

## How does children's music making affect language and communication?

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### ABSTRACT

Low educational achievement is a risk to become socially excluded. What can music education contribute to children's education? There is increasing evidence that children benefit from regular and playful musical stimulations from early in life. Among the beneficial domains are language and communication. A brief review on recent studies is given. Next, some problems related to traditional and static concepts of music and language are discussed. After outlining general theoretical assumptions about music and language, the earliest and simplest way of engaging in music and language is the main focus. Song singing and rhyming are both musical and linguistic. Both are founded on play; singing and rhyming are both playing with the timing of sounds in a generic way that is lacking in ordinary speech. Of central importance is the underlying emotional wellbeing related to these activities. Further studies into the co-evolution of vocal musical and linguistic communication should emphasize related emotional states.

### Introduction

The EC-funded *Usability of Music for the Social Inclusion of Children* (UMSIC) project has its focus on educational issues, based on the view that low school attainment increases the risks in other domains of social exclusion. The technical tool in music that we are designing, termed the *JamMo* (jamming mobile), aims to support children's processes of social inclusion through the use of new music technology. Our hypothesis, based on a range of literature sources (see below), is that the acquisition of skills, knowledge and understanding in digital literacy and music have beneficial effects on children's general education and on their social integration. Young children are highly motivated both to play music and to learn how to handle and master technical tools. These activities are founded on play, and playing is one of the most important experiences that humans engage in to explore, share, learn and understand (e.g. Barrett, 2003; Cross & Woodruff, 2008; Trehub, 2009). Play also fosters integration into their culture.

What and how can 'music' contribute to improve children's education? Since language and communication play a crucial role, my specific interest in this context is the relationship between musical activities, language, and communication.

Numerous researchers investigated effects of music on intelligence (for a recent overview see Jäncke, 2008) and other domains. Some of these studies were motivated to gain arguments in favor of music education. Questions in the following form: 'Does music enhance intelligence'? imply conceptual problems: What is 'music', what is 'intelligence',

and what is the relationship between the two? These and other concepts like 'language' are highly abstract and require some kind of operational definitions. First, I give a brief and general overview about research on effects of music. Next, I address some problems related to a certain understanding of music and language. Then, some general assumptions about music and language follow. Last, I will focus on song singing and poetry in the form of children's rhymes. The two are the earliest and seemingly 'simplest' traditional cultural form where music and language *sui generis* merge. I argue that these early vocal games facilitate and support language development.

The goal of this paper is to draw attention to a domain that would be fruitful to pursue.

### Music, language, and the brain

There is increasing evidence that musical training influences brain structures and functions (e.g. Schlaug & Chen, 2001; Münte, Altenmüller, & Jäncke, Gaab, Gaser, & Schlaug, 2006; Imfeld, Oechslin, Meyer, Loenneker, & Jäncke, 2009). For two reasons the brains of musicians have become the favorite model to study brain plasticity: i) professional musicians usually started their musical training during childhood, and ii) music making implies wide ranged and complexly organized experiences.

Especially the relationship between language and music attracts a lot of attention (e.g. Patel, 2008; Besson & Schön, 2001; Brown, 2000). Without going into detail of possible methodological shortcomings, recent studies have shown that engaging in musical activities has a range of beneficial effects to other domains (e.g. Schlaug, Norton, Overy, & Winner, 2005; Fogear, Winner, Norton, & Schlaug, 2008). A study by Schellenberg (2004), for example, yielded a slight but significant improvement of children's IQ after musical training in comparison to a control group with training in play-acting. Reported transfer benefits also include aspects of verbal memory (Ho, 2003; Kilgour, Jakobson, & Cuddy, 2000), syntax (Jentschke, Koelsch, & Friederici, 2005), linguistic abilities (Moreno, Marques, Santos, Santos, Castor, & Besson, 2009), reading skills (Anvari & Trainor, 2002), memory for pitch (Gaab, Gaser, & Schlaug, 2006), cognitive development (Costa-Giomi, 1999), second language learning (Slevc & Miyake, 2006).

Evolutionary oriented studies are increasingly interested in the functions of music for social bonding (e.g. Freeman, 2000; Dissanayake, 2000; 2008). In early childhood, joyful musical games and rituals between caregivers and infants are a major

source for building up supportive and healthy social attachment and for stimulating language and intellectual development (e.g. Papousek, 1996; Dissanayke, 2000, 2008; Trevarthen, 2008). In addition, a large national study with 1,251 young children in the UK provide empirical evidence that those who are relatively more skilled and developed in their musical understanding and performance, such as in singing behaviours, are statistically highly likely to report themselves as more socially included (Welch, Hímonides, Saunders, Papageorgi, Vraka, Preti (2009). The authors conclude that enabling children to gain mastery in music through playful engagement will normally bring allied developments in their sense of social well-being and social inclusion.

