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Differential Response to Joint Attention in Children with Autism Spectrum Disorder Depending on the Level of Attentional Cues

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The significant role of joint attention in the development of children with autism spectrum disorder (ASD) has highlighted the importance of early intervention. With the emphasis on the effective cueing and reinforcer for orienting to social stimuli in improving responding to joint attention (RJA) of children with ASD, the use of musical cue was hypothesized. This study aimed to examine the occurrence of RJA behaviors depending on the attentional cue, which differed in the level of information and type of auditory modality. Nine children with ASD participated in this study. The use of eight different joint attention cues were analyzed in terms of the frequency and accuracy of RJA behaviors elicited. The results of the study showed that RJA behaviors occurred more frequently with musical cues than with verbal cues and the mean accuracy rate of RJA was higher with musical cues (p = .047). Musically delivered eliciting and directing cues accompanied with pointing elicited the highest attentional shift and RJA accuracy. The significant increases in RJA with the use of musical cues indicated that incorporating musical elements into an attentional cue may provide more accurate cue information, enough to improve RJA behaviors of children with autism.

Keywords : Joint attention, Autism spectrum disorder, Musical cue, Early social communication

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주의 단서 수준에 따른 자폐 범주성 장애 아동의 공동주의집중 반응 연구

유가을*

자폐 범주성 장애 아동은 초기 사회-의사소통 기술 중 하나인 공동주의집중에 있어 심각한 장애를 보인다. 이로 인해 언어 및 인지, 사회성 발달에도 어려움을 겪는 것으로 보고되고 있어, 공동주의집중을 평가하거나 향상시키고자 하는 다양한 연구들이 진행되어 왔다. 본 연구에서는 음악적 단서를 포함해 주의를 유도하는 단서 수준에 따라 자폐 범주성 장애 아동의 공동주의집중에 반응하기(Responding to joint attention: RJA) 행동이 어떻게 달라지는지 보고자 하였다. 평균 연령이 65.3개월인 총 9명의 아동이 본 연구에 참여하였다. 1회로 진행된 평가 세션 동안에는 주의를 유도하는 총 8개의 단서가 사용되었다. 전달하고자 하는 정보량에 따라 네 가지 수준의 단서가 구성되었고, 각각의 단서는 언어적 및 음악적으로 제시되었다. 자폐 아동들은 음악적 단서가 제시되었을 때, 언어적 단서가 제시된 시도에 비해 이전 표적 자극에서 주의를 철회해 새로운 자극으로 전환시키는 시도가 증가하고, 공동주의집중에 반응하기 행동의 정확도 또한 높아지는 것으로 나타났다. 단서 유형에 따른 비교에 있어서는, 아동의 이름을 부른 후 주의를 유도하는 단서가 손가락으로 가리키기와 함께 음악적으로 제시되었을 때 주의 전환 시도 및 공동주의집중 행동의 정확도가 가장 높았다. 이러한 결과는 음악적 요소가 포함된 주의 단서가 주의 전환을 효과적으로 유도하고, 전달되는 정보의 정확한 처리를 촉진시킬 수 있음을 시사한다. 또한 이는 자폐 범주성 장애 아동의 공동주의집중을 목표로 하는 조기 중재 시 음악의 효과적인 사용에 대한 근거를 제시할 것으로 사료된다.

핵심어 : 공동주의집중, 자폐 범주성 장애, 음악적 단서, 조기 사회성 기술

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Ⅰ. Introduction

Joint attention is the ability to coordinate attention between a person and an object or event in a social context (Mundy, Sigman, Ungerer, & Sherman, 1986; Mundy & Stella, 2000; Tomasello, 1995; Toth, Munson, Meltzoff, & Dawson, 2006). A child may understand the intention of a social partner's gaze shift, head turn, communicative gestures, and/or verbal cues to direct the child's attention to an object and respond to the joint attention behaviors by attending to the object (Presmanes, Walden, Stone, & Yoder, 2007). Also, a child may initiate joint attention behaviors by pointing to or showing a toy and directing the attention of his mother to the same object in order to share an attention and the experience (Mundy & Stella, 2000).

Deficits or atypical characteristics of joint attention reliably distinguish children with autism spectrum disorder (ASD) from children with other developmental disabilities (Mundy et al., 1986), as well as from typically developing children (Dawson et al., 2004). While children with ASD show relatively less impairments in turn-taking and requesting gestures, their lack of joint attention is profound (Mundy & Neal, 2001; Whalen, Schreibman, & Ingersoll, 2006). Some researchers discriminated approximately 80% of young children with ASD from those with developmental delays, based on observations of joint attention alone (Dawson et al., 2004; Mundy et al., 1986). Moreover, children who exhibited disturbances in development of joint attention during their infancy and early childhood are likely to be diagnosed with autism later (Charman et al., 2003; Leekam & Ramsden, 2006).

