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TECHNOLOGY, SEN AND EY

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Introduction

In this chapter, we present a novel framework of musical development in the Early Years, which is informed by the now well-established Sounds of Intent (SoI) framework for the assessment of the musical development of children and young people with complex needs. Notwithstanding the novelty of the SoI paradigm, where the Special Educational Needs (SEN) world is now coming to inform the so-called mainstream world of Early Years (EY) education, we raise the importance of the conceptualisation of an extensible taxonomy of music educational technologies. We suggest that the theoretical framework of Sounds of Intent in the Early Years is a robust platform on which the proposed taxonomy can sit, and propose a way forward in developing such a taxonomy. We pose that this will lead to the decoupling from current practice that is believed to be tool-centric, often industry driven and not necessarily one that fosters critical thinking that places the child on the centre of the focus.

Sounds of Intent in the Early Years

The *Sounds of Intent in the Early Years* (SoI-EY) project set out to investigate the musical development of children to five years of age; it is an extension of the *Sounds of Intent* (SoI) research (Himonides and Ockelford, 2016), which explored how musical abilities and engagement evolve in children and young people with learning difficulties (see, for instance, Vogiatzoglou, Ockelford, Welch, and Himonides, 2011). At the heart of both projects is a putative framework of musical development that is grounded in theory and research, and is designed to be accessible and relevant to practitioners. Embedded within an online resource, the original *SoI* framework allows the musical abilities of children with learning difficulties to be assessed, in addition to offering teachers and therapists suggestions for widening children's musical experiences and to promote progress. *SoI-EY* was set up to explore the potential relevance of the framework in the context of so-called neurotypical musical development. Evidence is drawn from three sources: the psychological literature on the growth of musical abilities, observations of children engaged in musical activity and

"zygonic theory" (Ockelford, 2006, 2013)—a psychomusicological theory of how music 'makes sense' to us all, which also underpins the original *SoI* framework.

The Original Sounds of Intent Framework

The original *SoI* framework conceptualises children's engagement with music as occurring in three domains. These are *reactive* (children's responses to sound and music), *proactive* (children's creation of sound and music on their own) and *interactive* (children's interaction with others through sound and music). Within each of these domains, six levels of development are identified, ranging from a child seemingly making no response to sound or music or creating sounds intentionally, alone or with others (Level 1), to having the skills and knowledge of a culturally aware, technically advanced and expressive performer (Level 6). This vast range of accomplishment takes in all levels of musical engagement that may be observed within the population of those with intellectual impairment, from children with profound and multiple learning difficulties to young people on the autism spectrum, for example, who show exceptional musical skill. The six stages of the *Sounds of Intent* framework are outlined in Table 8.1.

The framework of musical development is depicted as a set of concentric circles divided into three segments, one for each domain (see Himonides and Ockelford, 2016 and also http://www.soundsofintent.org). Level 1 of the framework is innermost; Level 6 is on the outside. Segments are labelled 'R' (for reactive), 'P' (proactive) and 'I' (interactive), followed by the number of the level concerned ('R.1,' 'P.3,' 'I.4' and so on). The circular model provides the 'headlines' that define the columns in a matrix comprising more detailed descriptors of the types of musical engagement that may be observed—four for each segment.

Table 8.1 The six levels of musical development within the *SoI* framework, captured by the acronym 'CIRCLE.'

Level	Description	Acronym	Core cognitive abilities
1	Confusion and Chaos	C	No awareness of sound
2	Awareness and Intentionality	I	An emerging awareness of sound and of the variety that is possible within the domain of sound
3	Relationships, Repetition Regularity	R	A growing awareness of the possibility and significance of relationships between sonic *events*
4	Sounds Forming Clusters	C	An evolving perception of *groups* of sounds and of the relationships that may exist between them
5	Deeper Structural Links	L	A growing recognition of whole pieces, and of the *frameworks* of pitch and perceived time that lie behind them
6	Mature Artistic Expression	E	A developing awareness of the culturally determined 'emotional syntax' of performance that articulates the 'narrative metaphor' of pieces

vowel-like harmonic resonances (Legerstee, 1990). Again, these examples of proactivity and interactivity through simple pattern-making and imitation are characteristic of *SoI* Levels 3 and 4.