### **Beyond similarities and differences between music and language**

There exist many attempts to describe functional and structural similarities and differences between language and music. Often, such approaches make the most complicated and most developed forms of language and music as the basis for study. Unfortunately, such comparisons lead to almost endless analyses because of the various possible perspectives and of the lack of an agreed upon definition of what constitutes the one or the other. As a consequence, isolate features of both are used to gain operational definitions of 'music' (e.g. single pitches, intervals, chords,) and of 'language' (e.g. words, grammar, syntax). Then, such decomposed features are used to investigate the subjects' perception or production of music or language. Many of the studies following this paradigm are highly sophisticated and impressive. Although there is an important function for inquiries into decomposed linguistic and music features, such approaches are misleading when we want to understand how music and language have evolved and how they are used, e.g. as signs to create meaning.

### **Isolated features? Static? Separate?**

The first problem is that focusing music and language as normatively determined and complete cultural systems and to compare them as such means narrowing the mind and excluding the phenomena as they appear throughout human life time. An alternative is conceiving of the human capacity and propensity to acquire and use both music and language as an open and adaptable system. Music and language are cultural semiotic tools that allow 'human beings to become distanced in relation to their immediate life contexts.' (Valsiner, 2003, p. 50). The second problem is related to first: the reference to cultural norms limits the scope and does not contribute to gain general, non-ethnic knowledge and principles on human linguistic and music communication. This means, for instance, a search for principles that are present in the case of each and every individual, or in other words, the search for 'unity in diversity'. 'The idea that the diversity of individual forms gives us evidence of general lawfulness is present in psychology from the very beginning of differential psychology.' (Valsiner, 2003, p. 77)

The third problem is the static view implied by studying the highest developed forms of either music or language. The solution is adopting a developmental point of view and taking into account that human musical and linguistic behavior change as life passes on. But so far in most cases where music and language development is studied from developmental points of view (i.e. as changes over time and as emergence of novelty), a fourth problem is obvious: they are studied as separate and isolated domains.

In the last section, I propose two domains or activities where the two are naturally linked as a transmitted cultural practice: singing and poems. But first, some general assumptions need to be declared that are relevant to a developmental view.

### **General assumptions**

Musical and linguistic abilities have the same evolutionary roots for bioacoustic communication. For the evolution of both of them, hearing, vocalizing and moving (e.g. gestures, dance) in social contexts are crucial. Communication between two or more individuals means to transmit or share information of any kind by means of behavioral signals. In this respect, any behavior – alone or in social contexts – may function as a means of communication.

The specific human characteristic of human thinking and communication is its symbolic nature (Cassirer, 1948; Bertalanffy, 2006; Deacon, 1996; Gehlen, 1940). A symbol system is established by a selection of elements from a rich source of possible expressive forms that are not fixed (e.g. vocal sounds, body movements, written signs). These arbitrary signs are transmitted by tradition, and are neither inborn instincts nor learned skills. They represent something, and they are combined by rules or conventions, and form a system for representing synthetic logical relationships among symbols. Are there general principles in how the huge range of vocal sounds is organized into systems of music and language?

Physical conditions and the level of maturation constrain the expressive potential. The search for musical universals is old (e.g. Stumpf, 1911). Lenneberg (1967) proposed categorical perception and categorization to be human cognitive universals, a position consistent with empirical studies in different domains. When infants listen to music or to directed singing, the sounds are a stimulation to form categories, but what the infant selects is still a mystery. Trehub (e.g. 1994) proposed the interval of a fifth with the ratio 3:2 to be universal, and later (2001) assumes that small integer frequency ratios may be universals. Ethnomusicologists tend to abandon any structural features as candidates for universals, but rather postulate that functional aspects of music to be universal candidates (e.g. Nattiez, 1977). Nettle (2001) thinks that universals do exist in musical sounds and music conceptualization and behaviour. He mentions that all societies have vocal music, some kind of instruments, some music that conforms to a meter or contains a pulse, have at least three or four pitches, some having a principle pitch interval of the size of a highly variable major second. He points to the prevailing ritual use of music and suggests that early human music was somehow associated with ritual. *The earliest and world's simplest music consists of songs.* Interestingly, widespread features are a short phrase repeated several or many times, with minor variations, using three or

four pitches within a range of a fifth (2001, p. 469). Arom (2001) offers some criteria for a general conception of music: intentionality, ritual, some temporal ratios, periodicity, symmetry, a set of contrasting pitches, ordered and simultaneous interaction between participants, repertoires. Nettle (2001) argues on a similar theoretical level as Arom (2001).

