

# First things first: infants make good use of the sympathetic rhythm of imitation, without reason or language

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**Abstract** *Research on communication with infants, including newborns, has demonstrated that imitations in great variety play many different parts, and with emotions of interest and pleasure. Matching another's actions may seek attention and provoke reply, accept or reject advances, express admiration or mockery. It seems best to regard imitating as one way that persons express and receive sympathetic awareness, one manifestation of the intuitive readiness to move rhythmically with others in games of sociability. Infants exhibit growing awareness of how to cooperate with others in gaining knowledge and skills. The intersubjective intuitions that are active early in life and that build trust and companionship must be significant for therapists who work with young patients for whom communication is difficult. Imitating and accepting imitations can build reciprocal confidence.*

**Keywords** Infant sociability; imitations and provocations; motivation; musicality; mirror responses and sympathy; companionship.

## What's wrong with imitation?

It is not just psychoanalysts who have had trouble comprehending the merits of imitated expressions, and their uses in communication. Developmental psychologists, too, have struggled with conflicting ideas about if, why and at what age children imitate (Baldwin, 1894; Guillaume, 1926; Meltzoff, 1990; Meltzoff and Moore, 1997; Nadel and Butterworth, 1999; Uzgiris, 1981, 1999; Zazzo, 1957). They, too, have not seen what a fair exchange of imitations (rather than a slavish or self-stimulating copying) might contribute to learning and social development.

Neonatal imitation, especially, is a topic that has excited impassioned partisan debate. It has been identified as impossible by Skinner and Piaget, to name two. The debate has generated experiments that, far from being open-minded explorations, have, in many cases, been set up to refute the concept, as a prosecuting lawyer sets up an interrogation to flush out evidence of guilt. By their nature, experiments in controlled laboratory situations must limit the subject's freedom to initiate communication inventively, or to

test the consequences of their responses. As a rule, two-way communication with the experimenter/observer is controlled out. Experiments in a psychology laboratory are used to check the power and reliability of hypothesized judgements, or causes for responses, when a single subject is persuaded, or tricked, to limit his or her will and be attentive to the critical stimuli.

Neonates are not good subjects for experiments of scientific psychologists who start with parsimonious hypotheses. Most findings obtained when newborns are tested for a cognitive ability are negative – the subjects are not engaged. On the other hand, when treated with what the successful Greek investigator of their efforts and responses, Giannis Kugiumutzakis (1999), calls ‘respect’, a baby minutes old may participate in two-way imitative exchanges with interest and effort, and they show emotions related to the consequences of what they do. That changes the debate.

I believe that both fields of enquiry, the clinical and the experimental, have systematically failed to see imitations as precious signs of human sympathy on which both therapy and education depend. Investigators have been handicapped by the same model of the mind as disembodied, rational, mediated by static structures (representations), linguistically elaborated and explained – a very abstract mind seen from outside, one conceived as a system of causes and effects in an input-processor and learner of symbols.

### The myth of the timeless infant mind

It is easy to believe that a young infant lives only in the present moment. If time is made up of the recollections of experience, and a baby is born with little or no knowledge of the world and of life experiences in it, then there can be no narrative time, no story, in that mind. This belief that narratives are their *content*, that the contrived and conventional ‘scientific’ structure is essential to the coherence of any recollection of content in a narrative seems an error, comparable, or perhaps even the same, as the error Descartes (1649) made when he concluded that the only emotion a newborn baby can experience is *l'étonnement* – astonishment at the infinite novelty of experience.

However, meaning arises only in a narrative *process* of communicating among persons who are performing acts of discovery and understanding, and infants join in this with a natural competence. Within minutes of birth an awake baby can express a range of emotions, including pleasure at recognition of the mother’s voice or her touch, impatience with discomfort, and sadness at being alone when in need, as well as focussed curiosity or startled surprise at events that stimulate. And the newborn baby can even enter into a dialogue of expressions with another, in which the taking of turns is expected. Most obvious of all to a receptive eye is the graceful and progressive beauty of the baby’s unhampered movements. The flood of stimuli – from the feelings of the body, from the shifting light images on the retina, from the sounds of the surroundings – are assimilated by a process that must unroll with a rhythm of anticipation that exactly matches the time of events. And these self-related stimuli are differentiated, by that process, from effects caused by another source of change, such as the moving body of another person. The baby’s mind is not a receiver of time, it is a generator of time. Right from the start, there is a narration of purposes, and emotions evaluate a range of

consequences with innate adaptability. The most elaborate emotions expressed or recognized by the inexperienced human mind are those that will regulate relationships and communication. The newborn human animal is ready to share a story, and to learn new adventures in it.

### **Actions that capture the meaning of life**

There is enough detailed evidence from a growing natural science of infancy and parenting to make a good case for imitation as a primary motivating process in reciprocal mental relating. We are, each and every one of us, naturally active with consciously guided movements that coordinate a richly articulated body in purposeful acts. And we are intensely, immediately sympathetic to the symptoms of this active embodied mental life in one another.<sup>1</sup>

As John Macmurray (1959, 1961) put it so well, each human 'self' is an 'agent', who moves to do things, and we are 'persons in relation', acting together. Margaret Donaldson (1992), too, argues that we know the world with 'purposes and concerns', and that our emotional intelligence permits us to sense one another's purposes, to feel one another's emotions and to coordinate our actions so purposes, concerns and new experiences that arise from them are shared cooperatively.

