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Vol 3(1), March 1, 2003  
mi40003000116

## The Musical Nature of Human Interaction

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### Introduction



Experience from clinical work with congenitally deaf/blind children (Daelman, Nafstad, Rødbroe, Soriau and Visser 1996; Hauge & Hallan Tønberg 1996, 1997; Nafstad 1996; Nafstad and Rødbroe 1999) has generated questions about the qualities being exchanged in basic togetherness independent of sensory modalities. How is this basic togetherness created between congenital deaf/blind children and their seeing-hearing partners? Is it possible to talk about universal qualities or features in basic intersubjectivity that function across sensory modalities? Questions related to the nature of basic togetherness independent of sensory modalities address issues that seem to concern many professional fields exploring human interaction or intersubjectivity in general.

Traditionally the field of deaf/blindness has been closely related to academic disciplines such as special education, psychology and medicine. Theories from these disciplines have been applied to generate increased knowledge related to phenomenon such as interplay, communication, language and meaningmaking. However, experiences from clinical work in the field of deaf/blindness within the last decade have led to a need for broader knowledge. Collaboration between European networks and different scientific societies have led to a professional context where fields like musicology, cognitive linguistics, social anthropology and other cultural sciences seem to be significant.



Studying human interaction needs an interdisciplinary approach and may be studied in a context where the patterns and exchanges are more or less purely cultivated as for example co-improvisational music and dance. According to Schefflen (1982), music and dance represent significant ever-present aesthetic sources for gaining insight in the role of rhythm and temporal regulation in human interaction. These fields seem to be well fit to demonstrate human co-regulated interaction in its purest form. When focusing on the role of rhythm and temporal organisation of human interactive events, these artistic fields may generate knowledge from the pure cultivation of qualities and elements that seem to be significant regarding the establishment and maintenance of co-regulated human interaction patterns. In the following, we will shed light upon these questions and perspectives about the basis of an interdisciplinary approach including modern developmental psychology, musicology and experiences from music therapy.

As the literature in modern developmental psychology shows, a process towards a paradigmatic shift in theories concerning the development of communication in children started in the 70's. This includes a shift of attention, and, as described in Nadel and Camaioni (1993) the theories developed from an *emit/receive/answer telegraphist model of communication*, towards an *orchestra metaphor model*. The latter model focuses on harmonisation, improvisation, joint activity and co-regulation as prominent qualities. The orchestra metaphor invites the use of musical terms as rhythmicity, harmony, theme with variations, shared beat and musical improvisations and leads our attention to certain qualities in co-creation of non-

linguistic human interaction. The introduction of the orchestra metaphor and the musical terms within it can hardly be occasional, but most likely reflects basic structural characteristics of communicative exchanges in interpersonal processes.