### **Children's vocal development: the roles of songs and rhymes.**

The infant learning to communicate must learn not only to utter the linguistic and musical sounds of her or his social environment, but also to order the sounds to fit the established patterns used by others. In their pioneer work, Papousek & Papousek (1981) micro-analyzed the early communication between infant and caregiver and described early forms of musicality in the preverbal phase. Prosody and melody are indistinguishable or identical. Caregivers intuitively attune their communication to the infant's integrative capacities. They use musical elements and rhythmical games to stimulate or calm a baby. Communication comprises a high rate of reciprocal imitation. Papousek (1996) describes intuitive parenting as a hidden source of early musical stimulation. She mentions the important role of the joyful sharing of vocal games. Dissanayake (2008) considers the mother-infant relationship to be an evolutionary source for human music.

Infant research showed that the beginnings of learning to communicate start very early in life. Infants are amazingly prepared, are highly motivated to adapt to both, verbal and musical stimulations. The counterpart is the parent's predisposition for 'intuitive parenting' that offers a child early and rich exposure to a target language, music, and all kinds of joyful games. The child actively learns to participate in various social activities. Most importantly, the mechanisms of early intuitive parenting serve to co-ordinate and regulate behavior and emotional states, to create moments of feelings of belonging together.

Infant directed singing and vocal games play an important role for affect regulation (e.g. de l'Etoile, 2006), and for creating and maintaining positive emotional states. Songs are not only 'the world's simplest style' (Nettl, 2000, p. 469), but also the first complex musical form the infant and young child is able to participate (early infant song singing, e.g. the analyses by Papousek & Papousek, 1981). Infant's early singing-like vocalizations are observed to relate to positive emotional states, e.g. of wellbeing or of playfulness (Stadler Elmer, 2003).

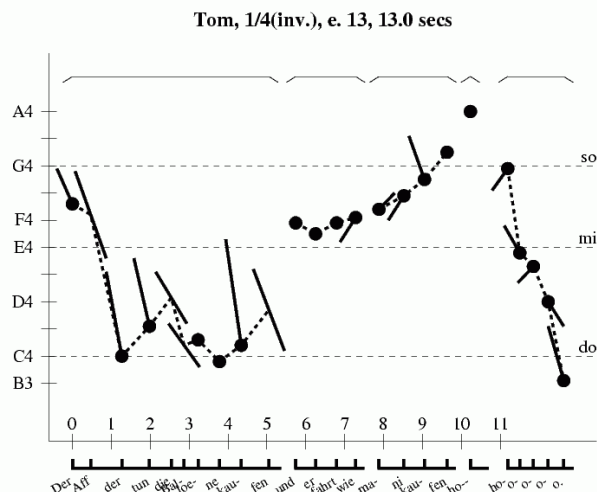
Singing, defined as the prolongation of vowels, is much easier than the articulation of words. There is some evidence to hypothesize that singing precedes speaking, and to speculate that infants that are sensitively musically stimulated (with infant directed songs, musical games, rhymes) have the advantage to use musical patterns to support their language use.

In order to underpin this hypothesis, I give some analytical and empirical arguments. Song singing implies lyrics. Melody and text are linked in a specific way and hierarchical order. It is mainly the temporal framework that keeps the two together. Usually, the melodic metre and the lyric's metre (jambus, trochee, dactyl, or anapest) synchronized, and both have the same duration. This is usually the case in traditional songs. But in newly invented songs, the accents in the two might be

different and need adjustments. This is just one aspect of a conventional rule of song singing in the western culture. Other rules concern the link between the syllables and musical pitches, and the phrasing. I do not go into more analytic details here, but given an idea of formal levels that are relevant for scientific analysis.

Figure 1 gives an example of a 4-year-old's spontaneous invention of a song while looking at a picture book. His lyrics is inspired by a picture; he tells what he sees, but some words do not have a conventional meaning but are neologisms that function to fill in the temporal framework, or more precisely, adjust the melody's metre with the one of his lyrics. Without being asked, this boy spontaneously combined new lyrics with a new melody. Young children often show such creative behavior. Davies (1986, 1992) provides detailed analyses of children's invented songs, focusing both, their lyrics and music. She says that this art form 'can bring out children's feelings which might not be explored in other ways.' (1986, p. 281). And: song singing 'can have a liberating effect, enabling the child to explore the imaginative use of language, which he might not do in speech alone.' (1986, p. 281).

