ASIA-PACIFIC JOURNAL OF RESEARCH
IN EARLY CHILDHOOD EDUCATION
Vol.14, No.1, January 2020, pp.27-48

ISSN 1976-1961
http://dx.doi.org/10.17206/apjrece.2020.14.1.27

Infants' Spontaneous Musical Behavior on the Basis of SoI-EY Framework

Youngae Lee[1)]
Korea National Open University

Sanghee Lee
SeoJeong University

Abstract

The purpose of this study is to introduce the SoI-EY framework and investigate infants' spontaneous musical behavior based on that framework. The SoI-EY framework is an instrument for investigating children's musical behavior and engagement. It was originally developed in England for children with learning difficulties, but a growing body of research using the SoI framework has been conducted throughout the world. SoI-EY was developed in order to explore the potential relevance for infants of so-called neurotypical musical development. We investigated three infants' musical behavior on the basis of that framework, gathering data by recording video over 13 weeks, then analyzed the total 1693 minutes of video. The frequency, average, and percentage of musical behavior were conducted based on three domains of the SoI-EY framework. We observed that Boy A ranged from Level 2 to Level 4 in the three domains, showing Level 2 overall, while boys B and C fit Level 2 in the reactive domain, and Levels 2 to 4 in the interactive and proactive domains. The results indicated that children of similar ages have different musical development levels, and that a child's environment, developmental level, and playmates can all influence the level of musical development.

Keywords: sound of intent, musical behavior, musical development, spontaneous behavior

Corresponding author, [1)] yaelee@knou.ac.kr

Introduction

Auditory perception is the first of the five senses to develop in a fetus, through exposure to the mother's voice and diverse other sounds, and it continues to develop after birth through auditory experiences. Similar to language development, musical development is a skill that all people acquire naturally unless they have particular disabilities. Depending on the environmental conditions we are exposed to, our musical development grows throughout our lifetime and is interlinked closely with our lives.

Compared to cognitive, social, physical and emotional development, for example, musical development has only recently become a subject to in-depth exploration. Researchers have speculated that this is largely because music was long associated with a gifted minority of people, and not viewed as an innate quality which all people possess, thus allowing hardly any study of the typical stages of musical development. In western countries, the mid-20th century saw an explosive interest in music education. This led to the spread of the idea that, similar to language, musicality is an innate quality that anyone can learn and develop, and one that should therefore be implemented in general educational systems. Since the acknowledgment of music as a skill for development, research has made many attempts to measure musical development. Researchers developed novel tools to probe this, and aimed their research to determine subjects' level of musical ability. An example of this is the Tests of Musical Ability which Seashore developed in 1919. It was one of the first tools still widely used in American schools to determine musical skills. This tool measures the ability of a subject to distinguish different tunes, dynamics, tempo, and tones. In addition, researchers developed different methods to measure diverse aspects of musical abilities. Gordon (1986) measured musical aptitude by determining the cognitive ability to differentiate rhythms and tunes, while Wang (1985) and Webster (1994) examined musical creativity, and Temmerman (2000) and Dence (2008) measured musical sensitivity. Individuals' musical preference is another aspect that has held researchers' attention.

However, Rutkowski and Kooistra (2016) have demonstrated criticism towards these tools' relatively fragmentary measures of musical ability, given the need to understand children's musical development from a dynamic and multifaceted perspective. Recent

research has made efforts to overcome the limitations of such methods. Rutkowski and Kooistra (2016) attempted to explore musical understanding in six spheres of musical understanding: non-related, related, approximated, imitated, integrated, and intuitive. Prior to this, UK-based Ockelford and colleagues (2010) developed a tool called Sound of Intent (SoI), to understand musical behavior in a multi-faceted way, as opposed to the existing instruments that measured a one-dimensional characteristic of musical abilities. They launched the SoI project in 2001, applying and systematizing it in a wide area of the UK, as a method to explore musical involvement and development in children with disabilities. The project targeted subjects with severe learning difficulties (SLD) and those with profound and multiple learning difficulties (PMLD). SoI's framework not only allows a way to understand the musical abilities of children with disabilities, but also helps to broaden teachers' and therapists' ideas, and to develop children's musical experience.

The SoI framework conceptualized the musical behaviors of children as occurring in three dimensions of involvement; reactive, interactive and proactive. "Reactive" refers to infants' reaction to sounds and music; "interactive" describes the ability to interact with others through sound and music; "proactive" refers to infants' ability to produce sound and music. Each dimension consists of levels or developmental stages ranging from one to six, where imitation is one of the most critical aspects.

These three domains and the six stages within each domain have developed through the analysis of hundreds of videos of children with learning disabilities. Observations on infants' and toddlers' musical development suggest that it is a multidimensional process, in which infants listen to music, respond to sounds, and make and control music, additionally interacting with others to make music. These findings conceptualized the aforementioned reactive, interactive and proactive areas of musical behavior.

Based on the SoI framework model for children with learning disabilities, Voyajolu and Ockelford (2016) developed the Sound of Intent in Early Years (SoI-EY) project, for musically-immature infants. The SoI-EY project started to explore the musical development of children from birth to 5 years of age. This project was an extension of the SoI framework, which had examined how children and adolescents with learning disabilities developed musical competence and participation. The focus of both projects was a possible frame of musical development at the basis of theory and research, designed

to be appropriate and accessible for teachers working in the field. The SoI-EY framework was designed to explore possibilities in the context of children's general musical development and to support it adequately..