Merlin Donald (2001) has identified a unique versatility of rhythmic programmes or motor plans as the distinguishing feature of the human mind, enabling us to plan, execute and reflect upon an infinity of new acts and effects of acting. He believes that the first steps to the accumulation of cultural knowledge – a human sense of meaning, moving through communities and down the generations – were taken in a 'mimetic culture', before speech. Our hominid ancestors danced and sang in mimicry, sharing the time of their life. They made dramatic narratives to explain their experience to one another and make the knowledge grow, much as toddlers, poets and musicians do in the modern world, with all its gadgets. *Homo sapiens* put knowledge of objects and actions, artefacts and rituals, into signs and symbols, inventing metaphors that could be transformed into an infinite code of articulated action of hands in a sign language, and of vocal organs in speech. The rest, to this age of electronic media, is history.

Like psychology (behaviourist or cognitive), psychoanalysis has, I believe, failed to give sufficient attention to the inherent power, versatility and grace of human moving, to the motivating 'time of the mind' with its 'future sense'. The actor of our embodied self has been in the wings. Is it not ironic that the field is called 'psychodynamic'? The classical model accounts for the mind as a collection of configurations, and matchings of configurations or constructions, abstracted from mind time.

Daniel Stern (1974, 1992, 1993, 1999, 2000, 2004; Stern *et al.*, 1985) is correcting this with his exploration of the dynamic narrative energy, relational affects and inventiveness of the 'present moments' of our lives. His work raises the absorbing question of how we may be transported from the intricate immediacy of what we are doing in any one of these short carriages of existence, only a few seconds long, into a past narrative of remembrance, or off into a future of hope and fears for the novelties and repetitions that will catch our awareness later, tomorrow, or in years to come. Now, that is psychodynamics. And that is where proper study of imitative transactions help us

understand how we share the perils and benefits of clever consciousness. We may suppose that tricks of memory or imagination depend heavily on metaphor, and what is a metaphor if it is not an imitation of movement?

### What a newborn imitates and why

Careful, sensitive and responsive observation of contented and alert newborn infants in intimate communication has taught us much – most particularly about the limitations of those assumptions concerning the initial state that are extrapolated down from ‘high level’ thinking, erudite reflection, logic and ‘theories of mind’. What can be achieved in relating between two humans when, for one at least, speaking is senseless vocal expression of motives and feelings? What scientific conclusions can be arrived at when no hypothesized, testable, arbitrarily formulated theory that might be used to explain an adult mind is permissible? Perhaps it is necessary to exercise a willing suspension of disbelief – a patient natural scientist’s curiosity, with faith that interesting events will occur, and be perceived for what they are.

Neonatal imitation is now proven by recordings made in France, Greece, Sweden, the UK, the US, Hungary and rural Nepal (e.g. Heimann, 1991, 1998; Kugiumutzakis, 1998, 1999; Kugiumutzakis *et al.*, 2004; Meltzoff and Moore, 1992; Reissland, 1988; Trevarthen *et al.*, 1999). Within hours of birth, babies imitate face expressions, hand gestures, shifts of the head and looking or closing of the eyes and simple vocal sounds. In experimental demonstrations, imitating, defined as reproduction of the same form of act as the act presented, is a rather puzzling activity, elicited by a ritual of exaggerated ‘modelling’ behaviour of an adult interrupted by waiting for a reaction from the infant. Observed in more spontaneous or intuitive encounters by adults who want to communicate with the infant, the infant’s responses exhibit the two cardinal features of conscious, self-motivated or intentional behaviour – inter-modal *sensory equivalence*, and *motor equivalence* for matching gestures with different body parts.

Imitation involves apprehension not just of the same form of movement, but of the intrinsic  *motive*  that generates both the form of imitation and its significant difference, and also expectation for its perceptual validation from the other person’s reply. It is communication with prospect of reply, made with emotions of pleasure, interest, surprise, etc. as the baby intently watches and listens (Kugiumutzakis *et al.*, 2004). In the home, with babies more than a few weeks old, imitation is frequently the object of a game. It can soon be used by an infant as a means of identifying a person as a familiar companion who played that imitation game before (Meltzoff and Moore, 1994).

Kugiumutzakis has traced steps in the history of recognition that imitating has an emotional significance or function. He says:

Baldwin (1896) described the emotional origin of circular reaction/self-imitation – a non-random response ‘selected’ because of its increased vitality, represented by *pleasure*. Freud (1921) noted that there exists a path leading from identification by way of imitation to empathy and that identification is the original form of emotional tie with an ‘object’. Guillaume (1926) considered mimesis together with smile, fear, sympathy etc., concluding that while imitation leads to sympathy,

sympathy does not constitute the emotional aspect of early mimesis. Wallon described the sharing of emotions (through bodily and facial expressions), after the third month and noted the emotional nature of early imitation, which he regarded as the source of sympathy (see Nadel, 1994; Tremblay, Brun and Nadel, 2004). Later, the hypothesis of a strong link between emotion and imitation was forgotten under the influence of Piaget.

(Kugiumutzakis *et al.*, 2004: 161)

A young Hungarian doctor, Emese Nagy (Nagy and Molnar, 2004), has taken up the challenge. She examined the purposefulness and expectation of imitation with babies less than two days old. Having acted as the partner who has called for and received an imitation, she paused and watched the baby patiently. After sometimes 2 minutes of Emese's peaceful waiting and watching, the newborn worked hard at making the right movement and eventually generated the imitative response again. This initiative was interpreted as a 'provocation', an *invitation* to continue the exchange. Heart rate measures showed that the newborn was becoming excited and prepared for being involved in gratifying action just before imitating – the heart beat accelerated. In contrast the heart slowed just before the gesture of request, as the baby became attentive for the effect, in the other, of the inviting act of provocation. This is an important demonstration of the human readiness for *negotiation* of expressive acts in face-to-face dialogue – of 'statements' and 'questioning', or 'assertions' and 'apprehensions'. As Nagy and Molnar described it,

Searching for the mechanism of neonatal imitation resulted in the discovery of a *neonatal initiative capacity*, called "*provocation*". Newborns spontaneously produced previously imitated gestures while waiting for the experimenter's response.

