Why do we like to dance and sing?

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Why do we like to dance and sing?

Wherever humans are there is dance, music making and music listening: in the concert halls, jazz clubs and dance venues of the west, in pieces from Japanese Gagaku, in African dance and drumming, in songs and games with infants, and in children chanting songs and moving rhythmically together as they play. We recognise and sympathise with these humanly organised gestures in sounds and movement – gestures organised simply or with much culture specific complexity. These gestures 'speak' to us, and move us; music and dance are communicative in ways that are often far more direct than words. Bjørkvold calls our sympathy for artfully organised gesture our *muse-icality*. "To lose our muse-icality," he writes, "would be to lose a profoundly essential part of our humanity" (Bjørkvold, 1992, p.xiii). John Blacking, one of the most influential ethnomusicologists of the 20th century, believed that the value of music making and listening (and by extension, dancing, which so often accompanies music making) lies in its ability to act as a vehicle for the expression and communication of both individual and social experience. "The function of music is to enhance in some way the quality of individual experience and human relationships; its structures are reflections of patterns of human relations, and the value of a piece of music is inseparable from its value as an expression of human experience" (Blacking, 1969). Ellen Dissanayake argues that the origin of the temporal arts – music, dance, mime – is to be found in early mother-infant interactions (Dissanayake, 2000). This chapter explores some of the evidence for dance and music being integral to being human.

Timing

Dance, music, indeed everything that we do occurs through time. Our ability to appreciate and create music and dance is inextricably bound to our ability to appreciate their unfolding narratives of gestures. To do this we need a sense of time. Coherent mind time is a largely neglected area in the discipline of psychology. Addressing this lack of investigation, Wittman and Pöppel (1999/2000) postulate "a general temporal principle of inter-personal communication." They argue from psychophysical evidence that human time, in both perception and behaviour, rests broadly on two frequency levels –

1. a high-level frequency of around 30 milliseconds, which is the minimum time interval necessary for humans to perceive two events as separate.

2. a low-level frequency of around 3 seconds, which is responsible for human perceptual integration of events into 3-second units of the 'psychological present'.

We experience the world through a common sense of passing time, and human communication, be it linguistic or gestural, takes place within this common mind time:

> "The expressive and the perceptual side [of human communication] are both embedded in a temporal framework in which the contents are transmitted. Communication, therefore, can be characterised as an interplay of temporal information segments exchanged between two persons (or a group of people). These information segments are constrained by the temporal integration mechanisms of the brain." (Wittman and Pöppel, 1999/2000)

Trevarthen (1999/2000) also addresses the question of mind time. He proposes that an integrated body-imaging core system (which he calls the Intrinsic Motive Formation) forms among the cells proliferating the brain of a human embryo, and, once formed, persists throughout life. As co-ordinator and regulator of human movement, the Intrinsic Motive Formation contains a system of generators of neural and body-moving time that he calls the Intrinsic Motive Pulse – or IMP. Trevarthen suggests that our whole being – thought, emotion and movement – is bound up with a system of pulse generators, and these pulse generators will be the common ground for our generation and appreciation of the gestures of voice, sound and body in dance and music.

Infancy research:

Gestures of voice and body (including touch) are the basis for adult-infant communication; communication takes place through the prosody of the infant-directed speech, the infant's participation in this (Trehub, Trainor and Unyk, 1993; Malloch, 1999/2000), and the facial and gestural movements of both parent and infant (Fogel and Thelen, 1987; Weinberg and Tronick, 1994). Evidence for the intrinsic and multimodal nature of our temporal framework and pulse generators is seen in various studies of infants (e.g., Malloch,

1999/2000). In recent research on infant babbling two groups of normally hearing babies were studied (at 6, 10 and 12 months) – one group was exposed to the usual environment of spoken language, and one group, born to profoundly deaf parents, was not systematically exposed to spoken language but saw signed language (Petitto, Holowka, Sergio, Levy, and Ostry, 2004). Across infant ages, they found that the rhythm of the predominant hand gestures of the hearing speech exposed babies had a frequency of 2.5 Hz, whereas hearing sign exposed babies had two distinct rhythms for the hand gestures – a fast one (2.5Hz – the same as that for the first infant group), and a slow one, 1 Hz. Remarkably, the latter was carried out predominantly within a restricted space in front of the body typically used for signing – the infants were learning sign language and were 'babbling' with their hands just as infants will vocally babble. Infants appear to be sensitive to the gestures of communication no matter the modality and they seek out, mimic and create with the gestures of communication using voice and body. The authors conclude that "all babies are born with a sensitivity to specific rhythmic patterns at the heart of human language and the capacity to use them."