Over the course of six months, the researchers observed 125 videos of 58 infants from 10 weeks to 5 years of age, based on the SoI framework. The pilot study reported that the stages of musical development could neither be subdivided into separate stages nor appear as independent domains (Voyajolu & Ockelford, 2016). Instead, there were ambiguities in the dimensions of musical behavior with overlaps among the developmental stages. The authors reported 2-5 musical development stages in young children and infants.

As mentioned above, musical talent is not a unique skill acquired by a minor subset of people, but an innately possessed quality that all infants can develop. Therefore, we predict that research in infants' and toddlers' musical development stages will continue to be an area of focus. Previous studies have critiqued the lack of tools for studying musical abilities in young children (Bang, 2009; Kim, 2016; Park, 2012; Yoon, 2014). They have also suggested a need for comprehensive tools that take into consideration the day-to-day experiences and context of an infant's musical development (Rutkowski & Kooistra, 2016). The SoI-EY framework was recently developed in the UK to overcome these limitations, and to provide a multifaceted means of understanding musical development. In particular, considering the importance of evaluating infants' behavior as a natural form observed in general play and life (Kim & Bae, 2016), the SoI framework was first developed to measure the musical behaviors seen in children with disabilities. In addition to children with disabilities, infants and young children have similar immature characteristics, both developmentally and musically. Based on the SoI framework for children with disabilities, Voyajolu and Ockelford (2016) adapted the SoI-EY framework in order to measure young children's musical abilities by categorizing musical behaviors in play situations as reactive, interactive and proactive. The SoI-EY framework can evaluate musical development in children without disabilities, and can provide teachers and parents with a wealth of information.

Previous studies investigating musical ability in young children utilized tools such as PMMA, portraying only a partial view (Jung, 2008; Jung, 2017; Choi & Jung, 2017; Hyun, 2005, 2009, 2010; Hwang, 2008; Hwang & Kim, 2010; Hwang & Kim, 2008). Such studies

were limited as they were not capable of examining the natural musical behaviors of children, showing a single-sided understanding of the more complicated picture. Other studies (Cho, 2015; Hwang, 2008, 2010; Kim, 2015; Kim & Hwang, 2010; Yoon, 2012;) approached infants' musical development through qualitative analysis, categorizing musical behaviors such as singing, playing with instruments, movement and listening. Aiming to determine which musical behaviors are most common, such studies were capable of qualitative analysis determining the characteristics of spontaneous musical behaviors. However, they could not compare the musical behavior of several infants on a common basis, nor could they repeatedly observe the musical behavior of individual infants in order to determine developmental progress.

Therefore, the purpose of this study is to introduce the SoI-EY framework as an evaluation tool for investigating musical development, and to explore infants' natural musical behavior. SoI-EY is capable of repeatedly observing infants' musical behaviors, and of exploring those behaviors from a multidimensional perspective. Although the SoI-EY framework has been applied to infants and toddlers in the UK, this is the first time it has been introduced in Korea. In particular, case studies in the UK were applied in single and structured situations, such as one-time observation or playing with adults, and thus it is necessary to assess whether it is possible to determine music development levels in a natural play-situation. To evaluate this, we investigated through observations on the spontaneous musical behaviors of 18-month-old infants in daycare. We divided their behaviors into the SoI-EY framework's reactive, interactive, and proactive areas, and their stages. We anticipate that the results from this study will provide preliminary data promoting research interest in infant musical development, as well as a multifaceted understanding of musical development supporting research facilitating early-childhood music education.

Method

Participants

The class of the participating children's daycare center consisted of six infants between

the ages of 20 and 27 months. Table 1 shows the genders and ages of infants in the class over the duration of the study (November 2015 to February 2016). At first, six infants consented to participate in the study, but three of them were frequently absent or late, resulting in a lack of observational data with potential to assess their musical behavior. Therefore, these three children were excluded from the study. Only three children ("A," "B," and "C") were continually observed for over six weeks, and the data were yielded for analysis using the SoI-EY framework, in order to determine their musical behavior and developmental levels.

Table 1. *Participants information*

		Months for study periods	Developmental feature
A	M	22~25	Able to understand and speak but slightly delayed in physical development.
B	M	27~29	Able to understand but not be able to express by action. To be introvert and obedience. Able to speak but not expressive.
C	M	20~32	Well developed in cognitive and language development. Very active and well done in most activities.

Instruments

SoI-EY framework

Voyajolu and Ockelford (2016) adapted the SoI-EY framework to measure the musical abilities of young children by categorizing reactive, interactive and proactive musical behaviors. Two experts in early childhood music education verified the validity of the content, and this was used as a standard point of analysis. The SoI-EY framework is divided into three areas (R, I, and P domains), and six stages. Each stage is further divided into four subdivisions (A, B, C, and D). However, we excluded this subdivision from our study because the subdivisions were marked by specific exemplars to guide teachers and observers, and they altered neither the six stages nor the three domains. Before beginning the study, two doctorate holders in early childhood education reviewed the evaluation methods by observing recordings not used for analysis. This was in order to verify the

appropriateness of the translated categories in observing and evaluating Korean infants. Both observers agreed upon a 96% appropriateness of the analysis method. Additionally, to ensure the reliability of the provided analysis, each observer repeatedly re-evaluated the recordings.

The three domains of the SoI-EY framework comprise a concentric spherical structure, where the first stage is the innermost and the increasing development corresponds to a gradual progression towards the outermost (Figure 1). The higher the level in each area, the higher the level of sound development, with the evaluated level representing the infant's current capability. Note that even if an infant does not show stage-two behavior when stage-three behavior is observed, it is assumed that they have the capability of carrying out stage-two behavior. However, various case studies have shown that a transition or migration to the next stage is possible beyond full maturity. Even if each stage is not fully reached, the next level of behavior may appear when a certain level of development occurs. It is therefore possible for young children to present behaviors across the range of stages from two to five concurrently (Voyajolu & Ockelford, 2016).