## Biological and Social Capacities in the Human Organism

Different studies form the basis for implying that social interaction rhythms are biological conditioned and that they resemble the tempo-patterns that are characteristic for biological systems, such as crying, sucking, spontaneous movements, sleep- and awakening periods, pulse rhythms, cardiac rhythms, respiratory and brain activity (Chapple 1982; Lester, Hoffmann and Brazelton 1985). It seems that the human infant is born with a species-specific competence or biological capacity that may seem important for perceiving the temporal structure of their social and emotional world (Stern 1985; Trevarthen 1992, 1993, 1998; Trevarthen, Kokkinaki and Fiamenghi Jr. 1999). We also suggest that rhythm is one significant aspect in this basic human competence. More precisely, *rhythm, movement, structure* and *time* therefore seem to represent significant features according to the organisation of affective human experiences. It is reasonable to assume that these basic human qualities are activated in the human organism long before birth. The fetus responds bodily to sound from the utter world, as the sound does not primarily reach the ears of the fetus, but the whole body. Sound therefore gives the fetus a total bodily experience, and the spontaneous movements related to the influence of sound may give rise to essential functions in the human organism after birth. The fetus is also exposed to the rhythm in the mother's heart rate and movements. The infant thus seem to be 'pre-designed' for perceiving rhythmic patterns that provide a structure for organising cognitive and affective experiences in human interactive events. Comprehensive research states that musical qualities such as rhythm and tempo seem to be significant components in the very early prelinguistic interaction in normal parent-infant dyads (Beebe et al. 1982; Papousek and Papousek 1981, 1989; Stern, Jaffe, Beebe and Bennet 1975; Stern 1982, 1985; Stern, Spieker and MacKain 1982; Trevarthen 1985, 1988, 1992, 1993, 1998, 1999). Interactive and cognitive functions of rhythm changes and temporal timing in vocalisation and gestures have been studied in terms of musical parameters (Beebe et al. 1982; Stern 1982, 1985; Stern, Beebe, Jaffe & Bennet 1975; Stern, Spieker & MacKain 1982). Musical elements in infant's vocalisation, and forms and functions of vocal matching in interaction between mother and infant dialogues have been studied as well (Papousek & Papousek 1981, 1989). All these studies indicate that *co-ordinated interpersonal timing* seems to represent a characteristic feature in adult-infant interaction in the first months of the baby's life. But, it seems reasonable to assume that these features in human interaction do not disappear as the communicative competence develops, but more likely remains as dynamic qualities that express the vitality and passion in symbolic exchanges in general. According to Stern et al. (1975), alternating and unison vocalisations in infant-parent interaction seem to appear and develop as two different patterns with different structures and functions, and with different affective levels. According to this study, unison vocalisations seem to involve a higher affective level than in alternating vocalisation. These two patterns remain in the human communicative system, and it might be that acts in unison involve high affect levels, maybe because they are primarily based on non-verbal cues and are less based on linguistic exchanges? From this we may ask if these musical qualities represent universal non-verbal dimensions that create coherence in human communication in general.

## Musical Qualities in the Correspondence Between the Partners' Expressions

As already mentioned, modern infant-parent research during the last two decades have provided us with profound knowledge about the complex structural interplay in typical infant-parent dyads. Modern research technology has contributed techniques that make it possible to study different forms of coherence within the dyad. Analysing human interaction on a dyadic level means that we need to observe two persons at the same time. Dyadic interaction includes more than the sum of the two individuals' behaviour. A shift of focus from the behaviour of the individual to behaviour patterns and processes occurring between the two persons is then recommended. Thus, the dyad ought to be described and analysed as a unit rather than an action-response pattern, and in a way that processes information vertically (simultaneous utterances) and horizontally (over time).

Experiments by means of video-technology where the child is offered a video-replay of recent successful events of interaction between the mother and the child, show the significance of the coherence between the child and adult (Murray and Trevarthen 1985; Trevarthen 1985). When the child tried to interact with the videorecording he seemed to be distressed by the lack of

appropriate answer from the mother, and the child lost interest. These studies indicate the significance of the temporal correspondence or coherence between address and reply. We may then ask if tuning or harmonisation has to do with degree of correspondence between the child's expression and the adult's answer concerning parameters as rhythm, dynamics and tempo.

