitherto unsuspected listening skills were proved for infants as young as 4 months. The Papouseks described the ‘intuitive parenting’ mode of vocal communication with infants in musical terms, stressing the modulation of affect provided by parental tones and rhythms (Papousek and Papousek, 1981). A diary study of their daughter documented the infant’s enjoyment of nursery songs, and her private practice of acquired musical forms. The concept of ‘affect attunement’, by which Daniel Stern describes how the parent picks up on infant expressions reflecting their beat, emphasis and intonation, encapsulates his strong musical sensibility (Stern, 1999, 2000).

By 5 or 6 months infants quickly recognise songs or recorded music often heard — stopping to listen, smiling in recognition, then bouncing and waving arms and legs, often synchronising with the tune (Figures 3 and 4). A baby’s selective orientation to musical sounds, critical discrimination of musical features of sound, and vocal and gestural responses that are timed and expressed to contribute to a joint musical game confirm that music, which is clearly in its polished forms a cultural achievement of human society, has strong roots in human nature (Trevvarthen and Malloch, 2002). Why are babies, and mothers, so musical? What ways of behaving show their musicality?

Research on the temporal foundations of expression and the development of narratives of expression has been advanced by musical acoustic analysis of vocal interactions between mothers and infants (Powers, 2001). A theory of Communicative Musicality has been developed (Malloch, 1999), which defines features of ‘pulse’, ‘quality’ of sound, and ‘narrative’ form that underlie the innate dynamics of moving and thinking and the sympathetic transmission of mental events between subjects of any age. Clearly, the expression of ‘music’ for an infant is to be understood in the sense of the ancient Greek word, μουσική (musiké), i.e. inclusive of all temporal arts — theatre, dance, poetry, as well as what we know as ‘music’. Musicality manifests its fundamental features in the ways that infants behave in interaction with the expressions of motive forces in other human beings (Dissanayake, 1999, 2000).

We have collected and analysed baby songs in many languages. Examples from Greek, Italian and Scottish English are typically made up of stanzas each with simple 4



Figure 3: Infants soon gain new interests, and mothers have to be more active to play with them. These are Scottish babies and mothers photographed in the University of Edinburgh.

A. Leanne, at 4 months, is curious about the room, and her mother asks, “What do you see?” She tries hard to grasp a ping-pong ball on a thread, presented by her mother.

B. Four-month-old Leanne enjoys a singing, hand-bouncing game with her mother, and, 5 months eagerly waits for the surprise ending (a tickle under her arm) of the baby song, “Round and round the garden, like a teddy bear”, which she knows well.

C. Infants over six-months old enjoy chasing and handling objects, and parents offer games and toys. Notice how expectant the mouths of the babies are. (Photos by Colwyn Trevarthen)

phrases, with the exception that the Greek ones often have a characteristic double phrase line, so that the stanzas are twice as long as English or Italian ones. There is often a pattern of rhyming vowels at the end of the second and fourth lines. For example, in the Scottish clapping song (Figure 4), ‘well’ and ‘bell’ rhyme. It, like most ‘action songs’, has a dancing ‘iambic’ rhythm.

Clapp-a, clapp-a han-dies,
 Mum-my’s at the **well**,
 Dad-dy’s a-way to Lon-don,
 To buy Le-anne a **bell**.

Babies become very expert by 4 to 6 months at predicting the timing and rhyming

features of the baby songs. For example, when a mother was singing “Round and round the garden, like a teddy bear”, eagerly watched by her 5 month old daughter, Leanne (Figure 3 B), the baby vocalised exactly on top of the long vowel of ‘bear’, and matched the sound of the vowel (Trevvarthen et al., 1999).

The core element of a cheerful baby song is a four line stanza lasting about 15 to 30 seconds, with a base pulse around *andante*, a dancing rhythm, simple pitch shifts and rhyming syllables at specific points, and variations in the beat to regulate excitement in the last two lines (Trehub, 1990; Trevvarthen, 1999). A lullaby to sooth a sleepy or unhappy infant will be *adagio* or slower with a gentle rocking rhythm. Infants quickly learn to recognise songs and hand clapping or bouncing games, eagerly joining in when invited (Figures 3 and 4), and old people remember songs and games they learned as infants. The idea of looking at the choreography and music of their behaviours together is turning out to be very helpful in unravelling how infant and mother can coordinate their expressions so precisely, and with such ease. We find that a young baby may be express-



Figure 4: Emma, in Edinburgh, Scotland, is very proud that she knows “Clap-a-clap-a-handies”, an old traditional baby song. She sits on her father’s knee at home and responds happily when her mother asks her to perform for the photographer. In the University, at the same age, she shows how her mother taught her, and watches her reflection in the camera window as she imitates. But she is too young to understand what her mother means when she asks over and over, for Emma to put the wooden doll in the truck. (Photos by Penelope and John Hubley and Colwyn Trevvarthen)

ing itself more with delicate hand movements than with its voice. So we have to pay attention to the baby's 'dance' while the mother is speaking or singing. This may be related to the work on the development of signed language in deaf children. A deaf baby under one year, especially one with deaf signing parents, may begin 'sign babble' around six months, just like hearing babies do sound babble. Goldin-Meadow and McNeill (1999) observe that while hands can learn language as well as the voice, they are better than the voice at metaphoric or mimetic expression. That is why we naturally elaborate our conversation with hand movements, adding emotive meaning. The two systems appear to have evolved as complementary ways of getting meaning across.

Early musicality certainly has a powerful role in building memories. It marks with emotional signatures the identity of persons and ritual events. After very few months an infant can 'make music', making singing sounds and banging objects rhythmically. He or she seems to have found a proud performer's personality, who can share a learned action or a musical '*joke*' that surprises and pleases (Figure 4). Taken with the infant's clear preferences for particular companions, this musical 'showing off' looks like the beginnings of his or her social identity as member of a group with known habits, celebratory experiences and acting skills that are valued for the bonds that they represent and reinforce (Trevarthen, 2002). Cultivation of intrinsic musicality is a way of declaring allegiance with a friend or to a social band (Blacking, 1988).

New evidence on the place of affect in intelligence, and on how emotions regulate brain development, cognition and learning, makes the infant's sensitivity to expressions of emotional narrative in musical form more comprehensible (Panksepp and Bernatsky, 2002). Musicality may be at the source of the ability to be socialised in the human way (Cross, 1999).