We are very good at recognising the timing in others' gestures of speech and body. Conversational analysis (Jaffe and Felstein, 1970; Siegman and Felstein, 1979, 1987), in which films or video recordings of adults in spontaneous engagement are measured moment-by-moment, has shown that humans interact with one another at unconscious speed and accuracy as we synchronise our own vocal and bodily gestures as well as synchronise with those of others in subtle rhythms of exchange (also see the work of David McNeil, e.g., McNeil, 1992). This ability to perceive and remember the gestures of another starts very early. Infants are capable of learning the sound of their mother's voice from before birth, and can recognise melodies and poetic verses that were presented to them pre-natally (DeCasper and Fifer, 1980; Fifer and Moon, 1995; Hepper, 1995; for a summary of infants' prenatal auditory abilities and experiences, see Lecanuet, 1996). And infants, at between two to five days old, can discriminate languages not spoken in their home on the basis of rhythm alone (Nazzi and Ramus, 2003).

Infants can assess the quality and appropriateness of the timing of human gestures. They are born with the expectation that a caregiver will behave in a communicative fashion (Trevarthen, 1998), and in happy, healthy interactions between young infants and adults these interactions are based upon contingency. If a mother and infant are happily

interacting, and then the mother is distracted, say by another adult walking into the room, then the infant is quite capable of waiting till the mother's attention returns without becoming upset (Murray and Trevarthen, 1985). However, asking the mother to use a "still face" and to remain silent while looking at her infant will make the infant distressed – the infant looks away from the mother, and subsequently withdraws (Murray and Trevarthen, 1985; Weinberg and Tronick, 1994). The infant has an expectation of how the mother will communicate. Further, if the infant is presented with the mother on a television screen, who then reacts with her infant in real time, the infant responds happily. However, if the infant is presented with a video of the mother recorded from a *previous* happy interaction, the infant becomes distressed and then withdrawn while watching this animated, but completely unresponsive 'mother' (Murray and Trevarthen, 1985; Nadel, Carchon, Kervella, Marcelli, and Reserbat-Plantey, 1999). Thus, even if the infant receives animated vocalisations and body gestures from the mother, the infant finds these highly distressing unless these are contingent on the infant's own vocalisations and body movements (and infants can probably assess gestures of other infants in a similar manner – see Selby and Bradley, 2003).

'Real life' examples of non-contingent maternal gestures of voice and body towards an infant can be observed in mothers suffering from post-natal depression (PND). Infants of depressed mothers often become avoidant or distressed (Murray and Cooper, 1997). If the mothers' PND continues, protesting behaviour may become integral to the infant's communicative repertoire. It has also been suggested that a mother's PND affects an infant's brain development (Schore, 1994). However, the healthy parent can also play with contingency. In teasing, the infant's expectation of a certain type of interactive timing can be manipulated within certain bounds with the result that great fun is had by both parties (Nakano, 1996).

Narratives of gestures

From the above discussion, it appears that an infant has a great drive to be an active participant in the use of communicative gestures, and the healthy parent supports this communicative drive. The Papouseks, who have done much to reveal the nature of innate human musical skills, describe the mother's specially attentive behaviour as 'intuitive

parenting' (Papousek, H., 1996; Papousek, M., 1996). They conclude that it is the essential external regulator of the child's cognitive development, as well as being the emotional regulator of inner states of arousal and physiological maintenance. We have seen that the infant's communicative expectations include the sensitive assessment of whether the gestures that the infant sees and hears in the other 'fits' in time and quality with the infant's own behaviour, and this 'fit' is vital for the infant's wellbeing. Music and dance therapy use this intrinsic human capacity, explicitly playing with many sequenced gestures of voice and body, without the need for words, to form mutually created links between therapist and client so that both can share companionable narratives of feelings and thoughts through time (Trevarthen and Malloch, 2000).