This kind of correspondence may also be described as contingencies. The concept of contingency seems to be used in different ways in different psychological traditions. For example, in the field of behaviourism (Skinner 1953:85) the temporal contingency is said to be the only important one. What follows in this contingency, or how this is brought about, is according to Skinner of less importance. Thus, qualitative aspects in interaction are not attended to procedures as for example operant conditioning. We suggest that it is too restricted to include only the temporal and causal contingency or correspondence between the child and the adult's behaviour, as these forms of contingencies overlook the significance of a *qualitative coherence* in the partners' utterances. It seems that basic human intersubjectivity includes correspondence between qualitative dimensions of the partners' expressions, such as *form, rhythm, intensity, tempo and duration* (Beebe et al. 1982; Nadel, Guèrini, Pezè and Rivet 1999 Stern, Jaffe, Beebe and Bennet 1975; Stern 1982, 1985; Stern, Spieker and NacKain 1982; Trevarthen 1985, 1988, 1992, 1993, 1998; Trevarthen, Kokkinaki and Fiamengi Jr 1999). All these parameters may be considered as significant non-verbal features that create dynamic temporal sequence and thereby allow alternation between tension and release, repetitions and variations, regularity and irregularities in acts of successful human interaction. The pure cultivation of such dynamic temporal sequences is perhaps best exemplified by the type of rhymes and babysongs that parents use to play with their infant. In such games, it is not the words or the linguistic meaning that creates expectations and excitement but the dynamic organisation of time and emotions. Expectations and excitement are organised in a specific form often characterised as a *narrative form*, as we for example find in fairy tales. Parents tell fairy tales to their children long before the child can understand the words as such. But even if the child does not understand all the words, she "understands" the dramatic organisation or structure.

## Experiencing Subjective Time

Imberty (1997:13) supposes that there is a structure that could be called "...proto-narrative, time-organising in the successive alternation between tension and release, repetitions and variations, full, dense time and empty or dead time. A structure that exists before any narration, any story, an intuitive structure, which is sensed in the dynamics of the temporal flow, a structure whose essentially cognitive nature we have tried to demonstrate for a long time, but which also appears as a proto-organisation of emotions and feelings". The organisation of dramatic elements organised in time and form can be recognized in rhymes, song-games and it is reasonable to assume that when the child is exposed to these narrative forms she makes experiences that function as a condition for something coherent, meaningful and recognisable to take form in the child's mind, and further become living concepts that can constantly be revised.

Stern (1995:87) applies the term *temporal feeling shape* as a contour that can be "...viewed as a plausible representational format for schematising affective experiences". In this temporal feeling shape there is a dramatic plot with tension and release, repetitions and variations, sadness and joy - all the elements that we find in rhymes, babysongs and movement games. We may then assume that the human being has capacities for perceiving structural entities in depth that can be re-presented within another narrating modus, as for example rhymes and baby-songs.

Studies have shown that infants are able to transfer information from one sensory channel to another. Meltzoff and Moore (1977, 1983) argue that newborn babies can imitate facial expressions of the adult. It means that the infant is capable of receiving one impression via the visual sense and thereafter produce the same facial expression herself (even if she cannot see what she is doing). Meltzoff and Borton (1979) argued that transformation from the tactile sense to the visual sense can be seen in 1 month old infants. In this particular study the infants tasted nipples with different taste and texture (they were not able to look at the nipples).

Afterwards, visual preferential looking in the infants showed that the infant preferred to look at the nipples with the same form as the one she had tasted. This shows that information received through *touch* and *taste* of an object can be used for *visual* recognition of the same object. In the literature referred to above, this phenomenon is usually referred to as the *cross-modal-transfer hypothesis*.

Knowledge about the ability for crossmodal transfer in newborn babies gives rise to further hypothetical assumptions. Stern (1985: 51) use the term *amodal perception* and describes this phenomenon as a congenital capacity in the infant for processing sensory impressions in more than one modality at the same time. He maintains that it is not "...a simple issue of a direct translation across modalities. Rather, it involves an encoding into a still mysterious amodal *representation* which can be recognised in any of the sensory modes." Stern argues that it is not the sensory impressions themselves that are perceived by the child but rather some common qualities across the impressions. He describes these qualities as *forms, intensity and temporal forms*. This is what he describes as *abstract representations*. This ability does not seem to be dependent on only the visual and auditory mode, but involves the tactile mode as well.

Perceiving phenomenon that unfolds temporally seem to be a basic 'skill' that the infant needs in order to, for example, decode changes in the parents' facial expressions, read meaning from different movements or learn a language from a flow of sounds. Discriminating and understanding a temporal structure seems to be a basic and efficient competence in the newborn infant.