The emergence of short, distinct melodic phrases in children's singing is followed by the development of longer structures, created through repetition (Welch, 2006), variation (Hargreaves, 1986) and the coherent juxtaposition of motifs from diverse sources, forming so-called potpourri songs (Moog, 1968). These are gradually replaced by songs that have an increasingly secure tonal and metrical framework (Hargreaves, 1986). Rhythmically, the ability to synchronise to an external tempo has been seen to occur in children from the age of four (Provasi and Bobin-Bègue, 2003). In relation to the *SoI* framework, we see here a move from Level 4 (the repetition, transformation and coherent concatenation of motifs) to singing whole songs in time and in tune (Level 5).

Reviewing the *SoI* framework in relation to the literature on early years musical development as a whole, it is evident that there are no reports of children functioning at *SoI* Level 1 (no response to sound or music) or Level 6 (mature engagement). However, Levels 2, 3, 4 and 5 describe musical behaviours and forms of engagement that appear to be well established in the young 'neurotypical' population, and the literature provides a general indication of when these phases may occur. However, the rate at which children develop musically appears to be particularly sensitive to the environments in which they live and learn (Ockelford and Voyajolu, 2015). Tafuri (2008), for example, found that the ability to sing in tune may present itself much earlier than the age of five, suggested by Hargreaves (1986), given substantial exposure to high quality and relevant musical activities from the outset. This suggests that the stages of musical development may be layered rather than linear and have fuzzy rather than clear-cut boundaries.

The Sounds of Intent in the Early Years Research

Following the literature review, observational evidence of children in the early years engaging in musical activities was gathered to and compared to the descriptors in the original *SoI* framework, to ascertain the extent to which new data would support, extend or contradict the old model. The observations of infants, ranging in age from 10 weeks to 5 years, were made in a Children's Centre in South West London, serving the needs of local families with a wide range of socio-economic and cultural backgrounds. Video recordings were made of the children in action over a six-month period for two hours each week. These were supplemented with field notes that set out the broader contexts in which children's engagement with music occurred. Parental permission was granted for all children participating in the study, with an assurance of confidentiality and the opportunity to withdraw from the project at any time, if desired.

As far as possible, the researchers adopted a non-participant stance, although within the informal setting of the centre, with its emphasis on free-flow play, unsolicited interactions inevitably occurred. Data were captured on 58 children (25 boys and 33 girls), resulting in 125 separate observations. These constituted 'snapshots' of the children engaged in musical activity, either on their own or with peers or adults, spontaneously or within more structured adult-led musical activities such as circle time and informal performances by visiting musicians. Every effort was made to gather a broadly representative selection of material, without undue emphasis on particular forms or levels of engagement. The video clips were observed by a small team consisting of the second and third authors and an early-years

practitioner at the centre, who was also the parent of one of the children, and was not a music specialist. Brief descriptions of what was seen were agreed, and these were mapped, as far as possible, onto the *Sol* elements (see Himonides and Ockelford, 2016). Initially, it appeared that there were some instances of engagement that were not captured in the *Sol* framework. Following discussion, these were resolved as including talk *about* music (rather than participation in musical activity) or children occupying themselves in other domains, such as dance. Hence it seemed that the *Sol* framework was sufficient to accommodate all 125 observations, although the whole framework was not used. In particular, as was found to be the case with the literature review, there were no instances of musical engagement observed at Levels 1 or 6. Table 8.2 shows some examples of the observations that were made.

Table 8.2 Observations with corresponding *Sol* levels, children's age and gender.

Description of musical engagement	Child's age (months)	Gender	Sol domain	Sol level	Sol element
Appears transfixed as the recorder is played to her.	6	F	R	2	B
Explores the drum's surface, tapping it with his hands.	9	M	P	2	A
Has a go at strumming the harp after it has been played for him.	18	M	I	2	A
During an impromptu music session in the baby room the practitioner begins to chant a song about a bubble growing bigger and bigger before it pops. She repeats the word 'bubble,' each time getting louder and louder, before clapping loudly once, simultaneously exclaiming 'pop!' With each repetition of the word and increase in dynamic level the child gets more excited, jumping up and down, then clapping and squealing with the final 'pop!'	14	M	R	3	C
Plays a steady beat on the drum while he walks in the garden.	30	M	P	3	A
Plays the drum, copying her friend, imitating his changing beat as he plays faster and louder.	39	F	I	3	D
An adult spontaneously sings a short song made up of repeated phrases: "I can shake, I can shake, and I'm having lots of fun. I can shake, I can shake, can you?" The child copies her shaking movement and smiles at the end of each phrase.	17	F	R	4	B
Makes up a tune about the toy bird he is playing with, singing and repeating short phrases about the bird 'flying away.'	36	M	P	4	B