The shape of contingent interactions can be captured through tracking the pitch curves of a mother's speech as well as the movements of both mother and infant. The top panel of example 1 shows a 2-minute-long extract of the pitch of a mother's voice as she chats to her 13 week-old-infant. Below the pitch graph are 2-dimensional plots of the infant's and mother's body movements as recorded from a camera side-on to the interaction – the infant's right hand (plotted in the y dimension), the mother's left hand (plotted in the x dimension), and the mother's head movements as measured from the tip of her nose (plotted in the y dimension). These graphs suggest that the gestures of voice and body of both mother and infant mutually support one another. Two large drops in pitch in the mother's voice (as shown by two vertical lines) coincide with larger or busier movements of the infant's right hand, a movement towards the infant by the mother's left hand, and a cycle of moving towards and away from the infant by the mother's face. This narrative of gestures carries emotional meaning for both mother and infant, meaning carried by what Daniel Stern calls 'vitality contours' which make up 'affect attunement'. Affect attunement is "the performance of behaviours that express the quality of feeling of a shared affect state, but without imitating the exact behavioural expression of the inner state" (Stern, Hoffer, Haft and Dore, 1985). Affect attunement is a multi-modal phenomenon, where the affect of a vocal and/or bodily gesture is attuned to by another and expressed in a different form from the original. According to Stern, this largely unconscious 'recasting' of events is necessary to "shift the focus of attention to the… quality of feeling that is being shared." For example, an infant excitedly vocalises an upward then downward pitch movement, and the mother smiles and moves her head with the vocalisation so that the tip of her nose describes an inverted U. Stern would say that the vocalisation and the

mother's expression and head movement share the same vitality contour, composed of the amodal qualities of intensity and timing. Vitality contours are the mechanisms by which affect attunement takes place.

In comparison with figure 1, figure 2 shows the movement of a different mother's head back and forth as she chats with her 15-week-old infant for two minutes. This is the movement of a mother who is severely disturbed with post-natal depression. The first mother seems to show a movement narrative with her approach and withdrawal from her infant. The second mother seems to be stuck in the repetition of a stereotypical back and forth movement. The 'musicality' of the movement has been lost, and the infant protests throughout this interaction.

Communicative musicality:

Malloch (Malloch, 1999/2000; Trevarthen and Malloch, 2000; Malloch, 2002), building on the research reported above, uses the term 'communicative musicality' to describe the contingent sharing of space and time that occurs between healthy adult and infant. Communicative musicality is the ability to engage and sympathise with the humanly shaped passage of time and consists of those attributes of human communicative behaviour (as expressed through gestures of voice and body) that underlie co-ordinated companionship. It is the communication that takes place through the intentions (underlying impulses for actions) and affect carried by the 'music-like' qualities of a caregiver's and infant's joint vocalisations in combination with the joint 'dance-like' gestures of their bodies and facial movements. This music-like behaviour is not music *per se*, but the expression through time of an innate impulse to communicate feelings and intentions. It has been suggested that communicative musicality is a fundamental human skill at the source of music and dance (Trevarthen and Malloch, 2000; Stevens, Malloch, McKechnie, 2001).

Communicative musicality consists of three attributes – pulse, quality and narrative. 'Pulse' is the regular succession of discrete behavioural events through time that enables us to anticipate when something will occur between another and ourselves. Because humans share a brain-based sense of organised time, in both perception and motor behaviour, the sharing of a sense of pulse comes easily to us. The 'quality' of an

interaction consists of the contours of the gestures, as expressed by changes in the pitch and timbre of the voice, and in the shape and velocity of the bodily movements. The combination of pulse and quality go together to create 'narratives' of expression, they embed an emotional 'feeling' in the gesture, and narrative structures enable us to anticipate what will happen next. The perception and production of pulse and quality, and their fusion into narratives of expression, appear not only to be vital in early infant-adult communication, but also to lie at the heart of our ability to engage and sympathise with others at any age. Communicative musicality is an embodied expression of the combination of motor pulse and emotional quality.

Teacherese:

This combination of motor pulse and emotional quality can be seen in another field of human activity where, as in caring for an infant, one person guides another. This is the field of teaching and learning. Research on classroom conversation by Fred Erickson suggests that a shared dialogic pulse facilitates effective engagement between a teacher and a class, and that children can make use of this pulse to gain the teacher's attention. Just as in the research cited above where the caregiver and infant are seen as mutually influencing each other, so the teacher and student are seen as mutually influencing each other – the teacher is seen as a person in relationship, both student and teacher actively engaging with each other in social interaction (Moll, 1990; Rogoff, 1990).