Stern et al. (1975) have studied the structural patterns in vocalisation in mother-infant dyads, and found two basic patterns in micro-level interaction, characterised as the co-action mode and the alternating mode. The temporal aspects of the interaction rhythms thus seem to organise the expressions into different patterns. Stern (1982) describes the rhythmic aspects in the regulation of interaction in mother-infant dyads, and assumes that these aspects are essential in the development of cognitive competence in the infant. Synchronicity in the exchanges of vocal expressions, describes one aspect in the basis for the development of dyads. Affective attunement by means of rhythm (timing and duration) and movement describes another aspect in the basis for the maintenance of togetherness in mother-infant dyads, e.g. expressed when the mother is rocking the child in a regular and slow rhythm.

However, Stern (ibid.) maintains that irregularities of rhythm are an essential structural aspects in the regulation of the interaction, and this aspect might demonstrate e.g. how infants create temporal expectancies. Irregularities in rhythm imply certain 'points' during the interaction where the system seem to change or break, and essential qualities related to the development of emotional and cognitive structures are developed through these irregularities. In play formats in mother-infant dyads, e.g. "I'm going to get you - game" we find these irregularities of rhythm demonstrated clearly. The mother, as Stern describes it, lengthens the 'waiting interval' in the structure of the game, and the child expects the mother's utterance to appear before it actually does. In this way the mother stimulates a cognitive operation in the infant by timing her action to a kind of mismatch between regularity and irregularity, a phenomenon that furthermore stimulates the child to explore. Those timing mechanisms represent an essential basis for how the infant in further development analyses behaviour and events in the world.

## **Narrative-like Gestalts**

This notion of the emergence of the child experiencing subjective time and form leads us to the notion of human narrative - a concept used and understood in different ways and 'levels'. Historically, we will find concepts in ancient Greece that harmonise with the dynamic qualities that unfold temporally as in narrative contours. For example, if we explore musical terms, as derived from the term *Mousikè*, we will see that this term includes much more than the term 'music', as understood in our Western culture. The term *mousike* also includes the Greek language, poetry and dance and the art of music. Taken together, these were all aspects of the same phenomenon, characterised by movement, temporal processes, dynamics, play and joint activity in an inseparable unity.

Phenomena that unfold temporally, and create 'meaning' through the temporal organisation, have given rise to phenomenological notions on subjective time in musicology and philosophy. The art of music has been lifted forward as an example of a qualitative consciousness of 'thickness in time'. St. Augustin (354-430) (Sundberg 1994), described how elements in music - understood as well-organised movement in time- contribute to a formation of our consciousness by virtue of what these movements represent for attention, anticipation and reminiscence. From this St. Augustin developed the notion of *expanded present*. By means of lifting forward perception of music, he showed how three dimensions of time are being actualised at the same time: the past of the presence (reminiscence), the presence of the present (attention) and the future of the presence (anticipation). By means of the concept reminiscence (*memoria*) St. Augustin tries to describe that a *gestalt* that unfolds temporally cannot be perceived and

undermined without the reminiscence. Thus, the perception of such a gestalt is experienced in time - we cannot take out one slice of a piece of music without destroying the whole.

So far, we have aimed at pointing to the musical qualities in a non-verbal interaction and how these are performed in narrative-like gestalts as rhymes and game/songs in typical infant-parent dyads. Our challenge is to explore how these elements can be 'translated' and mastered in clinical contexts where we are searching for scenarios that provide playful togetherness with congenitally deaf/blind people. Such scenarios may be established within the field of music therapy, and when the music therapist is supervising parents it is necessary to 'translate' knowledge about qualities in typical parent-infant dyads. It is important to show parents that even if the way of mastering rhymes and game/songs may look different because of the sensory loss in the child, they have the same function as in relations between parents and seeing-hearing children.