(Nagy and Molnar, 2004: 54)

These simple behaviours of wholly naive humans confirm the idea that human imitation is generated by an innate interpersonal sensibility, one adapted to regulate a range of 'acts of meaning' to regulate the interplay of intentions – acknowledging, asking, inviting, testing, and so on.

It has been claimed that infants under 2 months lack (have not yet 'constructed') a coherent, intentional 'self'. They respond to sensations of their own body, but do not anticipate their own agency and cannot appreciate agency in another person, with sensitivity for the contingency of the other's responses. But experiments by Edward Tronick (1989), Lynne Murray (Murray and Trevarthen, 1985) and Jacqueline Nadel (Nadel *et al.*, 1999; Nadel, Carchon *et al.*, 1999), testing how protoconversations are regulated, prove conclusively that 2-month-olds can predict the timing and emotion of a mother's expressions in communication. Indeed, awareness of the timing of another person's responses and anticipation of an appropriate response in time, has been demonstrated for a 2-months premature newborn by a film made by Saskia van Rees in Amsterdam of the baby exchanging coos with her father (van Rees and de Leeuw, 1993; Malloch, 1999). The mental clock, by which another's sympathy can be judged, would

appear to be innate after all, not implanted from experience of a moving body, the baby's own, or a mother's.

Motives of a person engaged with another generate what Bråten (1988a,b, 1998a,b), in a formal model of the intersubjective system, has called a 'virtual other', or active need for a partner, a process in the mind that expects the other will act in certain expressive and emotional ways. It animates a 'companion space', a dual representation that permits self and other to make a relationship of 'felt immediacy' in 'dialogic closure' (Bråten, 1988b, 1992). Infants and parents have a natural readiness for 'dialogic closure in felt immediacy', which is proved by the efficiency, productivity and regularity of events in protoconversations between infants and their intuitively responsive mothers or fathers. That this process is dynamically negotiated or 'worked out' on the interpersonal stage is shown by the playful perturbations or 'teases' that the interactants tend to introduce as soon as dialogic 'confluence' has been achieved, especially when it is between familiar partners in familiar territory and with familiar routines of play (Nakano and Kanaya, 1993; Reddy and Trevarthen, 2004). These acts of trickery expose and engage the active dynamic regulations of motives in the two individuals. Nakano calls them 'incidents' and has described the motives for them as manifestations of a human 'incident affinity' within 'the space of the We'. All playful behaviour of animals has a social reinforcing function – it is affiliative.

### **But a newborn has so much to learn!**

Surely, we should remind ourselves that a newborn is a very simple person with most rudimentary thoughts who can exhibit but the slightest and most fragmentary evidence of memory. How does the appetite for inter-mental life advance towards the sharing of language, and all the arbitrated meanings of human action in culture, fruits of an ancient history of communal life?

The evidence from longitudinal studies that collect enough data to track how infants change in their actions, preferences and expressions of interest and sociability week by week shows that there is an inner autopoietic, self-making process (Trevarthen and Aitken, 2003). Changes in the growing brain at particular ages, or 'periods of rapid change', that are much the same in all normally developing cases despite individual differences in their motives and family circumstances, transform what the infant agent is interested in doing, and these have large effects on the games played with familiar companions. There is an intrinsic regulated process of psychological change in active engagement with the environment. The evidence shows that age-related changes change parents' behaviour, teaching them to expect different behaviours from their infants, and to act differently in their support. Each relationship is a dynamic affair with its own history, but there are remarkable similarities, including differences between the timing of developmental changes for male and female infants, that cannot be explained as consequences of cultural ideas that shape parental responses.

The baby can, therefore, be viewed as the 'cyber', the oarsman who guides the craft of his or her relationship to others – parents, siblings and a growing circle of friends – avoiding the whirlpools and shoals of incomprehensible events and the strange, uncalled-for actions of unfamiliar people. The baby sets a course toward meaning by

trading mimicry with sympathetic known companions, exciting them to play with the patterns that are discovered and practised in everyday life, and eventually picking up the rules that cultural rituals and language teach, only to test them with the humour of mischievous nonsense, and that naughty sort of acting up that mocks the model.

Vasu Reddy (1991, 1996, 2000, 2001a,b, 2003) has made marvellous studies of the development of infants' self-awareness as awareness of the other – shyness, joking, teasing, showing off and generally 'mucking about', as she has called it. This is the behaviour that makes parents so proud, and that delights siblings, grandparents, and family visitors or strangers who are lucky enough to be accepted into the intimate circle of mimetic performances. The baby has, by 6 months, become a clever clown, using all sorts of exhibitionist behaviours to share jokes and make others laugh, or react in other emotional ways (Reddy, 2001a; Reddy and Trevarthen, 2004; Trevarthen, 2001a, 2004a,b). We have many examples of this kind of behaviour, and we are convinced we are right to call the infants' feelings 'pride' and 'shame'. We agree with Draghi-Lorenz *et al.* (2001) that these are primary, intuitive emotions that have important social power. We do not think that they are constructed out of simpler reactions by social experience. We think that pride and shame, and other 'moral sentiments' (Smith, 1759), are absolutely foundational in developing human relations, and in the growth of each person's sense of individuality or identity in society (Trevarthen, 2002). If the voyage of the infant navigator proceeds well, there is a kind of heroic glee in the navigating 6-month-old's spirit – an infectious pride signalled by presentation of previously imitated acts in clever, exaggerated and surprising ways for the appreciation of others.