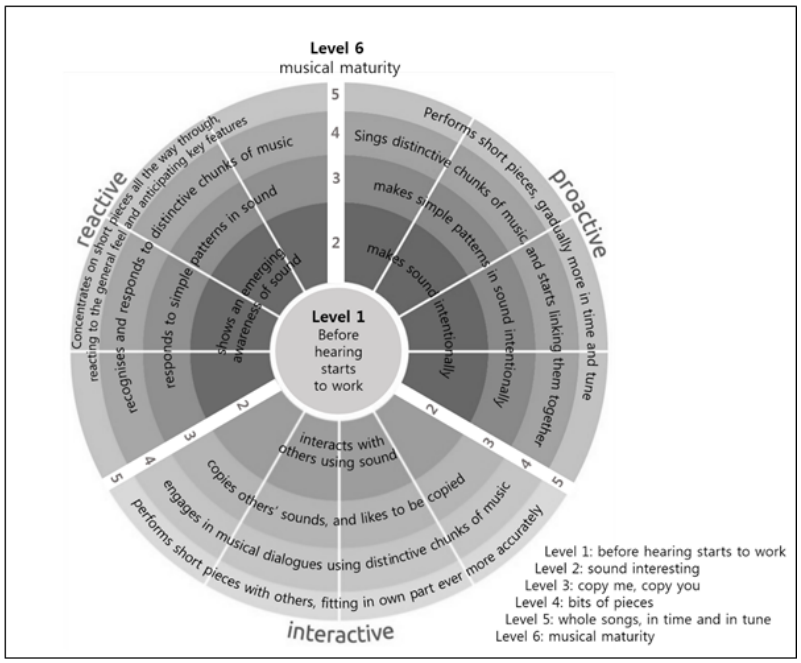

Figure 1. SoI-EY framework (http://soundofintent.org)

Evaluation Criteria

Figure 1 and Table 2 present the SoI-EY framework's evaluation criteria for infant musical activities, and Figure 1 displays the concentric circles utilized by the SoI-EY framework system. We evaluated the children's musical behavior by recording video footage of their natural activities and play situations, then by using an event sampling method through the recorded videos. During observation of the recordings, the stage and category of behavior were determined, and the highest level recorded was considered the infant's SoI-EY framework capability.

Table 2. *SoI-EY framework*

Level	Reactive	Proactive	Interactive
1	Before hearing starts to work		
2 Sounds interesting	Shows an emerging awareness of sound	makes sounds intentionally	interacts with other using sound
3 Copy me, copy you	responds to simple patterns in sound	makes simple patterns in sound intentionally	copies others' sounds, and likes to be copied
4 Bits of pieces	recognizes and responds to distinctive chunks of music	sings distinctive chunks of music, and starts linking them together	engages in musical dialogues using distinctive chunks of music
5 Whole songs, in time and tune	concentrates on short pieces all the way through, reacting to the general feel and anticipating key features	performs short pieces, gradually more in time and in tune.	performs short pieces with others, fitting in own part ever more accurately
6 musical maturity	usually occurs in adolescence		

Procedure

We proceeded with this study as follows. Firstly, we translated into Korean the SoI-EY framework selected as the analysis criterion for infants' spontaneous musical behavior. Three experts (a Korean-born UK primary school teacher, a Korean-American pianist based in the UK, and a Korean Ph.D. candidate in Education at a UK university) carefully examined the expression of each domain, stage and example. Secondly, to analyze the spontaneous musical behaviors of infants arising in daycare centers, we requested the cooperation of a daycare center for infants. After explaining the purpose of the study to the

parents in detail, we gained consent for video recording from the caregivers, and then took morning and afternoon video recordings of free playtime over 13 weeks with a focus on spontaneous musical behaviors. Thirdly, using the SoI-EY framework reviewed by experts, two researchers utilized the unused recordings for this research to train observers and increase observer consistency, and cases for each area were derived. Lastly, using the SoI-EY framework, we examined the musical development levels and behavioral characteristics of the three infants who had relatively few instances of lateness and absence.

Data collection and analysis

Data for this study were collected between November 2015 and February 2016. Over the course of 13 weeks, with the classroom teacher's consent, we recorded the children's musical domains during morning and afternoon free playtime. Excluding the recordings that did not display musical activities, a total of 169.3 minutes of video recording were used for analysis.

For analysis, we first collected and transferred all the data, and through repeated readings of the transferred data, we identified the behavioral characteristics representing the reactive, interactive, and proactive domains of musical behavior. In particular, to determine whether the extracted cases were representative of each dimension and to understand the meaning of particular behaviors, we exchanged continuous discussion, and determined appropriate examples while maintaining objectivity and reliability. If we observed one or more musical behaviors within one musical instance, we could double-check the domains and levels. Table 3 shows the representative examples, with each stage we observed.

Secondly, we calculated the sum of observation frequency for each region and stage after evaluating the three infants' developmental level of musical behavior based on the SoI-EY framework. Following the previous studies, we determined the musical development levels in the three areas using an averaging method for each musical dimension. In order to examine the tendency of the development level of the infants' spontaneous musical behavior, we determined the number of observations per stage as a percentage of the total number of observations made per infant, and summarized the results as concentric spherical diagrams.