(Continued)

Table 8.2 (Continued)

Description of musical engagement	Child's age (months)	Gender	SoI domain	SoI level	SoI element
While playing with the blocks, a child begins to sing a short phrase. Another child picks up the tune and begins to sing as well, and they repeat the phrase back and forth as they build towers and knock them down.	47	M	I	4	B
A practitioner sings the song 'Roly Poly' for the children, a song they know well. The second time through, it is performed very quietly. One child listens through the whole of the first verse and joins in the actions the second time around. She appears to understand the structure of the song, sometimes anticipating what is coming next.	24	F	R	5	B
A child is singing, making up her own text about Santa Claus to the tune of 'Frère Jacques.' As she improvises the text, she changes rhythmic elements as well to match the words that she sings.	6	F	P	5	B
A new 'Hello' song is being sung to the children during circle time. A child joins in, singing together with the practitioner; with each repetition of the verse she sings more confidently in tune and eventually taps along in time as well as singing simultaneously with others in the group.	9	M	I	5	A

The Sounds of Intent in the Early Years Framework

An amalgamation of the full set of coded observations, the literature on 'neurotypical' early years musical development, the original SoI framework, and the principles of "zygonic theory" (Ockelford, 2006) were brought together in a first version of the SoI-EY framework (Ockelford and Voyajolu, 2015). Initial feedback on the potential viability of the new framework was obtained from two seminars of early years practitioners held in London in 2014. Two main findings emerged: first that the language (which was very similar to that used in the original framework) should be simplified as far as possible, since many of those who would be likely to use SoI-EY would not be trained musicians, and that the matrix of elements should be presented visually in a way that made the connection with the headline descriptors (set out in concentric circles) more explicit. The resulting representation of the framework is shown in Figure 8.1.

For example, Level 2, reactive (R.2) reads "[Children] show an emerging awareness of sound"; Level 3, proactive (P.3) reads "[Children] make simple patterns in sound intentionally"; and Level 4, interactive (I.4) reads "[Children] engage in musical dialogues using distinctive chunks of music." Element R.3.D is "[Children] link particular sounds with events, places or people"; P.4.C is "[Children] connect different chunks of music together"; and I.5.A is "[Children] sing or play pieces with others, sharing a part."
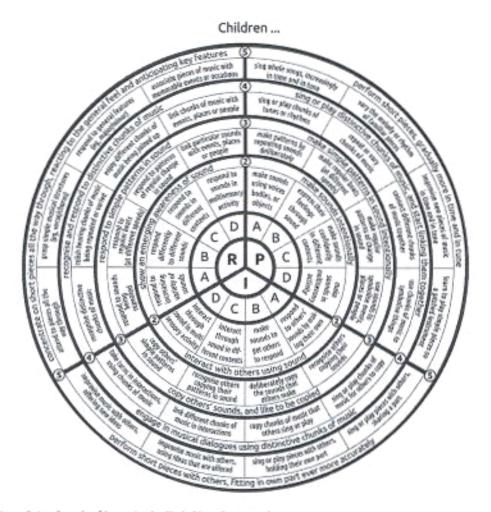
Children ...

Figure 8.1   Sounds of Intent in the Early Years framework.

As it stands, the *SoI-EY* framework is related to *stage* rather than *age*: the detailed analysis of the data from the project suggest that overarching areas of development may occur within wide age bands (Ockelford and Voyajolu, in press), with younger children in some instances demonstrating more advanced musical engagement than those who were older. It seems that children's musical environments play a crucial role in the rate at which they develop musically (cf. Tafuri, 2008). The data also show that levels may 'overlap,' whereby development at, say, Level 4 may begin for a child is fully competent at Level 3, and children may demonstrate musical engagement at more than one level simultaneously. For example:

S and H are sitting next to each other in the garden; they each have a drum. S taps her drum with a beater then reaches over and shows H how to do the same with his drum. She begins to play and H watches and copies. They play a simple duple pattern, although not always in complete synchronisation with one another (Level 3). While she plays, S starts to sing 'Twinkle, Twinkle Little Star,' with the correct words,

in time and in tune (Level 5). H copies the best he can, singing only portions of descending phrases, not yet using words, but following the melodic contour.