### **How meaningful sense is learned**

At 9 months, there is the step to collaboration in novel, potentially constructive skills that can be kept for future use. I am sure that the main motivation for cultural learning is something that is quite separate from what is described by attachment theory as the drive for seeking protective proximity to a mother. That is why I have developed a Theory of Companionship (Trevarthen, 2001b, 2005). Attachment theory is not 'wrong', it just does not give an adequate account for the emotions that normally operate in the development of a baby's self-confident possession of knowledge. The emotions of attachment have to do with regulating the needs of one's own body by communication with another person, soliciting their help and support. Cognitive learning and so forth relates one's own body to objects. Cultural learning and everything to do with education and shared artificial knowledge and skills involves communication in relation to a joint and mutual experience of the world of objects, and that is where you get these very powerful emotions of pride, which reflect the appraisal of other persons – pride in knowledge and pride in skill, and shame in not being thought master of such things, to be thought unskilled or ignorant. These emotions of companionship are crucial in the development of happy self-confidence at any age. I believe they call for deliberate and carefully controlled attention in therapy, especially for young children. And they are expressed in imitations.

The whole process of 'cultural learning' and the cultivation of techniques of education succeed or fail in short and long term depending on whether or not they

credit both teacher and learner with motives for sharing interest, experience and aesthetic evaluation of what can be known or done, and celebrated as valuable. We know what we do so we can live together in a world of ideas and understandings that are readily exchangeable. All our artefacts and symbols, including what is put into words, have both a practical reference or application in desired function, and an intersubjective quality that establishes their value. This value is always something felt sympathetically between human knowers, who have experienced the process by which values of things are discovered in negotiation. Ellen Dissanayake (2000) identifies works of art as products of intimacy, and she believes that a mother's musical and poetic play with an infant is its first manifestation.

Children learn language by sharing activities and interests, and they do so with excitement of invention, discovery and rediscovery. They build up narratives of meaning that can communicate these experiences immediately, as well as in more dispassionate textual ways – in song and dance, as well as in literature and mathematics.

### **Immediate imitation builds the sociability of toddlers**

The cooperative learning of language needs flexibility of imagination and this is expressed in the pretend play that flourishes among toddlers and preschool age children (Trevarthen and Logotheti, 1987; Nadel and Pezé, 1993; Nadel and Tremblay-Leveau, 1999). Objects and actions become assimilated into shared purposes, and this can change identity or meaning. Things can stand for other things by being used as they are – 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, imitatively. The development of the child's imagination and future learning are dependent on the ability to exchange points of view and imitated ideas with a companion. The reciprocity of this sharing is deficient in an autistic child in ways that disturb both communication and learning.

Jacqueline Nadel shows how parent–infant games are transformed into the sociability that develops and flourishes among toddlers (Nadel and Pezé, 1993). Selby and Bradley (2003) consider that attachment theory, and the restriction of attention to the mother–infant dyad in intersubjectivity research, give a limited account of an infant's needs for responsive company. They insist that a more inclusive 'sociability', laced by a rich array of imitations and emotions that signal liking and disliking, approval and disapproval, is what enables the infant to be ready to make friends (or even enemies) with peers in the first year, even when no adult is present to mediate. Nadel recorded on video 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 fun of sharing, signalled by exuberant gesture and happy calls (Nadel and Butterworth, 1999). This kind of triumphal display is what my friends at the Pen Green Sure Start centre in Corby, Northamptonshire, call 'chuffedness'. Even babies a few months old can 'act chuffed' when they know how to do something that others will admire. I commend the search of chuffedness to psychotherapists working with young children.

Indeed, we have good examples in the responses to sympathetic engagement with imitations in the cases Graham Music and Maria Rhode describe (this edition).

Social 'self-confidence' depends on a sense of security with communication of meanings and actions, and this confidence fluctuates with developmental change (Trevvarthen and Aitken, 2003). Around the middle of the second year, at 15–20 months, a child has a fragile social identity, and (as in a 'replay' of the sensitivity of the 7–8-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.

### Brain science has some answers

The findings of recent imaging research liberate our vision and imagination from reductive images, showing a way to acceptance of natural sympathy. But this new technology for observing the mind has its limitations. If experimental psychology of childhood has often set up roadblocks to understanding in its attempts to manage the traffic of scientific evidence and to protect physical investments and intellectual property, brain science, too, having found subtle and expressive ways to enter the skulls of people without harming them (but requiring them to be very limited in freedom of movement and relying upon their compliance with imposed tests in very expensive equipment), can only sample brain activities in ways that are coarse in time (relative to the speed of neural events) and approximate in space (compared to the delicate interwoven anatomy of nerve cells and the differentiation of transmission sites by which they are connected).

It is true – Italian neurophysiologists, recording activity related to hand to mouth movements among cells of the frontal cortex of a monkey accidentally discovered a 'mirror neuron' (Rizzolatti and Gallese, 2003). The story is that it was a very hot day and the researchers took ice cream for themselves while recording activity in cells in the monkey's brain. One cell with a recording electrode in it had been discharging only when the monkey picked up a piece of food and brought it to its mouth. Now the monkey, watching the researchers eating their ice cream, and surely with lip-smacking envy, experienced (?) a discharge of the same neuron. The loudspeaker connected to the penetrating electrode roared. This, of course, woke intense curiosity in the researchers who easily replicated the effect. Mirror neurons had been discovered. The monkey brain could 'imitate' the brain of the eating human!