The Sadness of Being Alone: Dynamic 'Moral' Emotions Need Friendship and Inspire Adventure

The emotions in protoconversation have been tested by observing what happens when the human response to a baby's interest is blocked or fails. If a mother holds her face still for a minute in the middle of face-to-face play with her two-month-old, this causes the infant to turn away and show distress (Tronick et al., 1978; Murray and Trevarthen, 1985). A similar pattern of anxiety and sadness appears when the mother presents the uncommunicative manner of simulated depression. Real post-natal depression interferes with the infant's communication and cognition, and, if it persists, is accompanied by limited cognitive development in later months (Murray and Cooper, 1997; Tronick and Weinberg, 1997). An unhappy, unresponsive adult cannot be a good companion and teacher.

A Double TV apparatus, in which a young baby and the mother are communicating via a video and sound link while in separate rooms, seeing and hearing each other face-to-face and life size on two monitors, allows a critical experiment to be performed. A lively, positive portion of the recording from the mother is replayed a few minutes later to the infant (Murray and Trevarthen, 1985; Trevarthen, 1993). The distress this produces shows that a 2-month-old is extremely sensitive to the contingent responsiveness of the live mother's expressions, which is lost when a physical recording is offered of what was a cheerful live conversation. If, conversely, a portion of the recording of a

communicating infant is replayed to the mother, she experiences an uneasy loss of contact, and she may conclude that the infant is avoiding her or that she is somehow giving the wrong signals. This makes her confused and unhappy. Live communication has to be just that, a real time engagement of feelings and impulses to communicate. A delay or an inappropriate response proves that the other is 'out of touch'.

Darwin (1872) is the acknowledged pioneer of modern studies of emotions. He sought to classify human and animal emotions according to their expressions in body attitude and movement. He did not restrict his classification of human expressions to a short list of discrete 'basic' emotions (fear, anger, surprise, sadness, joy, disgust and perhaps contempt). He included such moral qualities of motivation as 'love', 'tenderness', 'sulkiness', 'hatred', 'contempt', 'guilt', 'pride', 'shame' among those he attributed to expressions of animals and children, and he called them emotional expressions. His other terms denote different states of bodily feeling or of reaction to objects ('suffering', 'anxiety', 'grief', 'despair', 'joy', 'anger', 'fear', 'disgust'), or states of experiencing and thinking ('meditation', 'determination', 'patience', 'surprise').

Stern (1999, 2000) has insisted on the importance for communication with infants of 'dynamic' and 'relational' emotions that cannot be described by the names of 'categorical' emotions. For the dynamic emotions Stern uses the descriptive terms: "crescendo," "decrescendo," "fading," "exploding," "bursting," "elongated," "fleeting," "pulsing," "wavering," "effortful," "easy". These invite comparison with the 'sentic forms' of the musician Manfred Clynes, who attempted to identify different force curves or gesture shapes that convey momentary feelings in musical sounds (Clynes and Nettheim, 1982).

Young Infants' Delight in Shared Games, Jokes and Tricks

After 3 months, the baby will develop increasingly adventurous plans, making more vigorous use of their senses and limbs, seeking to explore and to form concepts of objects, negotiating purposes and the tempo of experience more vigorously with others. Then the infant starts also to become interested, not only to look about and try to get hold of objects for himself or herself (Figure 3 A and C, and Figure 4), but also to follow the shifts of gaze of the other person who is occupied in seeking and acting on objects (Muir and Hains, 1999). The mother is likely to be the first companion and teacher in these games with objects, but soon father, siblings and others can join in the infant's expressions of curiosity and anticipation as they seek information together (Figures 6, 7, and 8). The developments in expressive body signs before speech — from protoconversations of 'primary intersubjectivity' with two-month-olds, through games of the person and person-person-object games in the middle of the first year, to 'secondary intersubjectivity' or 'cooperative awareness' and protolanguage at the end of the first year — show that communication of intentions, experiences and feelings is the foundation on which co-conscious use of experience and the precise references and recollections of language are built (Trevarthen and Hubley, 1978; Hubley and Trevarthen, 1979; Bruner, 1983; Trevarthen, 1980, 1988; Tomasello, 2003).

In the games infants play with their mothers we observe first signs of an intelligence that wants to share ideas and fix meanings in a conventional, 'made up', code. We can trace the stages by which the baby's mind grows to think in propositional narratives

(stories) and in metaphorical representations (imaginary connections between feelings of being involved with things, happenings and people). These are the kind of events in the mind that can be put into language. The infant, we find, is much more than the self-sufficient, solitary experiencer and problem-solver that Jean Piaget studied, more than a private mover and thinker. A baby's mind has an appetite to learn by picking up ideas from a community of people, accepting what they have invented (Figures 5 and 6). The baby's consciousness is adapted to 'being moved' or being taught. It is ready for 'cultural learning' (Vygotsky, 1978; Bruner, 1996; Rogoff, 1990; Trevarthen, 1988).

After 3 months, a baby's games show the infant leading the mother's attention out of conversation to explore the shared world. The baby is curious about things that invite sensory tracking and manipulation (Figure 3 A and C). Developing strength in body and brain confer a power to support the head in free rotation and project the arms out to grasp objects. Objects are now discovered at an accelerating pace, by the combined application of hands, eyes, ears and mouth to pick up useful information.

Because the baby often shifts attention from her face to an object, the mother has to change her tactics to keep the dialogue alive. Often fathers, with a more vigorously playful approach, find they have a special appeal as playmates, too, now (Figure 2 B). Either parent adopts a challenging, quick-changing way of making fun. Soon play routines are discovered that facilitate lively and enthusiastic participation and make the baby laugh when half-expected surprises occur, or when the baby knows they are coming (Figure 3 B). The force and rhythms of movement in games of vocalization and dance get stronger. Patterns of expression are created with a person that are more complex than any play an infant can have with an object.

The parent's game can be a bit frightening, but great fun. It is like the rough-and-tumble play that many young mammals (such as kittens, puppies and young rats and



Figure 5: For one-year-old Basile, cooperating in a task and knowing about useful objects are easy. She quickly gets the message when her mother asks her to, "Put the doll in the truck", and looks pleased as her mother congratulates her. On her mother's knee at the University, she asked for *The National Geographical* magazine, recognising its yellow colour. She took the book and started 'reading it', looking at the pictures. At home with her mother, she shares the post. (Photos by Penelope and John Hubley and Colwyn Trevarthen)

monkeys), and some sociable birds (e.g. parrots), develop with their peers (Beckoff and Byers, 1998). But humans begin this experimenting with communicative action early, long before they can move about on their own, and in the company of exceptionally playful parents. Baby and parent are exploring ways of negotiating plans and projects in ways that will lead before the end of the first year to the learning of highly conventional 'acts of meaning', and then to a sense that words people say are of special importance as signs of what ideas are in their minds (Halliday, 1975). These 'dispositions to learn', and the matching parental 'dispositions to teach', are uniquely human (Figures 5 to 9).