Table 3. *The examples of musical behavior with each domain*

Level	Reactive	Proactive	Interactive
2 Sound awareness	*A observes the sounding toy car [R2]*	*"Tap, tap, tap-tap-tap, drag, tap (taps without any particular pattern.)" [P2].*	*C and A stand side by side shaking handbells and [I2]*
3 Imitation	*A pay attention to a regular beat or regular changing pattern (Do-re-mi, Do-re-mi)*	*A hits the mini drum with one hand, varying the sound by changing the strength of the beating [P3].*	*B copies A saying "Ah~ Ah~ Oh oh ah ah" [I3].*
4 Melody chunk	*A responds to D's vocalizing ("mababababa-mababa-" tune of twinkle twinkle little star) by rocking back and forth [R4].*	*C sings 'butterfly~ butterfly~ fly to me.'(daycare centernursery rhyme) [P4]*	*" At this time, A copies C singing "birthday to you~" [I4].*

Results

Spontaneous music behavior development level

Infant A (25 months)

A, who showed the widest range of musical behaviors during free playtime, displayed a total of 135 musical behaviors over the period of 13 weeks. The details of A's observed musical behavior, such as the frequency and the average level of his musical behavior, are shown in Table 4. Proactive behavior was most commonly observed in infant A, with a frequency of 68 (51%), followed by interactive behavior observed 45 times (33%) and reactive behavior, exhibited 22 times (16%). The highest average score was seen in the interactive domain at 2.5, followed by values in the proactive and reactive domains, at 2.3 and 2.1, respectively. These results indicate that A had predominantly mastered stage two, "showing interest in sound" and, as displayed on table 4, A had begun to enter stage four in all domains.

We observed the reactive behavior from stage two to four in A, and most of these were at stage two. Notably, stage-three and stage-four behavior was only observed in week three,

suggesting the behavioral level exhibited was influenced by the developmental level and characteristics of the other participants involved in the activities.

In the interactive domain, we observed behaviors ranging from stage two to stage four, and stage two behavior was consistent except for weeks five and ten (where no interactive behavior was observed), while stage three behavior was also frequent. Stage three of the interactive domain is where the infant reacts to musical behaviors and actively participates in musical activities by imitating the sounds of others, or inducing others to imitate their sound. The fourth stage of the interactive area requires utilizing distinct musical units to create a musical dialogue between individuals. Therefore, stage four was only observed in weeks 1 and 12, where particular musical activities involved singing short songs (a birthday party and singing "Happy Birthday" in week one; nursery rhyme time in week 12).

In the proactive domain, we observed musical behaviors of stage two or higher weekly, and singing at stage four in weeks 1 and 12. The SoI-EY framework evaluates behavior as proactive when an infant plays alone or explores musical instruments. However, when this

Table 4. *Musical behavior for A infant*

Week	Reactive			Interactive			Proactive			Frequency				Mean		
	R2	R3	R4	I2	I3	I4	P2	P3	P4	R	I	P	Total	R	I	P
1				1	1	1	2		1		3	3	6		3.0	2.7
2	2			2	1		6	1		2	3	7	12	2.0	2.3	2.1
3	5	1	1	5	6		12	5		7	11	17	35	2.4	2.5	2.3
4				1			6	1			1	7	8		2.0	2.1
5	1						2	1		1		3	4	2.0		2.3
6	7			2	2		11	3		7	4	14	25	2.0	2.5	2.2
7	1			2			2			1	2	2	5	2.0	2.0	2.0
8	2			3	3		4	2		2	6	6	14	2.0	2.5	2.3
9				6			2				6	2	8		2.0	2.0
10							2					2	2			2.0
11				3	1		3				4	3	7		2.3	2.0
12	1			1		2			1	1	3	1	5	2.0	3.3	4.0
13	1			1	1		1			1	2	1	4	2.0	2.5	2.0
Total	20	1	1	27	15	3	53	13	2	22	45	68	135	2.1	2.5	2.3

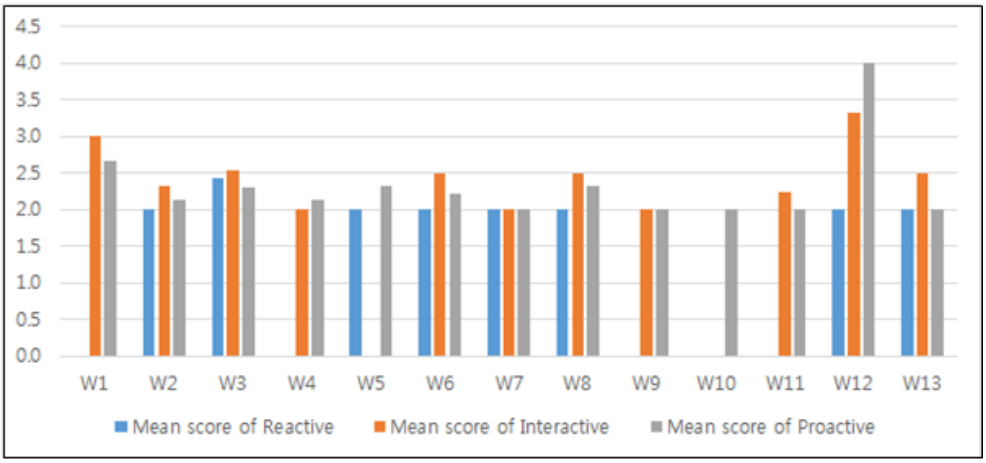

Figure 2. Weekly average for A child

evolves into playing with peers or creating harmony with the other infants, the proactive area can be linked to the interactive area. Figure 2 displays a bar graph of the average score for each weekly observation shown in Table 4. As shown in figure 2, the average weekly stage for all three domains is approximately two to three.