The physiological activity of cell populations that are active just before an animal moves, and therefore part of the intention to move, had been a topic of interest for some years (Di Pelligrino *et al.*, 1992; Rizzolatti *et al.*, 2001). It was known that the 'motor image' activity is coupled in time to autonomic adjustment of the body – e.g. heart rate and respiration change in anticipation of the energy cost of vigorous movement. The mirror neurons seemed to be a means of connecting intentions and emotion states

between separate brains – through channels of communication requiring perception of body movements of others – experiencing them as if they were done or ‘had’ by oneself.

Now, after a few years of exciting research with prodigious techniques for spotting local activity in normal live human brains, we know there is more to the story, and hard brain scientists must begin to think like philosophers, social scientists, or even theologians (Adolphs, 2003). It is not just the hand-to-mouth cells of the prefrontal cortex that can reflect (perceive?) behaviours other brains are generating. Rizzolatti and Arbib (1998) cite ‘mirror neurons’ in monkey frontal cortex as evidence for psychological matching of perceived external events to internally generated actions, or observer to actor, and find PET scan evidence for a mirror system for gesture recognition in Broca’s area of humans that links ‘doing’ with ‘communicating’, actor and observer, and sender and receiver of messages. Broca’s area is famous as the area for speech, discovered over a century ago by clinical observations of the effects of brain wounds in that place which make a person mute, and therefore it was assumed to be unique to humans – and here are these authors claiming to find the homologue in a monkey’s brain! But, after all, that is not so amazing when you think that talking and hand signing by humans must have executive mechanisms evolved from the high skills that make monkeys as good as us in fine and rapid digital manipulation (e.g. a baboon can de-sting a live scorpion with a flick of the wrist), at least for not too long sequences of movements, and equally delicate jaw, lip and tongue movements needed to eat food gained by foraging (a monkey can peel a grape with lips, tongue and teeth). The message is that tracking another’s movements is an important function of a primate brain. Both monkeys and humans are intensely sociable and ‘other-aware’ species, and this requires reflection of actions in awareness between them. Indeed the evidence now is that the cortical cells involved in perceiving and generating language, and for connecting it with meaningful actions or objects, are so widespread in the brain that no ‘language centre’ can be located (Pulvermüller, 1999).

More important for therapists (as for parents, teachers, psychologists of emotion, communication and language, etc.) is the evidence from brain imaging research that a very large proportion of the human brain is capable of sympathetic matching of self-activity and its mental regulation (intentions, emotions, motive impulses and style of moving) with these hitherto thought totally hidden events in others minds. But, of course, they were in the behaviour all the time, and we sensed them without knowing how to locate the skill inside us. As we must expect, the brain is very much concerned with the emotional appraisal of thoughts about human events. Decety and Chaminade (2003) say, of their findings from research on cerebral responses to stories:

Motor expression of emotion, regardless of the narrative content of the stories, resulted in a specific regional cerebral blood flow increase in the left inferior frontal gyrus. . . . these results are consistent with a model of feeling sympathy that relies on both the shared representation and the affective networks.

(Decety and Chaminade, 2003: 127)

I think the most wonderful report of recent times is one showing that the same ‘mirror’ systems for matching expressive states between people are already active in the

brain of a 2-month-old baby who is looking at a person's face, responding sympathetically to it and ready to communicate feelings (Tzourio-Mazoyer *et al.*, 2002). So intersubjectivity, or 'other person awareness and the impulse to engage', is extensively there, in the head, at this tender age.

### The systems of emotions in the brain, and organs for their expression

The emotional system that regulates activity of mind and body, of awareness and action, in dialogic Self and Other, has ancient evolutionary roots. It is made up of regulations that seek information to make movements of an animal safe and reasonably profitable, and other regulations that need to form attachment to the others for collaborative social life, and first of all for support in regulation of vital state or well-being. All the organs by which human beings express their thoughts and feelings at verbal and non-verbal levels have evolved as a derivative of the receptive and effective organs that regulate vital functions of the heart, lungs and gut. We communicate with the regulators of our state of living. Jaak Panksepp (1998a,b, 1999; Panksepp and Panksepp, 2000) describes this basic affective neural apparatus that controls how expressions are coordinated, and he argues that we should not elevate human social signals and susceptibilities so we seem utterly disconnected from the fellowship of beasts that have less subtle bodies and minds, and simpler reasons for what they do for themselves and in company. We, like them, feel curiosity that makes us seek experience, anger that defends us against what seems to threaten, attachment to those we trust to aid us, and sad depression when alone and in need.

Alan Schore (2003a,b) marshals a hoard of evidence for a special human affective regulator in the right brain, one that mediates the collaboration of mother and infant in their special intensity of being, and guides the mother's care. But there is evidence that both hemispheres of the human brain are active from the start, and that the differences between left and right cerebral cortices that have been identified for 150 years by neuropsychologists as related to the highest cognitive achievements of humans, including language, grow from a functional complementarity between motives for engaging with the world (Trevarthen, 1996). There are impulses that prompt active and selective commitment to assertive *ergotropic* action on the world on the left side, and, on the right, those that seek self-restorative *trophotropic* apprehension of vital needs and sympathetic attachment to the nutritive aid from others (Trevarthen and Aitken, 2003; Trevarthen, 2004a).