In the teasing and joking games and musical/dancing entertainments of infants approaching the middle of the first year, communication is complex and highly productive, but the topic remains the communication itself, i.e. it remains 'metacommunicative' or 'communication about communication' (Bateson, 1956). The baby anticipates and responds with increasing skill, and seems to be learning rules that students of the grammar of language recognise: such as 'entailment', 'qualification', 'contrast', 'repetition with changed emphasis', 'subordination', 'opposition', 'release' and so on. The infant senses different poetic or dramatic forms or 'melodies', and enjoys their repeated presentation. This provides the 'text' for awareness of causal relationships between the many objects that now can be discriminated, identified and recognized in the infant's awareness.

It all depends on a very special human imagination for planning how the body will act. Child games, and pedagogy, show what Merlin Donald calls an 'executive suite' of 'domain general skill clusters' (including metacognition (cognition about cognition), 'self reminding', 'autocuing' (self-triggering of memory), 'whole body imitation', 'symbolic invention', 'complex skill hierarchies') that are absent or poorly developed in apes (Donald, 2001). The mind of the baby is well on the way to sharing the thinking of an invented common sense-the world of meaning.

The 3- to 6-month-old baby can now share the drama of a favourite game routine over many seconds (Bruner and Sherwood, 1975; Trevarthen, 1999). A 'narrative sequence' of feelings and expressions is created that has a beginning, a development, a climax and a resolution or *dénouement*, the last being carefully paced to be startling and provocative of laughter, is what catches the infant's interest in a classical baby song or action chant (Ratner and Bruner, 1978; Trevarthen and Malloch, 2002). These songs and rhymes have the same prosodic or musical features in different languages, which testify to the complexity of infants' communicative motives everywhere at this age, motives that will later serve for catching the meanings in an historical heritage of symbolic forms.

'Person-person games' become transformed into 'person-person-object games' (Figure 3 A and C) and the baby is given reactive 'toys' that make noises or roll or bounce when handled, shaken or thrown (Trevarthen and Hubley, 1978). Again, the incorporation of such object-exploring behaviours into communication games or negotiated 'formats' (Bruner and Sherwood, 1975) is peculiarly human. The narrative 'plots' of such play have no equal in the fighting and chasing games of young mammals, even though some animal play may incorporate objects that are chased-for or fought-over. In a modern home there are electronic toys that are programmed to play tunes or carry out spontaneous simulations of human or animal action. Such 'robots' are exciting, indeed — but we have to wonder if they threaten to eliminate the creative interaction such as a

baby can only have with a live mind in a live body.

The infant can gain interest in experiences through the presentations that others make to change these experiences in momentarily surprising but quasi-predictable and often repeated playful ways. Identities and relationships or operations are 'dramatized' by the emotions coupled to their demonstration (Trevarthen and Hubley, 1978; Papousek and Papousek, 1981). The infant's imitative awareness appreciates the excitement of a partner's attempts to 'attune with' what the infant is doing and the changes of action and experience that the infant is showing (Stern, 2000). Soon the infant is expert at seeking for these feelings of the other and for the habitual forms of display (Figure 3 B and 4). Upon meeting a new situation or object, or after performing some deliberate 'act', the infant's learning and skill is evaluated or 'tagged' by the other person's emotions. Hopefully that person is amused and impressed by the baby's 'cleverness' when he or she 'shows off' (Reddy, 2001a, 2003). Usually parents are very proud of what their children can do (Figures 1 to 9, but especially Figure 4)

Being Somebody; Knowing Friends and Strangers

Around six months after birth, an infant can be observed not only imitating gestures and mannerisms, but also showing them to companions (Uzgiris, 1984). Affectionate praise from family members entices the baby to perform a 'trick' that impresses other persons — he or she is acting like a performer or clown (Reddy, 2001a). Sometimes the baby's 'sign' is offered to a stranger, apparently in an attempt to 'break the ice' of an awkward, anxious confrontation. But it is usually puzzling to the stranger and may be laughed at, which is a kind of mockery that distresses the infant (Trevarthen, 1990). A bold baby may act coquettish as if to impress a stranger, but remains ambivalent. Babies laugh easily now, but this is combined with a sensitivity to who laughs 'at' or 'with' the infant. What is called 'fear of strangers' seems to be linked with a tendency to try out supercilious expressions and clowning when the baby is with a partner who is either not supportive — for example, when the mother keeps a still face — or too observant of the infant's self, as when a stranger is trying to 'make friends' (Trevarthen, 1990). I think the baby knows that the meaning of actions is connected with properly negotiated relationships, with a history of being with the persons who shares those actions with them.

All self-referred, other-sensitive emotions become stronger and clearer in the second six months. The baby begins to recognise, and be interested in his or her self in a mirror (Figure 4) and toward the end of the first year infants prefer pictures of infants of the same sex as themselves. When looking in a mirror the baby makes 'experiments' with babbling, face grimaces and hand gestures, and repeats imitations of the exaggerated expressions others offer in play. By 8 and 9 months boys and girls are different in this; the boys tend to posture or 'challenge' more, while the girls show a greater range of expressions and are generally more 'friendly' (Fiamenghi, 1997; Trevarthen, Kokkinaki and Fiamenghi, 1999). From 6 months both boys and girls are clearly interested in their mirror images and entertained by them at the same time as they show themselves to be self-conscious when they are the focus of another's attention and interest (Reddy, 2003).

Self-consciousness in the presence of others' appraisal would appear to be prepara-



Figure 6: One-year-old Adegbenro, in Lagos Nigeria, asks for his favourite rattle, receives it from his mother, and shows it off to everyone. He enjoys sharing his piano with his uncle and with his mother, performing like a professional. (Photos by Penelope and John Hubley)

tory to learning in an active 'zone of proximal development' in which the partner can give cognitive, logistical and practical support (Vygotsky, 1978), and the child can begin to learn through 'guided participation' (Rogoff, 1990) (Figures 6 to 9). The infant is getting insight into the other's states of mind, and can be said to have a more critical 'sense of intersubjective self' (Stern, 2000).