Infant B (29 months)

B, who showed the most response to musical behavior, exhibited a total of 64 musical behaviors during seven of the 13 weeks. Table 5 describes B's frequency of behaviors and average behaviors by week. The frequencies for the proactive, interactive and reactive domains were 32 (50%), 19 (30%), and 13 (20%), respectively. The mean level of each region based on the observed frequency was 2.6 for the interactive domain, which scored the highest of the three areas, with 2.2 for proactive and 2.0 for reactive. From these results, we concluded that B had mastered stage two of all domains, becoming interested in sound, and has reached developmental stage two for the reactive domain, and the beginning of stage four for the other domains.

B exhibited an awareness of sound, a behavior characteristic of reactive domain stage two, every week of the observation period except for three weeks. B also displayed interactive behavior of stages two to four, and a higher level compared to other infants of mimicking others, a behavior characteristic of the interactive domain stage three. Although

B only displayed reactive behavior at stage two, considering his higher level of interactive behavior, B was capable of perceiving and copying simple sound patterns. In the proactive domain, B exhibited behaviors of stages two to four, but most of the proactive behavior observed in B was "purposely creating sound," a behavior characteristic of stage two. Singing short songs, characteristic of stage four, was observed once in week two and once in week nine, and over time we observed an improvement in accuracy of pronunciation and tune.

Figure 3 shows a bar graph of the mean score for each domain during each week presented in table 5. As shown in figure 3, the interactive domain has a higher average score compared to the other two domains.

Table 5. *Musical behavior for B infant*

Week	Reactive			Interactive			Proactive			Frequency				Mean		
	R2	R3	R4	I2	I3	I4	P2	P3	P4	R	I	P	Total	R	I	P
2	5			1	3		7		1	5	4	8	17	2.0	2.8	2.3
3					1		1			0	1	1	2		3.0	2.0
4	3			4	1		7			3	5	7	15		2.2	2.0
6	2			1	1		3	1		2	2	4	8	2.0	2.5	2.3
8	1			3	1		5	2		1	4	7	12	2.0	2.3	2.3
9	1			1			3		1	1	1	4	6		2.0	2.5
13	1				1	1	1			1	2	1	4	2.0	3.5	2.0
Total	13	0	0	10	8	1	27	3	2	13	19	32	64	2.0	2.6	2.2

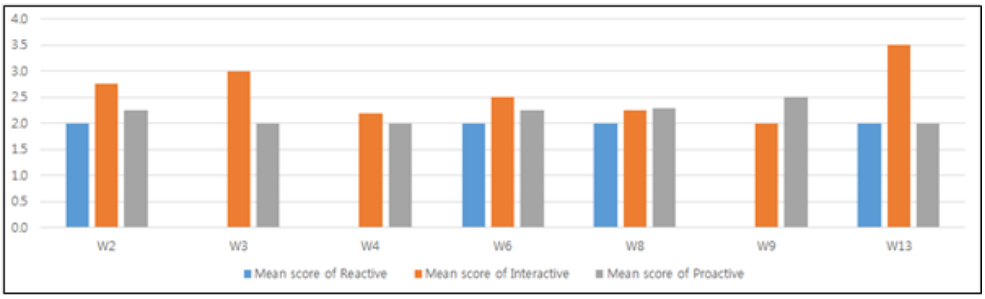

Figure 3. Weekly average for B child

Infant C (32 months)

C exhibited a total of 96 musical behaviors over the observation period excluding weeks five and six, and showed the highest number of singing behaviors. The details of our observations of C, including his frequency of musical behaviors and his average level, are presented in table 6.

Table 6. *Musical behavior for C child*

Week	Reactive			Interactive			Proactive			Frequency				Mean		
	R2	R3	R4	I2	I3	I4	P2	P3	P4	R	I	P	Total	R	I	P
1				1	1	1	1	1	2	0	3	4	7		3.0	3.3
2	2			1			4			2	1	4	7	2.0	2.0	2.0
3	3			2	3		8		2	3	5	10	18	2.0	2.6	2.4
4				4	1		6	1	1	0	5	8	13		2.2	2.4
7				3			3			0	3	3	6		2.0	2.0
8	1			2	1		3			1	3	3	7	2.0	2.3	2.0
9	1			6			1	1	1	1	6	3	10	2.0	2.0	3.0
10							6		2	0	0	8	8			2.5
11				3	1		4			0	4	4	8		2.3	2.0
12				2		2	2		2	0	4	4	8		3.0	3.0
13	1			1		1	1			1	2	1	4	2.0	3.0	2.0
Total	8	0	0	25	7	4	39	3	10	8	36	52	96	2.0	2.4	2.4

Behaviors in the proactive, interactive and reactive domains were observed 52 (54%), 36 (38%), and 8 (8%) times respectively. Infant C displayed only stage-two reactive behavior, and his average score for both the interactive and proactive areas were 2.4. Overall, we evaluated infant C as having mastered the "becoming intrigued by sound" level, characteristic of stage two, and beginning to enter stage four of the interactive and proactive domains. For C, only stage-two reactive behavior, "beginning to show an awareness of sound," was observed in weeks two, three, eight, nine and 13. Except for week 10, interactive behavior was observed in all weeks, and proactive behavior was observed in all weeks of observation. Of particular interest, in the proactive and interactive

domains, we observed stage-four behavior early on in the study, at week one. Of the studied children, C sang songs such as “Happy Birthday” “Three Little Bears,” “Butterfly,” and “Mr. Scarecrow” with the most precise tune. C's high level of proactive participation resulted in increasing levels of interactive behavior, for himself and the other infants.