I think every turn in a mother–infant dialogue proceeds around the cycle between these two ways an animate mind and body can engage with fortune by moving. We have suggested that imitations should be identified with one particular phase of the cycle – at the moment when the assertive initiative of one is about to end (Trevarthen *et al.*, 1999). By imitating, the 'apprehensive other' signals acceptance of a turn from the 'assertive performer', if it will be granted. Perhaps he or she can display this acceptance as an initiative that invites further sharing, as in Emese Nagy's exchanges with newborns. This last is the idea that Maria Rhode and Graham Music have found to be fruitful in their seeking for positive acceptance from children whose relating is difficult and forbidding.

## Exploring the rhythms

Some of us trying to follow the actions of this intimacy more closely are exploring jazz improvisation, which is such a marvellously recordable traffic of expressions in the motor-auditory space between players, so full of seductive, impish vitality, and open feelings, and telling such exciting narratives (Schögler, 1999; Trevarthen and Schögler, 2005). The poly-rhythmic humour, and sometimes tricky intellectual reflections, of improvised duets seem to fuel the human hunger for intimacy of consciousness-in-action in richly satisfying ways – at least for those who like this music. For the players and jazz lovers this frees the spirit.

We have a lot of evidence now that the talent for mind-to-mind improvisation, mediated by emotions that are carried by sights, sounds and touches of human bodies moving, is in a baby from birth. Baby researchers and jazz musicians and musicologists are teaming up, swapping data. The infant's musicality may be fragile, and it certainly has little instrumental skill. There is evidence that the cerebral apparatus for 'intersubjectivity' had begun learning *in utero* to improve the chances of good performance with the mother, picking up her stylistic preferences of speech from before birth. But the infant has a vast tradition to learn about techniques and traditions of human communication. A newborn baby fatigues easily, and has to obey urgent demands of a fast-growing body in a new environment, with requirements for nourishment, comfort and sleep that can only be met by a sensitive caregiver. But the wish to relate is already there, and can be roused to sympathetic reciprocation. It does so with 'musicality', with imitations that serve as attractive melodic notes of phrases to confirm or provoke contact, and with the improvisation of a narrative of feelings that is excited by both the changing motives of the self, and the subtle contingent expressions of the other. In a good protoconversation with a 2-month-old, infant and adult carry one another as complementary partners in a satisfying duet.

This evidence for these claims is firm, and no law of parsimony can destroy it. It entails a radical revision of the models employed by analysts to investigate and describe what they have conceived as the 'construction' of an 'object relation', and a more dynamic description of the projection and introjection of feelings transferred and counter-transferred. The terms that have become habitual belie the necessary sympathy that is uniquely interpersonal. From the start, human relating is not at all 'objective', at least that is the least of its concerns. What matters is the sentiment – the sympathy of feelings implicit in how the impulse to relate is transferred, within each mind according to its state of alertness and coherent agency, how it feels for the other, and between them according to their expressed emotions of sociability and the affections of their attachment.

## Putting communicative musicality to work

Skilled therapeutic work awakens confidence and calms fear and rage. It can build trust and win affection. I find the work of music therapists relates immediately to the non-verbal patterns of expression in sound that mediate 'communicative musicality' in mother–infant games. Music attracts babies' interest, stimulates pleasure in them and

makes them move (Trevvarthen and Malloch, 2002). It communicates with the very young human being because it engages with the beat of an Intrinsic Motive Pulse (IMP) generated in the human brain (Trevvarthen, 1999). It depends on: (1) a rhythmic time sense (that detects syllables, the beat, phrases and longer elements); (2) sensitivity for the 'qualities' of Manfred Clynes' 'sentic forms' (Clynes, 1980), the temporal variations in intensity, pitch and timbre of voices and in instrumental sounds that mimic the human voice; and (3) a perception of 'narrative' in the emotional development of the melodic line, which supports anticipation of repeating harmonies, phrases and emotional forms in a vocal or musical performance (Malloch, 1999). Music, as it changes, evokes motive universals in the human experience of moving, the unfolding of purposeful projects and their dramatic cycles of emotional expectation and consummation. It has the capacity to heal (Robarts, 1998; Trevvarthen and Malloch, 2000), because it supports intrinsic, neurobiologically founded needs for qualities of human communication that are organized with musicality, 'in time' with the mind (Pöppel and Wittmann, 1999).

Research on the structure of songs for infants in different languages has taught us a great deal about how we share, and imitate, states of mind, moods and rituals of story-telling underneath the spoken word. The infant's cheekiness, attentiveness, sleepiness or distress can be mirrored and modified by song and instrumental music. Responses to music prove that by 4 months music easily catches a baby's attention and moves him or her to dancing in time with hands and legs, and songs are quickly learned, becoming favourite messages for companionship (Trevvarthen, 1999, 2002).

A remarkable film, made by Gunilla Preisler in Stockholm, of a blind 5-month-old girl's reaction to her mother singing two familiar songs teaches us more (Trevvarthen, 1999). The infant was born totally and permanently blind, has never seen her hands or the hands of any other person, and yet she can accompany portions of the song her mother sings with expressive hand gestures that display intelligent precision and even some anticipation of the melody. Her gesturing is recounting the message in non-verbal mimesis. She is dancing dramatic moments and the progress of the adventure in these little 'myths'. We see that she does so with the 'right' moves, even as a trained conductor might. She accentuates the flow of feeling in the 'story', pointing up high notes, spreading to the side to follow the surges of energy, closing her fingers and/or dropping her hand eloquently at the close of a phrase. Her sense of pitch space seems to be aligned with the axis of her body while she lies on her back, higher pitch being accompanied by a move headwards, lowest pitch being below the waist. As her gestures occasionally anticipate the mother's melodic and rhythmic change by a fraction of a second, we know she is recognizing the songs and performing them, at least partly, from memory. We have evidence now that this is perfectly natural infant behaviour. Babies dance to the pulse and expression of music. This case is just so astonishing because the baby cannot see her movements. She just 'feels' the music in her, and has learned them that way.