Humorous teasing provokes the older infant to laughter and coyness (Reddy, 2001c), but subtle signs of self-other -awareness are seen very early. Reddy (2000) has documented coy smiling at a mirror image in 2-month-olds, and she lists many other behaviours that signify awareness of others at this age (Reddy, 2003). In the development of self-awareness we observe a transformation of motives to share consciousness and purposeful actions with others that were evident at birth.

As the baby picks up comical ways of handling things, and starts showing objects for others, seeking congratulation, holding them up as a joke with a look, a gesture, a grimace or a vocalization that can become a coded act that is transmitted between the child and the 'audience' of the other, the object becomes part of an 'act of meaning'

(Halliday, 1975) or 'protosign' (Trevarthen, 1990). Babies 'make sense' of their actions in the loyal and affectionate communication of the family or with familiar playmates, but may not with strangers (Trevarthen, 1990, 2002). It is the quality of assured mutual *friendship* that counts.

My observations lead me to believe that 'stranger fear' is an anxiety of seeming foolish with a person who can't comprehend. It is a direct and strongly felt emotion — one of the 'complex' or 'relational' emotions, expression of which makes the infant seem a sophisticated social being long before language, and before any system of beliefs or explicit 'theory of mind'. The fact that it increases as the infant gains in self-awareness and 'showing off' with familiars, suggests that the beginning of coded communication is part of a motivation for defining a cooperative group in which meaning is consolidated by daily practices that must be protected against 'strange' customs or beliefs. Subsequent developments into language confirm this idea.

Identity and Pride, and the Shame of Misunderstanding: Emotions Beyond Attachment for Care

In every human relationship the pleasure of active discovery and the mastery of experience and skill are regulated by interpersonal or moral feelings. As long as essential needs are provided for and the child is not distressed, sick or exhausted, these feelings, of pride in knowing and doing, and embarrassment or shame at not understanding or 'being left out of things', are asserted powerfully in every young child. They guide the growth of experience, and they do so by emotional regulation of the growth of the brain. They are manifested out of control in disorders of mania and depression.

I believe that the intensely shared pleasure of pride in knowledge and skill that others applaud, as well as the feeling of shame in failure that threatens loss of relationship and hopeless isolation, are as important to the mental health of every human being as the emotions that seek comfort and care for the body (Figure 4). Indeed, I would suggest that attachment itself, if it is a *friendship* and not just the very asymmetric relationship between a weak and immature 'patient' and sensitive caregiver, is animated by emotions of shared discovery and the creation of inventive art. Even the most disciplined and authoritative teaching regime requires a minimal mutual respect between teacher and taught, or its purpose is totally defeated. I suggest we need a 'circle of attachments' - of emotionally charged relationships to care and comfort givers, to places and things that foster our discoveries and activities, and to friends and companions in adventure, discovery and invention, persons who share the impulses of our thinking and acting, and of play with roles and meanings (Figure 10). I believe human relationships are motivated by innate emotions that display and evaluate shared purposes and interests, and that these emotions of 'attachment for companionship' are just as important for mental health as the emotions of attachment for care.

Human sympathy and shared consciousness is governed by powerful emotions of pride and shame, of generosity and guilt, of moral goodness or evil. A case can be made that such 'complex emotions' have primary importance in the development of human consciousness (Draghi-Lorenz, Reddy and Costall, 2000). These feelings of human relating cannot be derived from the cognitive emotions of 'surprise', 'curiosity', and 'pleasure in mastery', which are appropriate for regulating actions on non-sentient objects. Emotions



Figure 7: Parents at home teach infants under one year simply by enjoying shared activities. Top Row: Jack, 4 months, learns the game of “Aaaah . . . Boo!” Aiden 7, months, is taught how to shake his rattle to imitate the rhythm of his mother’s bouncing. Bottom Row: Sami’s mother talks about his game with the ‘orange’ in French, while his father shares the name for ‘apple’ in Finnish — at 12 months he is happy to have his parents talk in 3 languages, knowing what they mean.

of satisfaction, or of disappointment and annoyance, expressed by young infants solving, or failing to solve, instrumental problems, are significant to others as manifestations of knowing and discovering. They ‘communicate’ what is going on in the infant’s mind.

Getting Common Sense the Human Way: The Prehistory of Narratives with Meaning

The infant about 7 or 8 months old is about to crawl. Now he or she can also share interest in an expanded world of places and things with other persons, taking up their direction of gaze or their pointing (Scaife and Bruner, 1975). This means that by that age, at least, the other person’s awareness can be linked to the infant’s awareness in a common space of experience, taking possession (Figures 5, 6 and 7). Such ‘joint awareness’ is recognized as a key element in communication that leads to language (Tomasello, 2003).

Around nine months it may be observed that an infant is taking a new, much more definite initiative in games, sometimes attempting to direct a partner to behave in a certain way or to repeat a playful act (Trevarthen, 1977; Hubley and Trevarthen, 1979). The infant may show considerable skill in teasing an adult, as if knowing how to manipulate feelings and predict reactions (Reddy, 2001b). Such behaviours appear to be part of the transition to a new constructive sharing of interest in things and tasks, the beginning of

'protolanguage' (Halliday, 1975).

An infant enjoying the message of a familiar baby song is showing us how human meaning began. As Marc Turner has made clear, the whole of our consciousness and life together is made of story-telling (Turner, 1996), and the stories are made of metaphors with affective quality that describe agents going places and doing things with energy and style, conscious of how their bodies move and how experience is made by moving.

John Blacking asked if dance, music and other artistic activities are not, "essential forms of knowledge which are necessary not only for a balanced personality but also for the development of cognitive capacities." (Blacking, 1988, p.91). In arguing the case for 'affective culture', he said, "Passion is as important in scientific endeavour as is compassion in artistic vision." (loc. cit., p.93). The ways in which infants present themselves as performers and masters of creative acts indicates that one of the principal outcomes of affective understanding with others is the development of a secure recognised and valued 'identity' — being somebody, placed in the world with others as a 'knower' and 'doer', 'making sense' of oneself.