Figure 4 shows a bar graph of the weekly average score in each domain. The graph shows that the average level for each domain remains relatively consistent over the course of the study, and that C showed a high score for interactive behavior from the beginning, maintained throughout the study.

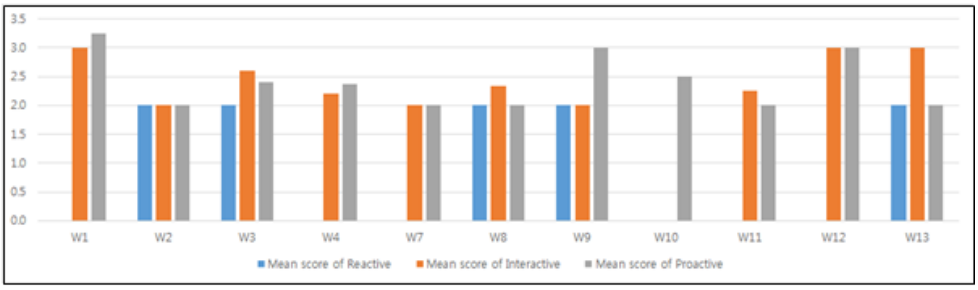

Figure 4. Weekly average for C child

Comparative analysis of the sound development level of the observed infants

The compilation and summary of the sound development of the three observed infants in the form of concentric spherical diagrams are presented in figure 5.

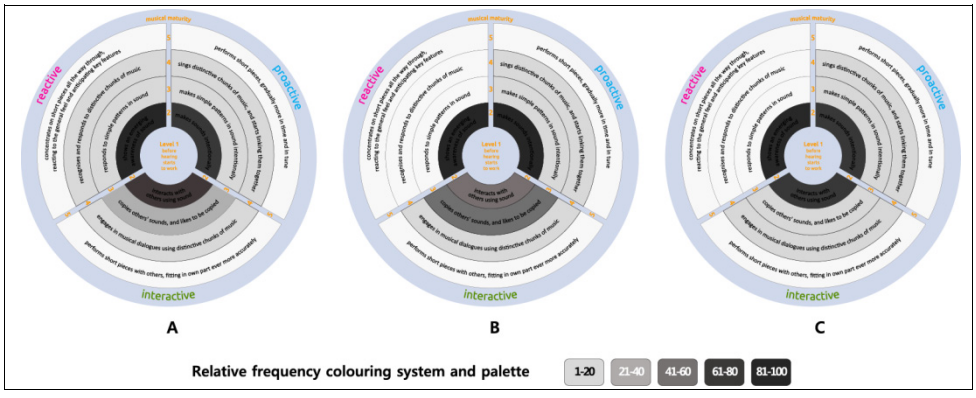

Figure 5. SoI-EY framework for three infants

Figure 5 shows the percentage of the musical development of A, B, and C, as observed over 13 weeks on the SoI-EY framework. The observation ratio is presented as a concentric-circle diagram. For example, in the concentric circles expressing the sound development of infant A,  represents stage-two reactive behavior composing more than 80% of his reactive behavior. Meanwhile,  represents the stage-two interactive behavior observed in A, in the range of 21-40%. Also, seen in stage three for all three domains shows that less than 20% of A's behaviors were observed at these levels, and sections represented in white indicate that no behaviors were recorded at those stages. Observing the concentric-circle diagrams for each infant, we can see that each shows unique patterns of development. In the case of infant A, the developmental stages for all three regions lie between stage two and stage four, predominantly localized in stage two. In contrast, for infants C and B, only stage-two behavior was observed in the reactive domain while the interactive and proactive domains ranged from stage two to stage four. These results suggest that the level of active participation from peers involved in play may influence the proactive and interactive domain results. In the case of the proactive area, infant A (stage two 77.9%, stage three 19.1%, stage four 2.9%) and infant C (stage two 75%, stage three 5.8%, stage four 19.2%) showed similar levels while infant B (stage two 84.4%, stage three 9.4%, stage four 6.3%) showed higher frequency at lower levels. For the interactive domain, B showed a higher level of interactive behavior compared to infants A and C.

Discussion and Conclusion

The purpose of this study was to analyze the spontaneous music behaviors of infants in the same class using the SoI-EY framework in the field of early childhood education, thus assessing the framework's applicability. The results of our study are discussed below.

Firstly, from evaluating the level of spontaneous musical behavior in one-year-old infants, we observed stages two to four in all domains (reactive, interactive and proactive). Infants are born with diverse musical perceptions (Trehub & Hannon, 2006) which they build on (Kim & Hwang, 2010) early in their development (Gordon, 1997), and our