A skilled music therapist can use our intuitive awareness of the emotional stories music makes to draw even the most isolated, physically handicapped individual into a shared experience, one that can relieve fear and anger by giving it an accepting accompaniment, that can calm and draw a joyful affectionate response. Girls with Rett's syndrome, a very profound intellectual handicap and disorder of intentional action, were

helped by a skilled musical communicator into sharing simple songs with different moods, and expressing their likes and dislikes clearly (Elefant, 2002). They recovered intended gestures that had been thought lost. Their delight in this game was a miracle to behold.

### **Conclusions: the life of emotions in the space between minds**

In a dialogue, face-to-face, two persons fill the space between with expressions of emotion. They are linked by many threads of contact between senses and movements. Each emotion is a test or judgement in that space between selves in the eyes of each other, a vibration in the threads. Eyes make a reciprocal link, each person's regard both signalling interest, or disinterest, by where and how animatedly the pupils are directed into one another, or away to other sites, taking in those signals from the other – seeing every minute conjugate shift in the position of the irises in the white scleras (unique to humans). We do talk under the mutual surveillance of our eyes. But the voice carries a more intimate message of rhythms and tones, and the hands are active in gesturing the impulses of intention and memory, often referring in explicit mimetic ways to absent places and events, and to hopes and fears of protagonists in the spoken narrative. By direct touch, hands convey gentle concern, calm, or urgent pressure of command. By the way all these parts of the body move in concert, the traffic of thoughts and feelings in one's mind are offered to, and crave response from, the sensibility of the other. The two minds may complete thoughts and feelings at once as the bodies move sympathetically or harmoniously into synchrony, or they may separate in dissention with a takeover of one by the other. One may be scared away by rudeness, or may be carefully helped to find a richer purpose.

### **What the clinical accounts teach us**

There are a host of questions raised by the rich and fascinating accounts of Maria Rhode and Graham Music, two child psychotherapists who share a disenchantment with the austere scientific or 'mathetic' model of how interpersonal experience is 'constructed', and who seek to discover how imitative actions occur in intimate, emotion-charged and intentionally permissive encounters, and what good use can be made of them.

I am, as always, impressed with the rich provocations of skilled psychotherapists' case descriptions. As a natural scientist, I am interested in what we learn from accurate presentations of the acts and interactions of live beings 'in the field'. But the analyses anyone can make of a rich account are many. I feel very cautious about imposing *a priori* theories on my data and prefer to keep shifting my interpretations as new evidence comes out. I delight in how patterns of actions and consequences recur in communications between adults and children, and how they make sense of past experiences.

My immediate response is one of agreement with both authors' dissatisfaction with the static structures that many psychoanalytic models hypothesize to explain self-other relations and how they change with experience. They are 'surfaces', 'containers', 'representations' that have substance and surface form which seem to have no felt value

or shared meaning. I just cannot accept the description of interpersonal experience as an 'object-relation', and I must say that accepting imitations as 'identifications' (matchings) and 'internalizations' or 'imitative fusions' à la Gaddini does not go far enough – these fittings of structures do not capture the 'magic' of sympathy. I would say, too, that the kind of knowledge we have of the essential dynamics of relating means that we must go beyond the idea of a 'solid' three-dimensional personality – the person, and persons in relation, are moving in the fourth dimension of time.

Graham Music says, 'As child psychotherapists we know that the rhythms, tone, timing and prosody of words affect how they are received. Talking is a physiological act and speech is a form of action' – and all action is in regulated rhythmic time, marking out steps to the future. It is the need for endless control of balance in dynamic moving that makes 'slavish copying' or 'narcissistic reflection' sterile or dangerous. The imitator must not 'fall in the hole' of conformity. He or she has to climb up to what can be shared, invented and 'regulated' in company. Self-confidence is something requiring sharing. We certainly agree about that. I am delighted with how Carol got to join in with the imitated 'wah wah wah', and came close. That is exactly the kind of response Jacqueline Nadel receives with judicious use of immediate imitation (Nadel and Pezé, 1993), and Carol's defiant bravery, full of wickedness, is surely good news.

Maria Rhode's use of the term 'internal occupant' for the mother's receptor of the baby is, of course, very much the same as Bråten's 'virtual other'. Her insistence of the need to see an autistic child as seeking a welcome to the human family chimes so well with the findings of infancy research about how infants seek and pick up meaning in sociable ways. In fact, I think it may be closer than she believes, because the imitations of newborns are of very odd human actions – real novelties. Yes, the action of tongue protrusion has to be in the baby's repertoire. But if you have seen Melzoff or Kugiumutzakis poking their tongue out for an infant you would agree that the baby is probably attracted to the absurd exaggeration of this gesture. The same goes for all the other things that newborns have been tricked into imitating, an 'insult' which, given the chance, they are able to reciprocate. Newborns imitate peculiar invented forms of human gesture. I think it is this latent appetite for sharing inventions that can capture the unwilling interest of an autistic child, and get them into a pleasurable game. Freud's 'primary identification' does not seem to me to be up to understanding this human game.

A mother's place in the wider human family, as well as in her home family, is a factor in her well-being, and it certainly can influence how she supports her child's seeking for a welcome (Raphael-Leff, 2005). Being 'at home' in a community is encouragement for the confident and confiding teaching of a parent, and the learning of a child. Maya Gratier (2003) has found that the playfully musical quality of a mother's imitative communication with her infant, which signals her intimate pleasure with the baby and confidence in herself, may be lost if she has been transported from her home culture to a strange land. Gratier calls this an effect of emotions of 'belonging'. She has confirmed that consciousness of meaning begins in an intimate coordination 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', to the family with her relatives, and to the social world she is in now.