All humans revel in a freedom of gestural action that is intensely shared. And we use our whole bodies to act out meanings (Goldin-Meadow and McNeill, 1999; Trevarthen, 1999). We need this whole body sense to learn language (Trevarthen, 2003). These are the reasons why prehistorians are giving the evolution of music precedence over the emergence of language as a means of communicating experience (Cross, 1999; Morley, 2002)

The minds of our distant ancestors were not simply rational computing devices for categorisation of perceptions or strategic processing of instrumental tasks. The human view of the world has always have been ruled by aesthetic and mystic forces. These forces come from the impulses of the mind to act and create with anticipation, from dynamic evaluations of experience in action, and from memories of exciting contingencies of acting in the natural world. And they must always have been enriched by the sense of being in Sympathefic company sharing art in intimacy (Dissanayake, 2000). Hominids, according to Merlin Donald (2001), acquired words to name ideas, and to convey the rational abstractions that words facilitate, after evolving messages of 'mimesis'. Our ancestors will have performed rhythmic narratives of dance and gesture recreating experienced events in allegories of body posturing and stepping, gesticulations of the hands, facial expressions of eyes and mouth, and modulated cries of the voice. The important addition Merlin Donald makes to cognitive theory is that he defines a form of story making that is embodied and performed in regulated rhythmic time, that conveys narrative in transitions of feeling. In this he agrees with Blacking's insistence on the vital role of an 'affective culture' of music and dance.

The greatest challenge for the psychology of language is how narratives in thought are composed by blending an infinite variety of impressions with a sense of agency-of actors doing things with purpose and emotion, seeking and evaluating goals in a world of territories, places, objects and natural events, as well as animals and people (Turner, 1996). Being involved in talk or writing and reading is being involved in conceiving and executing body movements in a world that has other persons. Language is not an object



Figure 8: Toddlers are enjoying talk, and beginning to follow narratives and the rules of the game.

Left: Alice, 20 months, enjoys her father's telling of the story from a favourite book, pointing to the pictures for the words he uses.

Right: Robert is 3 years old, and he has just put the last piece in a jigsaw puzzle, receiving praise from his father with delight.

that has existence outside active human hopes and interests, and outside the history of friends, families and communities. It results from brains regulating bodily events in time and space, and recording the experiences that body movements acquire (Varela et al., 1991; Damasio, 1999; Donald, 2001).

As words are learned, they attach to the known persons in communication, to their actions or to the objects that are indicated in their shared interest and actions. They give an account of shared memories (Figures 8 and 9). Different toddlers with differing parental support and differing temperaments may show preference for objects or persons as topics in their first speech (Locke, 1993).

Conventional use of tools, roles and rituals of performance is mastered in the second year, beginning before speech, preparing the way for rapid learning of the maternal language (Figure 8). The change from manipulating for private gain or discovery to imitation of others' directives, indications and evaluations leads to ideas that have already been coded in words by the older members of the community round the child (Tomasello, 2003).

The cooperative learning of language needs flexibility of imagination that is expressed in the pretend play that flourishes among toddlers and preschool age children (Trevarthen and Logotheti, 1987; Nadel et al., 1999). Objects and actions become assimilated into shared purposes, and this can change identity or meaning. Things can stand for other things - a banana can be a telephone (Leslie, 1987). When the desired objects or events are absent and no substitute presents itself, they may be created entirely in imagination to satisfy the motive for shared play and communication. The child can invent play actions alone, too. But all play motivated by pretence is creating meanings that are ready to be shared. The development of the child's imagination and future learning are dependent the ability to exchange points of view and imitated ideas with a companion. This is ability that is deficient in an autistic child in ways that disturb both communication and learning.

Jacqueline Nadel shows how quickly collaborative parent-infant play transfers to

communication between toddlers (Nadel and Pezé, 1993). She has recorded how immediate imitation of actions and utterances is used by 18-month-olds for non-verbal negotiation of purposes and for sharing meaning, and she underlines the pleasure and humour of sharing signalled by exuberant gesture and vocal prosody. Social 'self-confidence' depends on a sense of security with communication of meanings and actions, and this confidence fluctuates with developmental change (Trevarthen and Aitken, 2003). Around the middle of the second year, at 15 to 20 months, a child has a fragile social identity, and (as in a 'replay' of the sensitivity of the 7 to 8 month-old) is acutely aware of the potential difficulties of communication with strangers (Kagan, 1981). It would appear that the imagination that is reaching out to learn how other persons categorise their experiences is sensitive to the risks of imitating without understanding. The withdrawal of a shy child into a private fantasy world may have much to teach us about the pathology of symbolic thought in autism and schizophrenia. Developments in preschool years show how mastery of thinking is dependent on a free and flexible regulation of contact with other minds by emotions.

Learning at Home

Recently, I collaborated with Dr. Dorothy Cadell, a researcher in the Education Research Unit at Edinburgh University, in directing a practical exercise for psychology undergraduate students. Pairs of students were introduced to a family in which the parents had agreed to be subjects for a study of play and teaching with young children at home. We selected families with a child of preschool age or in primary school. There were 7 children, ranging in age from 4 months to 7 years, and we asked the parents to let the students video just the usual games they played when everyone was relaxed. The students were given training in how to make good videos then left to do the work on their own. The results of this exercise were extremely rich and interesting (Figures 7 to 9).

Surprisingly, we found it was possible to score the phases of communication, the exchanges of initiative and the emotions that regulated interpersonal contact and sharing of experiences with the same set of categories for all ages. The principles of interpersonal contact and mutual interest, and the ways parents supported and took part in what their child found interesting and challenging remained the same, while the different children's knowledge and skills increased with age prodigiously. We think we proved two things. That parents can be wonderful teachers who use many different ways of sharing learning, and that young children put great energy and emotion into learning in collaboration. Home learning is often much more lively than what can take place in school, and it covers a wider range of experience and skills, especially with respect to social or interpersonal skills. Both parents and children showed different ways of communicating and regulating what happened, but there was always lively learning, and often great pride in achievement shown by child and parent.

How Teachers Talk: Pupils Need Teachers Who Listen and Learn

Human learning requires the young to develop deep insight into the thinking behind the moves that elders make, and into the expressions of approval or disapproval that signal the value of their experiences. The young learn an historically established



Figure 9: School involves children in learning according to fixed principles, but creative learning is still the richest experience in the right company and parents can be excellent teachers.