Erickson's work is influenced by the neo-Vygotskian approach, which sees all cognition as socially situated in interactions (see Vygotsky, 1978; Wertsch, 1985). His interest is not so much in the linguistic content of the exchanges, but in the dynamics of the classroom discussions, in particular in the analysis of the timing of interactions (Erickson, 1996). As Erickson says: "timing appears to be what holds the whole ecology of interaction together in its performance" (Erickson, 1996). To demonstrate this, Erickson presents exchanges between a teacher and class represented as music notation. Through this method, Erickson shows that a regular metrical pulse occurs as teacher and students take both sequential and overlapping turns in question and answer and comments. He says that there is a particular moment at which an answer to a question is expected to be given, and children can 'steal' answer turns from each other, or fill a space left by the non-

answer of a child to which a question was directed. He finds that information salient words (e.g., the S in "this letter is an S") fall on the beat, the children's attention directed to this moment of important information. This way of characterising the nature of classroom interaction suggests that an effective learning environment will clearly display these attributes, while a less effective environment will show the lack of these attributes (just as healthy mother-infant interaction shows narrative form, but depressed mother-infant interaction lacks this – see Robb, 1999/2000). Malloch, Scott and Crncec (in review) had university education lecturers rate a series of videos of classroom interactions along a scale of student engagement – engaged to unengaged. They found that low ratings of pupil engagement were significantly associated with duration of teacher pauses, number of student/ student interruptions, number and duration of student/ teacher overlapping turns, and number and duration of instances of student background chatter. Low ratings were thus associated with characteristics of the learning environment that suggest poor timing organisation – a breakdown in the sorts of behaviour that Erickson describes as vital in the 'ecology of interaction.'

The humanity of music:

It is argued here that our capacity to create and appreciate music and dance is based in our drive to reach out to others in contingent interaction through time; it is based in our wish to participate in the gestures of co-ordinated companionship and to sympathise with the vitality contours embedded within the gestures of that companionship. This being the case, it would be expected that there would be explicit recognition of the human communicative gestural nature inherent in the temporal arts. Certainly anecdotally this appears to be true – we talk about melodies or dance gestures as being lively, warm, rushing, proud, tranquil; all attributes that are readily applied to the gestures that people make. One of the few studies to investigate this explores the possibility that the vocabulary of musical expression concerns psychological aspects of people (Watt and Ash, 1998). Participants were played 24 music extracts (all without human voice), and as a sensory comparison asked to taste a number of different foods. In response to the music and the food, they were asked to choose words from pairs of words that fell into 4 categories – people traits: e.g., male/female, young/old, good/evil; people states: e.g., gentle/violent; joyful/sad; movement: e.g., stable/unstable; leaden/weightless ; and

adjectives rarely applied to people: e.g., bright/dull, prickly/smooth, sweet/sour. The person categories male/female, good/evil, angry/pleased and gentle/violent showed significantly higher levels of information content (i.e., greater deviation from chance) in responses to the music stimuli than to the food stimuli. In discussing these results, the authors conclude that it appears that "music is perceived as if it were a person making disclosure" (disclosing some information about him/herself). They go on to say that "music might be said to have a personality… In that same sense, the action of a piece of music in any individual will depend on their personality." Their conclusions support the view that music is derived from those same gestures that we use and sympathise with in our communication with others. We might say that dance and music are, actually or potentially, acts of intersubjectivity. They communicate with us because we move in musical ways with gestures linked into narratives of expression. We are born like this.

The Brain and Evolution

To conclude this chapter, we will look very briefly at some writings on the brain and evolution that throw light on possible mechanisms that underlie our musical dancing natures.