## Clinical Implications - the Improvisatory Style

In order to explore critical aspects concerning how to relate to the idiosyncratic expressions of the individual child with congenital deafblindness, the search for an entry to the improvised non-verbal interaction have resulted in the increased awareness of immediate imitation as a tool (Nadel and Pezè 1993; Nadel, Guèrini, Pezè and Rivet 1999), and the attendance to musical aspects in social interaction (Hauge and Hallan Tønnsberg 1996, 1997, 2000). The awareness of the improvisatory style as an important approach may have changed the clinical work from a primary verbal to a primary non-verbal and musical dimension.

Clinically, when working with atypical children (or adults) with idiosyncratic expressions, it seems that the competent adult partner is responsible for creating optimal conditions for this coherence to appear. An example of this kind of adult competence is described as for example attunement behaviour (Stern et al. 1985) which includes the adult's different forms of 'matching' certain qualities in the infants expressions, as rhythm matching. Stern et al. suggest that the clinical implications of adult attunement, or lack of adult attunement, might be considered when searching clinical tools for making idiosyncratic expressions more 'sharable'. That is, by matching certain qualities in the child's idiosyncratic expression, the child's contribution becomes the subject matter of sharing. Taken together, all the qualities or features in adult attunement represent dimensions of dynamic forms of interaction that are based on *dynamic improvisation* with respect to the ongoing expressions of the child.

This improvisatory and playful approach first and foremost has the child's own expressions as the 'departure', and represents a clear contrast to more rigidified traditional teacher-conducted 'programmes'. The improvisatory approach in clinical work, is, in our opinion, one important contribution from the field of music therapy relevant to other related fields in psychology and special education. The function of an improvisatory style on the micro-level of social interaction gives us the chance to incorporate the idiosyncratic expressions of the child into a dyadic and social community independent of topography, function or intention. From this we may assume that an improvisatory clinical approach, that enables the pure cultivation of aesthetic and non-verbal dimensions in human intersubjectivity might be characterised as the *art of creative communication*. The performance of the art of creative communication, when applied clinically, gives place for a joyful scenario that allows all the idiosyncratic expressions of the child to be significant as contributions to the co-created interaction (Hallan Tønnsberg and Hauge 1997; Nafstad and Rødbroe 1999). In order to make these idiosyncratic expressions more 'sharable' the adult has to leave the cultural conditioned 'glasses' and respond to the expressions independent of topography but according to their qualities. The adult simply has to recover his talent for creating narratives, for creating temporal forms that organise variations in mood, tension, pulse and rhythm in a dramatic and multimodal way together with the child. Experiences have shown us that it ought to be some kind of expression in the child, for example movement or sound, that serves as the first 'theme' in the subsequent interaction.

In this *socio-dramatic communication* (Trevarthen 1992) the partners negotiate 'shared meaning' by means of dynamic qualities. As microanalyses of mother-infant interactions has provided us with detailed knowledge about the creation of this interaction, the concept and foundations of human intersubjectivity have emerged. According to Trevarthen (1992:128)

"...transactions between human beings in society take place on a number of psychological planes, of which four, at least, may be distinguished as basic and universal".

"...risk-tempting, playful and humorous testing of the springs of interaction, communicated by teasing, mixed wickedness with affection. This playful intersubjectivity is responsive to ritual performances initiated by a partner. Intuitively, with or without cognitive or symbolic elaborations".

Traditionally, such playful and dramatic co-action has not always been considered as 'serious' in special education. Still, this field is influenced by the 'education-perspective' that focuses on training of specific skills. Strategies for intervention that have focused on communication have traditionally been based on operant conditioning procedures where the child learns to produce simple words or signs in order to influence the social or physical environment. However, improvised and human interactive games do not always have any other goal than the moving along process itself, thus learning is not explicitly the goal of the play but might appear as a by-product. In other words, there might be a defined goal, but the way to reach the goal is not prescribed. Such games demand improvisation and a lot of spontaneity, creativity and ability to stay in the moment, in the adult partner. Schön (1987: 15) describes the ability to take part in co-creative improvisation as the performance of professional artistry,

"... it is no accident that professionals often refer to the 'art' of teaching or management and use the term artist to refer to practitioners unusually adept at handling situations of uncertainty, uniqueness and conflict".