Top Row, Left to Right: Elliot (5 years, 9 months) and his mother compose a poem about the “Wolf of the Wind and the Huskies”; and afterwards Elliot plays it on the piano, while mother, a professional singer, sings the words; He triumphs over his mother in checkers, gloating at his victory; He is much less confident about his homework and needs mother’s help.

Bottom Row, Left to Right: Kara, 7 years, who lives in Edinburgh and speaks both German and English with her mother, learns that the rules of chess can be hard — she knows she’ll lose. At ‘pick-up sticks’ she is much better than her mother, and gets her revenge. Making *papier mâché* bowls they work almost silently together, as two expert craftswomen, enjoying efficient collaboration in ‘intent participation’. The few words they exchange are in German. (Photos from a student presentation by Ben Graham and collaborators)

cosmology and meanings and values that were invented among ancestors who were intensely aware of one another’s interests, purposes and emotions. Discoveries of new ideas and ways of acting are especially attractive to human minds, even to those that are very young and inexperienced. This curiosity for meaning has innate motivation, and it needs an exceptional emotional sensitivity that goes far beyond the expression of immediate bodily needs. The process can build in comfort, confidence and confiding in a loving family and community, or it can fall prey to fear and distress, loneliness and self-doubt. This is why infants crave the consistent sensitive company of an affectionate parent or other person who can be trusted to sustain the shared memories that have been discovered in their company.

Research inspired by Vygotsky has shown how an expert and novice interact together in the ‘Zone of Proximal Development’, where, by collaborating with the expert, the novice becomes able to achieve a goal that would otherwise be impossible by his or her effort alone (Vygotsky, 1978). Wood and Bruner (1976) identified techniques of ‘scaffolding’ by which adults assist a child’s efforts in solving a problem or completing a task (Figures 6 to 9). Rogoff and colleagues contrast ‘adult-run’ and ‘child-run’ ways of teaching and describe a ‘community-of-learners’ model where all share responsibility for learning (Rogoff et al., 2003).

In many cultures 'intent participation' in meaningful and immediately useful activities is the way children become able to contribute to their community and culture (Rogoff et al., 2003). This contrasts with the 'instruction' model of education in industrialised and literate cultures where the value of what is taught may not be immediately evident to the learner. Although learning takes place in any, and indeed all, kinds of educational practice, the community-of-learners model has been shown to promote in the pupil greater co-ordination with others, and responsibility for his or her own learning and motivation. Where the adults are supportive and provide leadership, rather than controlling all interactions, the participants work together, with each may serve as a potential resource for the others. The degree to which all are actively trying to learn and understand determines how satisfying a learning environment will be. The teacher should be prepared to learn continuously from the learner, being 'guided, directed and inspired' by the children's understanding. Bruner (1996) conceives this kind of classroom organisation as 'a subcommunity of mutual learners with the teacher orchestrating the proceedings'. He highlights the crucial role of the school, as an institution that judges a child's performance and subsequently facilitates a process of self-evaluation.

"What characterises human selfhood is the construction of a conceptual system that organises, as it were, a 'record' of agentic encounters with the world, a record that is related to the past but that is also extrapolated into the future - self with history and with possibility" (Bruner, 1996, p.36).

"The management of self-esteem is never simple and never settled, and its state is affected powerfully by the availability of supports provided from outside. These included . . . above all the chance for discourse that permits one to find out why or how things didn't work out as planned." (Bruner, 1996, p.37)

As in the sharing of experience that grows between an infant and a parent, the timing and quality of expression in the communication are important in teaching and learning with older children. Erickson (1996) has explored how timing and 'contextualization cues' (such as volume and pitch shifts in the voice and in body motions) function in classroom discussion to help participants to anticipate impending courses of action:

"Timing appears to be what holds the whole ecology of interaction together in its performance. The relative temporal location of the various actions of interlocutors is an important aspect of the ordering of the collective activity of conversation in both its reciprocal and its complementary aspects . . ." (Erickson, 1996, p.34).

The interaction is held together by 'cadential patterns' that produce 'points of emphasis in the verbal and nonverbal behaviour stream' (loc. cit., p.54). The members of the group collectively organise their attention and thus contribute to listening and speaking in a smooth, coherent manner that is cognitively stimulating. It can be hypothesised that, in cases where the teaching is not effective, the smooth running of turn-taking behaviour within an organised temporal framework will break down.

Louise Robb and colleagues undertook a study in Scotland to explore ways of analysing teacher-talk or 'teacherese' in a small class of young children (Robb et al., 2003). The aim was to identify characteristics of communication that can facilitate or impede learning and retention. Teacher-pupil interactions were recorded on video with sound and analysed in detail, to identify key characteristics of satisfying and effective

communication. A target group of 8 teachers, who were selected by their colleagues and consultant Educational Psychologists as particularly skilled communicators in the classroom, were compared with a control group of 7 experienced teachers on a standardised teaching activity with groups of pupils matched for age and ability. All were teachers of Primary 4-7, with equal levels of experience and general competence. Each teacher chose 6-8 pupils from their class to take part in a group discussion.

Teachers were asked to introduce the following imaginary task to the pupils and to orchestrate a discussion in their usual way:

“You are to spend a week on an uninhabited island with a partner. You have to find the buried treasure. Plan everything that you will take with you for the entire week.”

Audio and video recordings were made of each group discussing the project.

Five-minute excerpts were chosen for analysis by the researcher who was blind to the categorisation of teachers. The videotape was analysed for teachers' contact, mood, verbal and non-verbal initiatives and responses to pupils. Discourse analysis was also employed to identify types of comments. The audiotapes were analysed for length and frequency of turns, timing, phrasing, pitch and tone of teacher/pupil vocalisations.

Although there was no overall difference between targets and controls in their positive responses to pupils, the target group were more attentive to the pupils and also more lively and humorous. They made more supportive approving responses and higher levels of positive initiations to pupils than the controls. Target teachers also made more accommodating, reflective and metacognitive interventions. Voice spectrograph analysis demonstrated that the target group showed more reciprocal attunement with their pupils in terms of pitch plot contours and phrasing. They were also more successful in eliciting pupil participation.

The study indicates that satisfying and productive communication in a classroom should embody the same principles of reciprocity, mutuality, attunement, regular timing and turn-taking behaviour that have been found sustain parents' communication with infants. The same principles of intersubjectivity apply. Young children learn naturally in dynamic relationships of admiration and trust. Thus, the living emotions in the teacher's voice, language and non-verbal behaviour may be as important as the timeless facts and routine exercises of thought and skill he or she may be wanting to transmit.