(Level 4)

Musical Environments and Contexts

The realisation that *environments* play a crucial role in children's musical development also reminds us that development and learning do not occur in vacuum; they take place within particular systems (or contexts) that are physically but also socially located. The existence of such systems and the various interactions and interrelations between their underlying components has been hypothesised by numerous educational thinkers, and represented schematically in different ways, with some scholars even claiming to offer theoretical 'models' of learning (i.e. therefore implying that they had fully understood, mapped and presented all underlying mechanisms). A popular theoretical approach towards understanding human actions is *Activity Theory* (AT), the development of which is originally attributed to thinkers Lev Vygotsky (1980) and Alexei Leont'ev (1974), and now widely associated with the work of Yrjö Engeström (2001) and known as *Scandinavian Activity Theory*, which is a hybrid theory somewhat more systematic in its approach and more closely aligned to cognitive science. Engeström's theory has proven to be sound but also convenient to utilise within narrower foci and more specific 'systems,' such as (from wider to narrower) Education (Roth, 2004), Music Education (Welch, 2007) and Technology Enhanced Musical Creative Development (Burnard, 2007). As Burnard (2007) explains:

> as with most sociocultural theory and practices, the starting point is the principle that individual learning is a social activity mediated by psychological tools (e.g. language and other symbols) and shaped by cultural artefacts (e.g. music, literature, computers), expectations, "rules"/conventions and norms as defined by membership of groups within a wider community.

(p. 45)

Welch (2007) similarly explains:

> In the upper part of the figure, Engeström presents a Vygotskian conception that the "object" of an action by (or on) a "subject" is culturally "mediated" by some form of "artefact." This model is extended in the lower part of the figure to encompass Leont'ev's perspective of individual and group actions being embedded in a collective, interactive activity system in which "rules," a sense of "community" and "division of labour" (division of effort) are also evidenced. In this model, the "object" of the activity is perceived as a cultural entity and the "outcome" may or may not be the same as the intended "object."

(pp. 25–26)

Sociotechnical Systems

In the present discourse, however, regarding the role of technology in the musical development of children in the Early Years, we propose that the focus is placed on the basis that we

are essentially working with a sociotechnical system (Trist, 1981). It would therefore make sense to rehearse the application of a theory such as AT with an emphasis on the interaction between the young *people*, the various forms of *technology* (i.e. tools, skills, methods, affordances, modalities, media and channels) and *spaces* (the learning, creative, collaborative and/or blended environments within which all activities occur).

This approach is closely aligned to Burnard's (2007) suggestion that

> through the myriad of systems exhibiting patterns of contradictions and tension, AT can make visible the relationships and structures within music participation and the roles and rules within practices. In this way, it has the potential to illustrate the key components of the relationship between creativity and technology as they develop in different learning communities.
>
> *(p. 46)*

Charisi (this volume) suggests, however, that a need has emerged for further investigation of young children's interactions and the dynamics of their music-making processes within the new settings that technological advances have introduced.

A Conceptual Synergy

We suggest that a conceptual synergy is therefore imminent in understanding the role of technology within EY musical development. We argue that the employment of the Sounds of Intent in the Early Years framework for the assessment of musical development of children in the Early Years can facilitate the systematic classification of technology's role. This will allow the decoupling from current practice that is believed to be tool-centric, often industry driven and not necessarily one that fosters critical thinking that places the child on the centre of the focus. Therefore, instead of sustaining current practice where parents, teachers and the wider educational sector usually strive to stay abreast of technological developments (or tools) and try to be creative in utilising those with their children, at home or school, we suggest that it would make sense to focus on understanding what is actually happening with the children's musical and creative growth, and employ, seek, develop or even aspire to conceive tools that can foster it. We also suggest that this cannot be viewed in a vacuum, and that the spaces/environments within which we assess cases should form part of the new taxonomy. An exciting amalgamation of the *space* and the *tool* is also presented elsewhere in this volume (see Zanolla et al., this volume), introducing the notion of *multimodal environments*; this offers novel insights in understanding the 'system' *child–tool–space*.

This paradoxical current praxis is not necessarily placing the child on the centre of the focus. We believe that Sounds of Intent in the Early years could be used as a theoretical pegboard onto which technological solutions could be pinned, thus allowing us to form a research-informed taxonomy of technology-supported musical development in the early years.

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