It is our assertion that if knowledge about human interaction from modern developmental psychology is to be taken seriously in the field of education, we have to focus more on creative co-activities that can introduce the children to their potential for creative participation in frames of joyful togetherness. In that way we can develop a clinical practice that truly reflects theoretical knowledge.

## Closing Comments

On the basis of modern developmental theory we have implied that correspondence between a child's utterance and an adult's answer in basic social interplay comprehends *more* than just a temporal and causal link. We state that in analyses of prelinguistic social interplay it is necessary to bring in various other dimensions of contingencies. Experiences from clinical work show that one important feature in successful social interplay is the adult's contingent answer on the child's utterance. However, we can also observe certain common features indicating that *how* the adult answers is not occasional. The establishment of basic prelinguistic social interplay also seems to comprise dimensions in answer forms that are attached to rhythm, tempo, duration, and form. Qualitative similarities between the child's utterance and the adult's answer seem to represent significant conditions for the establishment of the dialogue. The establishment of dialogue patterns thus differs from traditional operant conditioning procedures in a way that the adult's answer in such procedures does not have to have qualitative similarities with the child's utterance.

As we have seen, the significance of temporal regulation of human interaction has been emphasised in descriptions of typical mother-child dyads. Indeed, this theoretical contribution has clinical relevance in the search for intervention tools related to atypical children. However, a clinical approach including those theoretical aspects should be adjusted to the individual child, and magnified and dramatised as well. The musical aspects operationalized into categories as rhythmicity, tempo and timing may give us the chance to study video sequences of interactional events in order to identify more precise target areas of intervention, and we will be able to see if our intervention had any effect on the target area. As an example, the regulation of rhythm may be identified as distorted if the adult is unable to tune into the rhythm of the child when the tempo of the child seems to be irregular or chaotic. Or, if the adult is timing her responses in the way that she loses the child's attention, intervention in this area is required as well.

If it is reasonable to state that the temporal organisation or timing mechanisms within interpersonal processes represent critical qualities to promote and maintain relationships between the partners, this point raises questions about the role of music used in therapy. As music therapists, the focus of our attention within interactional processes seems to differ with regard to the competence and developmental level of the child. In this paper, focus on music or on musical aspects is related to the promotion of prerequisites for interaction for social and communicative development. Thus, intervention strategies based on regulatory mechanisms



within interpersonal relationships then seem to represent a different approach compared with therapeutical processes where the child, or adult, have acquired necessary social and communicative competence. For instance, interpretation of the musical expressions and content within interactional processes, understood as expressions perceived through the ear, seems to have secondary relevance in contexts where the developmental level of the child primarily force us to focus on timing mechanisms, constructing the structural qualities of functional social acts and social interaction as such. However, it is reasonable to believe that focus on basic musical aspects in human interactional processes is also significant in therapeutic intervention aimed towards more social and communicatively competent partners. With focus mainly on musical (understood as something perceived by our ear) skills, musical content, musical expressions and musical interpretation, we would argue that as music therapists we are at high risk of overlooking basic and important aspects in developmental processes aiming at increasing qualities in interpersonal relationships. Improvised socio-dramatic human interaction is based on a multimodal regulation principle where vocalisations, gestures, movements, sight direction and mimics all appear as equal components. Creative improvisation seems to be significant for the composition of elements of process of each event of unique human interaction. Clinically, it seems to be necessary to cultivate the variations in the musical parameters that constitute the dynamic qualities within the improvisatory style in order to establish the kind of intersubjectivity that leads to more advanced interaction patterns.

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**To cite this page:**

Hallan Tønnsberg, Gro E. & Strand Hauge, Tonhild (2003). The Musical Nature of Human Interaction [online]. *Voices: A World Forum for Music Therapy*. Retrieved from <http://www.voices.no/mainissues/mi40003000116.html>

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