These rules of relating apply for an infant learning at home with family, in pre-school, in classroom instruction through primary and secondary school, and in the university. They are at work in informal recreational learning, too. They also promote individual effort and the discovery of achievement through experience of 'flow' in mastery of difficult tasks (Czikszentmihaly, 1988).

The All-Important Sense of Belonging

Being at home in a community is essential for the confident teaching of a parent, and learning of a child. Maya Gratier (1999) has found that the musical quality of a mothers communication with her infant, which signals her intimate pleasure with the baby and confidence in herself, maybe affected if she has been taken from her home culture to a strange land. Gratier calls this the effect of emotions of 'belonging'. She believes she has shown that consciousness of meaning, begins in an intimate coordina-

tion of the motives of mother and infant, in their seeking to generate and share experience within one space and time of companionship. Her data show that the capacity of the mother to successfully share experience with her infant through dynamic negotiation of states of interest, purpose and emotion is predicated on her having her own 'sense of belonging'.

If a mother cannot find a secure attachment to her adult world that gives her a coherent identity with its specific grammar and expressive signature, she may not be able to meet her infant's desire for company. A mother brings to her child both personal and cultural ways of moving, speaking and singing. These influences shape the infant's developing sense of self and agency. They may be said to constitute a person's primary sense of "core culture" (Hall, 1989), the deeply rooted sense of being in tune and in time with certain non-verbal, intuitive, communal ways of being. In happy communication mother and infant are anticipating the other's intentional motions. They balance one another on the cusp of the future, each poised to step in at exactly the right moment, that is at the moment most meaningful to the other and most motivated by them. This concept of 'looking ahead' to the course of agency recalls Husserl's notion of 'protention'. Infants appear to have an innate "future sense", and they instantly sense meaning in the timing of the other's expressive gestures.

By making joint narratives, adults and infants come to share history and invoke community. The narrative form contains both the security of an ending and the exciting tension of its timing. The contrasting elements of security and tension, or familiarity and novelty, or repetition and variation, constitute the crucial vectors that give impetus to the infant's developing mind, and the one-year-old has begun to find fascination for the 'topics' of this sharing. This is the 'flow of common sense' (Figure 10).

The infant's future sense may lose clarity and direction if he or she is not provided the opportunity to develop these natural skills in intimate companionship. And a mother's future sense that makes her a confident and confiding companion may become perturbed in a variety of ways. A depressed mother, for instance, seems to have trouble in precisely that way, in her use of intimacy: her interactive behaviour, as we know, is less contingent and thus less meaningful to the infant, she has lost her sense of time and within a dialogical framework is unable to share her mental space with her infant with an even, playful grace (Murray and Cooper, 1997; Robb, 1999). This difficulty of maintaining hopeful 'time in the mind' has been highlighted by many researchers as being characteristic of depression; people who suffer from depression have difficulty projecting themselves into the future, making plans, envisaging possible worlds. A depressed person lacks self esteem — he or she experiences shame in company of confident others.

Gratier applied Malloch's musical acoustic analysis to talk and games between mothers and infants over the first year. She identified episodes lasting between 20 and 30 seconds presenting the universal phases of a narrative — introduction, development, climax, and 'resolution. Recordings of the spontaneous vocal interaction of mothers who recently emigrated (from India to the U.S.) and their infants aged 2 to 6 months were compared with those of non-immigrant dyads. She analyzed the spontaneous interactions of 30 dyads where the mother had recently emigrated and compared them with those of 30 non-immigrant dyads.

people around them. For others, this process of rebuilding a world-view and an identity is inhibited or thwarted. Motherhood itself can bring about a certain amount of stress and identity confusion, and some immigrant mothers become “trapped” between two world-views, experiencing conflict with regard to their own identity and to the representations they have of their infants.

Human consciousness is communitarian. It develops through cooperative awareness, and depends on communicating a personal narrative. The essential motive for cultural learning is a sympathetic, mimetic sense of being an actor having adventures in common sense with companions, not just imitating or sharing joint attention to objects and events. It is best to feel ‘at home’.

Getting Hold of Symbols as Cultural Tools: Starting to be ‘Artful’ and Talk Sense

There are impressive gains in social awareness as children begin to speak in second year. (Trevarthen, 1988, 1990). They have fluent inventive or creative fantasy, recognising objects of technical, industrial or artistic importance; roles and postures; socio-dramatic performances with pretend emotions; moral positions. These ideas and skills are imitated from others and spontaneously displayed to portray child’s personality as observed by others (Figure 8). The way a child gains entry to language brings out the primacy and lasting importance of interpersonal cognitions and their emotional regulation. Emotions enable transfer of evaluations and reinforcements to the infant and the orientation of the infant to present circumstances. They enable the infant to learn by being taught.

Evidently the ‘relational’ emotions of companionship are by far the most elaborate and significant for human mental growth and integration of the child into society, even though the emotions implicated in the making and breaking of attachments may have greater immediate importance in psychosomatic health and well-being.

A sense of beauty, and of what looks or sounds ugly, also is a vital part of human emotion (Turner, 1991). The pleasing or disturbing properties that persons feel in empathic awareness given to objects of shared interest, especially in the appreciation of rare objects and those made artificially with special care to give them high social value, are made evident in *aesthetic judgements*. Thus a carefully crafted artefact, a work of poetry or art, is made part of vital common experience (Figure 9). The human emotions by which cultural experience is propagated, and creativity is given moving value, appear to have evolved by elaboration of ‘experience seeking’ and ‘attachment regulating’ motives emotions of sub-cultural species. They are matters of ‘taste’ that are profoundly influenced by sympathetic response to the preferences and aversions of respected persons.

Art is, as Ellen Dissanayake says, the product of the intimacy that brings infants to meaning in parental care (Dissanayake, 2000), and that explains why it can be a source of solace for a trouble human spirit. All human cultural achievements arise shared meaning, even when they appear to be lonely products, of creatively dreaming or of adventurous risk-taking in thought or action. New thoughts, how an individual imagines of experiences generated by actions, make sense through the thinker sharing their originality and ‘truthfulness’ with others, who judge their value and ‘significance’. Human effort is directed to build relationships through cooperative and inventive works.