Spontaneous songs of children in the pre-conventional phase do not yet follow conventional rules, but are idiosyncratic (Stadler Elmer, 2002, 2009). At the same time, the imitation or reproduction of songs, song fragments, and joint singing may be very accurate. But the limited song repertoire does not yet allow for generalizing conventional rules to new instances, inventions, and singing contexts. Children growing up in families with little or no child-directed musical stimulation focus the lyrics of a song rather than the melody, whereas children from musical stimulating families focus first the musical dimensions such as the timing and the melody (e.g. Kelley & Sutton-Smith, 1987; Stadler Elmer, 1998). For preschool children, the challenge in learning or inventing new songs is the coordination of the lyrics with the melody, and thereby especially the synchronizing of the timing or the metre of both, music and language. Song singing, reciting rhymes, dancing, and instrument playing are activities founded on play. The child has to develop an understanding of the functions of social rules in any kind of games (e.g. Piaget, 1973). The same is true for singing, for poetry, and for music making: the child must have lived through certain experiences and must be cognitively ready to reach a new quality of understanding of aspects of the social organization. Before fully understanding the conventional rules of song singing, the child changes any features according their own mood and egocentric conception of the social situation.



**Fig. 1:** Example of a spontaneous song invention by of 4-year-old. Analysis is based on acoustic measurements (Stadler Elmer, 2000, 2002).

Progress in singing development in any phase in childhood strongly depends on adequate stimulation in the family, on the national or local educational system, or even on individual teachers. Poor singing children have had little or no adequate stimulation during pre-school or school years. Research on singing development shows that singing abilities also depend on the difficulty of the tasks, on instructions, on models, and on learning strategies (e.g. Welch, 2006).

In the conventional phase, children have gained implicit knowledge and intuition about how musical conventions are integrated into their own singing or into creating own lyrics or poems. Their song reproductions and inventions follow the conventional rules, but yet without being able to conceptualise them at an abstract level (e.g. Stadler Elmer & Hammer, 2000). In comparison to the younger children, they clearly gain control over their actions, and they are able to reproduce and invent more complexly organised songs. The increasing control is obvious when they start correcting themselves, by that showing that they implicitly understand the conventional rules at the level of their actions. They learn fast, and they still spontaneously invent songs and thereby combine melodies with lyrics. Later, with more skills available, children become able to sing canons. Canon singing provides the challenge to focus the attention to both, the own singing voice, the delayed timing of other voices singing all the same melody and lyrics. A similar challenge is polyphonic singing.

## Conclusions

The question in the title: How does children's music making affect language and communication? has not at all a simple answer. I finish with summarizing some statements of which some have a speculative character.

From a certain point of view it makes sense to view music and language as two separate symbol systems which differ in their major functions: language serves as an economic communication tool, as means to represent thoughts and to symbolize meanings, and helps referring to objects etc. The various musics, on the other hand, represent the

psychophysical and mental worlds of sounds in time, are tools to create moods, to relate people, and to stir bodies. Blacking (1973, p. 99) said: 'the function of music is to reinforce, or relate people more closely to, certain experiences which have come to have meaning in their social life.'

In my view, an important and overarching question is: How do children learn to use the symbol systems of their social community? In my view, the most interesting phenomena related to 'music' and 'language' lies in the very early and common roots in infancy and the early caregiver-infant communication. It is possible that the more musical aspects – related to emotional states of wellbeing and play, experiencing temporal repetitions and variations, temporal regularities – have a supportive function for the more linguistic aspects: communication about basic needs, reference to objects. But maybe any separation into 'music' and 'language' related to early communication or to song singing and poetry is inadequate, because they are inextricably linked.

Music and language are just two among the many means to create feelings of belonging to a community. But both are special, not least because very young children are observed to be highly interested in the human voice, in communication, in music-linguistic games and in related rituals, probably because their communicative development from the earliest months of life is powerfully shaped by caregivers' intuitive parenting, 'infant directed' speech and singing (Papoušek, M., 1996; Papoušek, H. 1996; Trainor & Zacharias, 1998; Welch, 2005). It is the child directed human voice, with its repetitions and variations, prosodic or melodic features, temporal patterns, and exaggeration of positive emotional states that together attract the infants' attention and encourages them to join in and share. Of central importance is the underlying emotional wellbeing related to these activities. Participation in joyful collective musical experiences creates the feeling of belonging together, and hence, by generalizing such affective experiences (Valsiner, 2005), these feelings contribute to the building up of individual, social and cultural identities.

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