Recent neurophysiological findings suggest a mechanism that allows us to 'read' the movements of another. Neurones have been identified in both monkeys and humans that fire according to particular meaningful actions of the hands and mouth, rather than with the individual movements that form them. The neurones are categorised on the basis of the specific action that causes them to fire. This action can be as specific as grasping with the index finger and thumb. Di Pellegrino, Fadiga, Fogassi, Gallese and Rizzolatti (1992) have shown that a class of these same neurones, which they called mirror neurones, fire when the same action is observed being performed by another – the mirror system represents in an observer the actions of the other. And as might be expected, an increase in motor evoked potentials has been measured in the muscles of subjects that would be used in the production of an action that they are observing (Fadiga, Fogassi, Pavesi, and Rizzolatti, 1995), but an actual movement in the observer is inhibited. The above research concerns visually observed actions, but the principles of 'mirroring', or *sympathetic motor response*, are amodal – they will probably apply equally to any other activity of an organ

of sense by which the vitality contour or 'sentic form' (Clynes, 1980) of a movement may be apprehended. Indeed, it has been shown that in the monkey audiovisual mirror neurones code actions independently of whether these actions are performed, *heard*, or seen (Kohler, Keysers, Umiltà, Fogassi, Gallese and Rizzolatti, 2002). It is probable that our mirror neurone system lies behind our affect attunement and empathetic responses (Wolf, Gales, Shane and Shane, 2001), and may be an important part of our appreciation of dance (Stevens et al, 2001). It is also supposed that the mirror system was the evolutionary basis for language, suggesting that gesture was the precursor to symbolic communication (Rizzoloatti and Arbib, 1998; Tomasello and Camaioni, 1997).

This ability to mimic**,** to 'join in' and sympathise with another's gestures, is also supported by the existence of an internal body schema. In the neuropsychological literature, a specific body schema device has been invoked to explain a variety of spatial disorders after brain damage, and Reed and Farah (1995) propose that this body schema, from evidence from those without brain damage, is supramodel, applying to visual and proprioceptive inputs, being used both for encoding the body position of the self and the body position of the other. This hypothesis supports the role suggested for mirror neurones.

Turning to the evolutionary literature, Jaak Panskepp believes that the intrinsic emotional sounds that we make may be the basis for music in addition to "the rhythmic movements of our instinctual/emotional motor apparatus, that were evolutionarily designed to index whether certain states of being were likely to promote or hinder our well-being" (Panskepp and Bernatzky, 2002). These instinctual emotional sounds and movements underpin Merlin Donald's notion of mimesis (Donald, 1991) – the ability to act, dance and sing a narrative of experiences and emotions by moving the body with expressive rhythm, depicting absent or imaginary events. Donald hypothesises that this would be a necessary first stage in the evolution of the human mind that would prepare the way for language and symbolic thought. Donald hypothesises that mimesis would need to come from an ability for voluntary recall of memory and for reviewing and refining one's own actions. Thus, according to Donald, our evolutionary ancestors began to 'mime' situations on the principle of perceptual resemblance (e.g., a hunt). Mimesis is essentially metaphoric, and Donald imagines that with mimesis came the ability for humans to understand each

other's acting as a dramatic message – an ability essential for the existence of music and dance.

An evolutionary suggestion for the origin of our ability to act rhythmically together – something that musicians and dancers do all the time – is supplied by Bjorn Merker (1999/2000) who suggests that male synchronised chorusing activity (chorusing and possibly moving together around a regular beat), occurring in a common evolutionary ancestor to chimpanzees and humans, may have been used to enable the sound of the group's vocalisations to travel further (due to sound amplitude summation) in order to advertise the presence of food, and to attract wandering females. This behaviour would increase mating opportunities, but discourage other males as the synchronised chorusing would suggest a large organised group. The attraction of females would have made this ability sexually selected. Merker's evolutionary theory for music and dance stands as a male balance to Ellen Dissanayake's suggestion that music and dance come out of mother-infant interaction (Dissanayake, 2000).

In conclusion…

Humans, of all ages, not just infants, need to have their impulses of sympathy attuned to by others. This is the basis of companionship. Humans need to share experiences and skills in order to make sense of them. They need to feel pride in accomplishment and to experience the admiration of affectionate, generous companions (Trevarthen and Malloch, 2002). Music and dance are particular cultural substantiations of this need to share sympathetically with others. The means we use to share is gestures of voice and body, as well as language. The vital non-linguistic gestures, created within our common mind time, allow us to share time together in emotionally meaningful ways without the complexity of words. We instinctually sympathise with these gestures. Given that we are born needing to reach out and communicate with others, it is no wonder that this gestural impulse should lead to the creation of great artistic accomplishments as well as simple ways of sharing our innermost thoughts and feelings. We will continue to reach out to each other through music and dance – to do otherwise would not be human.

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