There are many, many other observations in these case accounts of children turning to the therapist, approaches that recall moments of shared fun between parents and infants, and I cannot comment on them all. I am sure we should bring the clinical and the normal closer in this way, and not keep the former as a quite different world. I believe a rich account of how happy well-supported infants achieve pleasure and pride in learning skills and techniques of social performance has a crucial message for therapy. Moreover, it is never completely smooth. All persons, even those who are severely handicapped, coming alive and trying to develop after a very abnormal course of development, have the infantile capacity for sympathy with others' rhythmic impulses and expressive movements. This is the first place to meet them if they need support.

I am not happy with the idea that animal mimicry is 'an autonomic reaction' and 'not at all conscious' – with Panksepp I believe that animals have emotions like we do in the fully conscious regulation of their life in relation to one another. The difference is essentially that they cannot talk about it, or fabricate representational models, things that are constantly negotiated and modified as approximations to experience, and their self-regulations have much simpler bodies and action plans to keep in good functional order. Animals and infants are not so far beneath the most educated adult in respect of their imitative capacities. Even very simple species, far below the mammals, just as they share the homeotic genes that design and elaborate the segmentation and symmetry of body form (Lewis, 1978), evidently have the essential neural mirroring circuits and 'emotional contagion' in their tiny brains, though we have poor knowledge of this yet, I believe.

The impression we gain from introspection and from research on consciousness is that the body is moved by many agents, that it has the capability to take up multiple purposes that can develop a degree of anarchy and conflict (Donald, 2001). Each of us knows that lines of thought can 'fall apart', 'lose boundaries', or 'jump tracks', 'fade in confusion'. They are not always weaving a creative satisfaction. And not just dreaming – thinking and writing academically is a familiar state of this chaos in emergent, liminal consciousness. The body waits on the mind to 'make up its mind' in a 'virtual reality' of images of moving agents.

As a movement psychologist with a background in physiology, I understand that 'motor images', which give prospective control to what the body can do, depend upon the proper activation of body maps in the brain. I am, therefore, greatly taken with the theoretical interpretations of Tustin and Haag. I know that intersubjective communication with a child needs not just sensibility for 'kinematic' and 'energetic' features of movement in the human body, but also 'physiognomic matching' of signalling parts of the body, especially eyes, mouth and hands (Trevarthen, 1986). These body parts are stages for interpersonal dramas, and they can become peopled by expressive forces and protagonists that can even be alien to the self who is trying to keep its purposes, hopes and fears intact.

Tustin's and Haag's descriptions of failing body images receive definite confirmation from observations of the fragmentations of purposes and channelling of awareness seen in commissurotomy patients, rare cases where the cerebral hemispheres have been

surgically separated to suppress the crippling effects of epileptic seizures (Trevvarthen, 2004c). These people occasionally make duplicate and conflicting volitions with two hands, and experiments that invite them to switch between ways of ‘processing information’ throw light on the great system of anatomical links of the sub-cortical brain that normally ensure unity of volition and awareness.

But more pertinent, and easier to relate to the clinical accounts, are observations of my students with young autistic children, to study their communication and play, or how they may be engaged in communication with a skilled music therapist. Most informative, however, are the findings of Catherine St Clair and Stuart Daniel from their detailed analysis of home videos of homozygous twin sisters at 11 months, one of whom was diagnosed as autistic at 18 months (Trevvarthen and Daniel, 2005). Fine description of the videos made by the mother, and systematic comparisons of the rhythms of dialogue of the two girls playing with their father, confirms what I have seen with older children, and the evidence of a growing literature of the first signs of a range of developmental brain disorders due to prenatal disturbance of the making of the brain. Cognitive disabilities and failure of communication and learning in children with these different disorders are consequent upon loss of regulations for motor coordination and attention, as well as a confusion of the affects that accompany purposes. In a human child, such disturbance inevitably weakens the powers of the mind to enter into engagement with another person’s mental life. These persons’ expectations of an interplay of feelings and interests are not met. The jazz does not swing. There is a loss of intimacy and of opportunities for building confident games and for discovering the meaning of acts in narratives of adventure. Why people are excited to do what they do escapes the child. Clearly the most promising support will be one that compensates for failed meetings of action, that invites initiatives with special a consideration that is alert for any sign of initiative and enjoyment within communication.

The prospect opened up by what we have learned about the development of communication before speech invites us to consider the human mind as a maker of movements that are emotional in their expression to others, receptive to their moves and emotions, enabling feelings and conscious purposes to be shared. It does not explain how rational thought and language embellish this basic synrhythmic sympathy, though it sets essential parameters for that task.

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## Note

- 1 This is what I mischievously called ‘innate inter-subjectivity’ in the early 1970s. Now, though it has served its purpose well, that rather ponderous, indeed intellectually pedantic, term is something like an albatross round my neck, but maybe useful to baffle experts in machine intelligence. I prefer, in fact, innate inter-personality, but that is little better, so I am settling for natural ‘sympathy’, which turns out to have excellent historical and philological credentials. I am advised that the ancient Greek word ‘synrhythmia’ means the sharing of

regulated movement – the process of acting together in the same way or in complementary ways. This is how Adam Smith employs the word ‘sympathy’ in the *Theory of Moral Sentiments*. He shows a picture of spectators moving to posture and gesticulate keeping balance while the watch street gymnasts who tread a tightrope.

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