findings using the SoI-EY framework supports this. Moreover, we show that infants become intrigued by various sounds (stage two), imitate others (stage three), and express short songs (stage four). We also observed the reactive, interactive and proactive domains of musical development from natural play situations. This observation allowed us to evaluate musical ability from a multi-dimensional perspective rather than evaluating a single measure of music such as musical perception, singing ability, or creativity. The results from this study confirm Kim and Lee's (2012) previous study, which showed that behavioral characteristics of singing made it not merely a vocal act but one involving physical movement and expression, similar to interactive play situations with peers. Also, our results are in line with Kang's 2017 study, which showed how musical experience for infants manifests as a result of physical, temporal, spatial and relationship awareness. These findings further emphasize the need to evaluate musical development using a multifaceted approach within the boundaries of an infant's natural play behaviors and day-to-day situations rather than by a single measure. Young children typically enjoy music and react spontaneously to it (Radocy & Boyle, 1997/2001), reacting to an object that makes a sound, or to a voice or an instrument that plays a tune, and forms of behavior like this belong to a reactive domain. As children enjoy imitating other people's behavior, or playing with others to create sound, their behavior can be viewed as partaking in an interactive domain. Similarly, actively exploring instruments to create and control diverse sounds is a good example of proactive-domain behavior. Infants' musical behavior appears naturally when infants concentrate in play situations (Radocy & Boyle, 1997/2001), and the development of musical abilities occurs in a multi-dimensional process (Voyajolu & Ockelford, 2016). The results of this study, and the results of previous studies, suggest that enabling infants to respond to sophisticated characteristics of music places them in a reactive domain. This can lead to interactive-domain imitation of the sounds, developing the proactive ability to actively express music through playing or singing which, in turn, leads them to interact with others on a higher level. This suggests that the spontaneous musical behaviors of infants are cyclical and repetitive, circulating through reaction, expression, and interaction.

Secondly, from examining the musical behavior of infants using the SoI-EY framework, we see that the overall developmental level for all domains was in the second stage and was influenced by the level of the proactive area stage of the other peers playing together. The

results showing differing levels of musical development in infants of similar age suggest that the development level of interacting peers, and the external sound environment, are types of activity that can induce higher levels of musical development.

In the present study, the overall level of development for all three domains being stage two can be interpreted as a result of the cyclical relationship of the three domains. This suggests the concentric circle structure of the SoI-EY framework is suitable for measuring the musical behavior of Korean infants. According to Voyajolu and Ockelford (2016), transitions between stages occur when an infant has reached a certain level at the lower stage and begins to show behavior respective of the next stage, and behavioral jumps between two or three stages can also be observed. Our results support this, as we mostly see stage two behavior but observations of stage three and four behaviors are available within the same week. The results of this study showed that the presence of a more advanced infant, or an adult, in a play situation allows infants to imitate the other's behavior and naturally practice behavior of a higher musical level, making it their own. This observation is in accordance with Vygotsky's study that showed having competent peers or adults providing hints, or verbal interactions, acted as an essential scaffold (Vygotsky, 1978). However, this study showed relatively different results from Voyajolu and Ockelford's (2016) study, which analyzed the SoI-EY framework of infants 10 to 52 months of age. Their study showed that infants between 21 and 51 months of age during free play situations would not show stage-two behavior, but stages three to five were observed, and even for infants 15-21 months old, stage five behavior was observed. These results show a much higher level of musical development compared to the infants we observed in this current study. However, this discrepancy in results is likely to be due to differences in experimental design. Unlike the current study, where the same infants were observed repeatedly over an extended period of time, the Voyajolu and Ockelford (2016) study observed infants over only one or two sessions. Additionally, instead of observing a class of similarly aged infants, Voyajolu and Ockelford (2016) observed infants in diverse situations and different play situations, introducing the difference from situation to situation of the people interacting with each observed infant. Even in the current study, reactive domain stage four was only observed in infant A, the only one who played with an infant showing a high proactive domain level. This emphasizes the important influence of

interacting peers on infants' musical development. Furthermore, we were able to demonstrate the use of the SoI-EY framework as a multi-dimensional tool for measuring the musical development of infants in a daycare free play situation.

The SoI-EY framework used in this study is advantageous in that it examines musical development stages in three multidimensional areas, rather than a limited single aspect. Another interesting finding of this study was that musical development may occur on a linear scale but could be a multi-phase process, where stages two to four were observed together. Stage four was observed early in the study and also in the later weeks of the study. Previous developmental studies suggested infants tend to predominantly exhibit behavior of a single stage at a particular age (expressed in months). However, our results support Vygotsky's view of the zone of proximal development, whereby developmental stages are not disconnected, but there is potential to expand from one stage to another. This implies there is a need to evaluate and understand musical development as multifaceted, but there is also a need to acknowledge latent developmental stages. The findings of this study show that when teachers use this tool, they do not need to concentrate on the numerical stages of observed musical behavior, but rather on the distribution of the interactive, reactive, and proactive domains. For example, if a child lacks proactive or interactive behavior, the teacher could strategize to create a less constrained environment and allow the infant to explore and interact in musical dimensions.

The limitations of this study and suggestions for future research are as follows. First, this study was a preliminary study, to examine the applicability of the SoI-EY framework tool in Korea. Therefore, only three small case studies at the individual-child level were conducted and, due to the small sample of only three participants' data, it is difficult to generalize the results from this study. A follow-up study, with balanced genders and a more extensive age selection, is required. Secondly, in the SoI-EY framework, when infants play alone, behaviors are characterized as reactive or proactive but when involved in parallel or interactive play, behaviors are characterized as interactive. This suggests that the type of play behavior shown in infancy may also affect music behavior. Therefore, in order to analyze the musical behaviors of infants in depth, further research is needed that will examine infant play development characteristics and music development systems together. Thirdly, since music development is a slow process where various stages can be observed

at the same time depending on the nature of play, we propose that this be used as a qualitative tool rather than as a quantitative tool. Here we investigated the musical development of infants through a novel concept called musical development, and we also investigated the possibility of utilizing the SoI-EY framework in the field of early childhood education in Korea.

References

Bang, E. (2009). Developing a test tool of young child`s musical propensity for teachers. *Korean Journal of Research in Music Education, 3*7(37), 61-84.

Cho, H. (2015). The effect of theme-oriented music programs for one-year-olds on infants" spontaneous musical behaviors. *The Korea Association of Child Care and Education, 94*, 163-186.