These are the reasons why a cognitive, information-processing, perception-categorising, memorising approach to human cumulative intelligence is unable to comprehend its social motivation or to perceive its intersubjective psychological foundations in evolution. The theory of cognitive modules in separate heads contrasts with a psychobiological theory of culture as a product of human will to make and understand in relationships and communities (Gardner, 1983). Cultural learning is not just a set of cognitive achievement of the human mind in different domains of experience. It is a new development in animal social initiative, and in ways of conscious and voluntary subjects relating intelligently (Figure 10).

Artists, painters, sculptors and poets, actors and musicians, explore their private discoveries in consciousness and their deepest feelings, leaving a record of what they find. Their work communicates these lived experiences. When they create in authentic relation to their feelings, they make statements that can open up our consciousness and change how we value what we experience. Scientific discovery and technical invention share with the arts a foundation in human curiosity and the capacity to convey to others the motives and excitements of finding out, or making. That is why an education that is both broad in its scope and democratic in its sharing of opportunities and findings has the most lasting value - socially and practically.

The 17th Century Czech educator Komensky (Comenius) led the way to an enlightened view of how children learn best. He wrote, in a book that was translated into many languages, the following:

“My aim is to show, although this is not generally attended to, that the roots of all sciences and arts in every instance arise as early as in the tender age, and that on these foundations it is neither impossible nor difficult for the whole superstructure to be laid; provided always that we act reasonably as with a reasonable creature.”

(John Amos Comenius (1592-1671) *The School of Infancy*. Translated by D. Benham. London, 1858. Quoted by Quick, 1910).

Comenius believed that older persons — parents, siblings, teachers of many kinds — naturally respond to a child’s vitality and eagerness to understand. They feel they want to help. They can learn how to do so from the child, who in this is their teacher.

A desire to know more and to gain skill in ways that other trusted people recognise and encourage, and to ‘talk’ about it all, is the defining feature of young human nature. It is the instinct that makes ‘cultural learning’ happen. This may be an old and obvious idea, and Comenius expresses it well. Nevertheless, intricately rational and busily occupied adult minds often deny it, forgetting how they themselves learned. The inventive curiosity and love of social attention of the young child is easily seen. But many who assume authority and expertise have difficulty accepting the innateness of human sympathy in action and knowledge, probably because there is no obvious rational explanation for it — nothing in the physical or biological world to compare it with, no computational system that can simulate it. Even in academic psychology, intentions and feelings of the young child are given less attention, simply because they do not fit scientific models of how minds work. This neglect by those who claim expertise can have inhibiting effects on the practice of applied psychology, and on the training of teachers. We do not know how an imaginative sympathy for the human-created view of the world

could be born in the human mind, so it is easier to conceive it as constructed from experience, by instruction from outside. Thus is the adult world led to teach, but not to learn from the child.

Lev Vygotsky (1978), Michael Halliday (1975), Jerome Bruner (1983), John Locke (1993), and Michael Tomasello (2003) have all emphasised that a child picks up words by noticing what other persons do with it, aided by shared human interest. Acts negotiating social participation with emotion come earlier in development than intention-directing 'proto-imperatives', just as 'person-person games' came before 'person-person-object games' in the middle of the first year (Trevarthen and Hubley, 1978). The early stages of 'grammar' learning, getting the syntactic and functional conventions right for sentences, is not simply a matter of coordinating vocalisations with intentions and attentions — requests, pointing, showing, giving. It has concern for human feelings and sensitivities that form the backing texture of all live communication and 'experiencing together'. 'Joint attention', strongly associated with the picking up words, is not just a convergence of lines of sight and directions of instrumental action. It involves 'mutual attention' as well (Reddy, 2003) — subtle awareness of moods and purposes, of instantaneous shifts of interest and emotional reactions that the infant has practised with familiar playful company through the first year.

Meaning and language continue to grow in personal relationships of shared pleasure and trust. Children and adults alike are easily caught in dramatic make-believe, identifying the roles of 'characters'. Infants play with emotional narratives long before they talk, and toddlers create dramas together before they have any demonstrable 'theory of mind'. This gives both the reason and the means for language learning. From 2 to 6 children make things, tell and listen to stories, create drama, with fantastic parts for the actors, dance and exhibit all sorts of musical skills. Their appetite for cultural forms of life is enormous and their perception of human roles is rich and penetrating.

Making Education Collaborative and Rewarding

It may be more convenient for the management of a complex industrial society to plan education as a construction of skills according to curricular formulae that are 'quality tested' at each prescribed stage. It may be practical to focus on each child as an intellectual athlete in training, who strives to master facts and rational skills that society wants. But this is an artificial, one-sided, cultivation of the natural process by which children can and want to master cultural knowledge, and for which adults enjoy giving natural encouragement. The 'intent participation' of the child in mastery of meaning (Rogoff et al., 2003) must be respected, and shared (Figures 5 to 9).

The emotions involved in teaching and learning are often overlooked. It is perhaps a product of social organisation and planning in industrial societies, and a reaction to the abuses of child labour as Rogoff and her colleagues (*loc. cit.*) indicate, that mothers are seen primarily as protectors or keepers of their infants, who may or may not be substituted by sufficiently sensitive surrogates, and teachers are seen as instructors—neither is understood as available friends and collaborators who benefit from the infant's or child's instinctive companionship and playfulness. The psychology we have created to support our society and measure its effects on individuals is one that treats the emotional and

intellectual success of each person separately. We have come to think of ourselves as communicating just information about what each of us perceives is real and practical, and, perhaps, what each of us thinks. Inevitably our conceptions of sympathetic and intuitive mental life have become over-cognitive and impoverished. Sigmund Freud made a powerful effort to redress this imbalance, but left the unconscious mind at the mercy of language, the vehicle of clear thought. He did not have full confidence in the intuitive communication of purposes and concerns by non-verbal means. He did not investigate how the process of interested, practical and joyful communication of thoughts and imagining begins in infancy, and nor did Jean Piaget.

Research on the development of communication and cooperation in the first two years of a child's life indicates a different way of conceiving human teaching and learning and the propagation of cultural knowledge (Bruner, 1996; Trevarthen, 1988; Trevarthen and Aitken, 2001; Hobson, 2002). And it leads to a new view of the relationship between cultural learning, the form and movement of the human body and the anatomical peculiarities of the human brain. The rich and rapidly developing sociability of infants and toddlers indicates that this brain has evolved for sharing knowledge and skill. The essential motivating and emotional systems are laid down long before birth as generators preparing the capacity of a human being for initiative in acting and experiencing, and for inter-subjective communication.

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