Choi, M., & Jung, H. (2017). The effect of musical ability of 5-year old children: According to the types of institutions, times, and methods of music activities. *The Korea Association of Child Care and Education, 102*, 51-74.

Dence, O. (2008). A case study of preschool children's musical interests at home and at school. *Early Children Education Journal, 31*(5), 439-444.

Gordon, E. E. (1986). *Manual for the primary measures of music audiation and the intermediate measures of music audiation: Music aptitude tests for kindergarten and first, second, third, and fourth grade children*. Chicago, IL: GIA Publications.

Gordon, E. E. (1997). *A music learning theory for newborn and young children*. Chicago, IL: GIA Publications.

Hwang, I. (2008). The relationship between music aptitude and attitude in two to three-year-olds. *Journal of Ewha Music Research Institute, 12*(1), 109-135.

Hwang, I. (2010). The relationships among teachers' self-perception on musical knowledge, music teaching efficacy belief, and infants' spontaneous music behaviors. *The Korean Society for Early Childhood Education & Care, 5*(2), 91-115.

Hwang, I., & Kim, H. (2008). The effect of appropriate music experiences on the musical aptitudes and attitudes of two year-olds. *The Korea Society for Early Childhood*

Education, 28(6), 65-90.

Hwang, I., & Kim, E. (2010). The effects of teachers' knowledge of early childhood musical education and reflection on young children's musical aptitude. *The Korea Association of Child Care and Education, 64*, 227-253.

Hyun, K. (2005). A study on music aptitude test for children from age 6 to 9. *Korean Society for World Music, 12,* 111-138.

Hyun, K. (2009). A concurrent validity study of kids` music aptitude test. *Korea Association of Arts Education, 7*(2), 53- 66.

Hyun, K. (2010). A predictive validity study of kids MAT. *The Korean Society of Music Education Technology, 11*, 101-119.

Jung, J. (2017). An analysis of the relationship between young children's musical ability, creative ability and cognitive ability. *Korean Society for Early Childhood Teacher Education*, *21*(5), 239-260.

Jung, K. (2008). *Influence of synthetic musical activity on children's development and musical talent* (Master's thesis, Keimyung University, Daegu, Republic of Korea).

Kang, E. (2017). A phenomenological study on the musical experiences of preschoolers. *The Journal of Korea Open Association for Early Childhood Education, 22*(1), 497-503.

Kim, E., & Bae, J. (2016). An ethnographic study on assessment of toddlers in two-year-old classes. *Korea Open Association for Early Childhood Education, 21*(6), 51-82.

Kim, E., & Hwang, I. (2010). The Relationship among Playfulness, Musical Attitude and Spontaneous Music Behaviors of Infants. *Society for Pentecostal Studies in Korea, 39*, 63-92.

Kim, H. (2016). *A study on the development and validation of early childhood musical interest inventory*. (Doctoral dissertation, Duksung Women's University, Seoul, Republic of Korea).

Kim, H., & Lee, Y. (2012). Inquiry of toddlers' spontaneous singing. *Korea Open Association for Early Childhood Education, 17*(5), 209-244.

Kim, M. (2015). Influence of sensory integrative music Activity on 2-year-old children's voluntary musical behavior and social emotion development. (Master's thesis, University of Chongshin, Seoul, Republic of Korea).

Ockelford, A., Welch, G., Vogiatzoglou, A., Himondides, E., & Zimmermann, S. (2010).

Sound of Intent. *SEN Magazine, 45*, 36-8.

Park, E. (2012). Developing a assessment tool of young children`s musical attitude for teachers. *Korea Association of Arts Education, 10*(1), 15-29.

Radocy, R. E., & Boyle, J. B. (1997). *Music cognition: The relationship of psychology and music*. (Choi, & Bang, Trans,). Seoul, Republic of Korea: Hak-Ji Sa.

Rutkowski, J., & Kooistra, L. (2016). *Spheres of musical understanding: A fluid, situational, and context specific model*. Paper presented at the Early Childhood Music Education Commission ECME 17th International Seminar Proceeding, Ede, Netherlands.

Seashore, C. E. (1919). *The psychology of musical talent*. Boston, MA: Silver, Burdett and Company.

Temmerman, N. (2000). An investigation of the music activity preferences of pre-school children. *British Journal of Music Education, 17*(1), 51-60.

Trehub, S. E., & Hannon, E. E. (2006). Infant music perception: Domain-general or domain-specific mechanisms?. *Cognition, 100*(1), 73-99.

Voyajolu, A., & Ockelford, A. (2016). Sounds of intent in the early years: A proposed framework of young children's musical development. *Research Studies in Music Education, 38*(1), 93-113.

Vygotsky, L. (1978). Interaction between learning and development. In L. Vygotsky (Ed.), *Mind and society: The development of higher psychological processes* (pp. 79–91). Cambridge, MA: Harvard University Press.

Wang, C. (1985). *Measure of creativity in sound and music*. Unpublished manuscript.

Webster, P. R. (1994). *Measure of creative thinking in music(MCTM): Administrative guidelines*. Retrieved from http://soundofintent.org/about-soi

Yoon, J. (2014). *Development for measurement scale of pedagogical content knowledge in early childhood music* (Doctoral dissertation, Duksung Women's University, Seoul, Republic of Korea).

Yoon, P. (2012). *The application effect of the integrated music activities of search-expression-appreciation for one-year-old on infants' spontaneous musical behaviors* (Master's thesis, Korean Bible University, Seoul, Republic of Korea).