Longitudinal studies have exhibited that impairments in development of joint attention lead to disturbance in subsequent language (Charman et al., 2003; Mundy, Sigman, & Kasari, 1990; Toth et al., 2006), cognitive (Carpenter, Pennington, & Rogers, 2002), and social development (Presmanes et al., 2007; Whalen et al., 2006). Likewise, the significant role of joint attention as pivotal skills in early development of children with ASD has given rise to the importance of early intervention. A growing number of studies have demonstrated that children with ASD show significant gains in joint attention skills following early intervention that directly targets joint attention (Whalen & Schreibman, 2003).

Regarding to the effectiveness of intervention for orienting to social information including joint attention or response to name calling, the literature has proposed that a key factor is to facilitate children with ASD to engage in the relevant process spontaneously and repetitively (Dawson et al., 2004; Mundy & Stella, 2000). It is supported by previous findings that these

children show difficulties not only in accurate attentional processing, but also in perceiving shared attention with others as reinforcing (Mundy & Crowson, 1997; Whalen et al., 2006). Previous research has demonstrated that children with ASD show stimulus-dependent sensory processing patterns with increased performance in discriminating and orienting to attention-specific information among competing stimuli (Ceponiene et al., 2003; Iarocci & McDonald, 2006). Musical stimuli as found to increase responsiveness to attentional bids containing social intentions and facilitate further attentional processing has been considered as potential modality to effectively improve social information processing (한성은, 2006; Kim, Wigram, & Gold, 2008; O'Loughlin, 2000; Reitman, 2005).

Therefore, this study aimed to investigate the emergence of joint attention behaviors following attentional cues that differed in the level of information and type of auditory modality. This study focused on responding to joint attention (RJA) that emerges at earlier stage and is considered pivotal in understanding language, behaviors, and intentions of a social partner. Research questions are the followings:

Research Questions

1. Are there significant differences in attentional shift of children with ASD between musical cues are provided and when verbal cues are provided?
2. Are there significant differences in the accuracy of RJA behaviors of children with ASD when musical cues are provided and when verbal cues are provided?
3. Are there significant differences in attentional shift and the accuracy of RJA behaviors of children with ASD depending on the attentional cues differed in terms of the incorporation of musical elements, the level of information and visual cues utilized?

II. Methods

1. Participants

Nine young children with autism spectrum disorder (ASD) participated in this study. The mean age of the children was 65.3 months (SD = 16.02). None of the children received music therapy services more than 6 months, prior to this study. Based on ratings by parents and special education teachers, the children were reported to show severe level of limitations

in orientation to social stimuli, attention to and imitation of other children at play, transition to different activities, and appropriate use of objects.

In association with different developmental pace considered in early diagnosis of young children, however, five of the children were diagnosed with pervasive developmental disorder-non specified (PDD-NOS) at their initial clinical diagnosis, despite marked autistic behavioral phenotype observed. Although children with PDD-NOS show relatively milder autism-related impairment than children with autistic disorder, deficits in joint attention behaviors is still significantly salient compared to children with other developmental disabilities (Dawson et al., 2004). Furthermore, previous studies have reported that no significant differences between children with autism and PDD-NOS in terms of joint attention behaviors (McDonald et al., 2006; Osterling, Dawson, & Munson, 2002). To validate the inclusion of children with autistic disorder and children with PDD-NOS in one group with autistic disorder, a Levene's test was conducted. The results showed the homogeneity within the group, $F(1, 238) = 3.36$, $p = .07$, assuming the equality of variances between two subgroups.

All relevant procedures were reviewed and approved by the human subjects committee of the University of Kansas. Informed consent was obtained from caregivers of all children prior to participation in this study.

2. Materials and stimuli

This study was conducted in a quiet place within the daycare center or the kindergarten where the children attended. The place was set up to minimize distractible materials and equipment. A video camera was mounted on a bracket approximately 90 cm above the floor to record each child for behavioral coding.

During responding to joint attention (RJA) assessment trials, six instruments with distinct shapes and timbres requiring different playing methods were selected to minimize risk factors for persistent preoccupation with specific physical features of instruments (see Table 1). Each targeted instrument was named with a demonstrative pronoun "this" without the use of its actual name. Using the neutral word was intended to minimize the possibility that either familiarity or unfamiliarity with the object's name would affect a child's response, rather than the cue itself (Presmanes et al., 2007).

〈Table 1〉 Features of Musical Instruments Used in This Study

Instrument	Sound-Making Material	Primary Playing Method
Bongo drum	Skin	Tapping with hands
Cabasa	Metal	Rubbing on the surface of instrument with hands
Clave	Wood	Striking a pair of instruments with each other
Guiro	Wood	Scraping the surface of instrument with a beater
Handbell	Metal	Pressing a small button type of part
Maracas	Plastic	Shaking

Four levels of attentional cues were composed based on previous research. In a study by Presmanes et al. (2007), each cue delivered one of the following three kinds of information: eliciting (i. e., calling a child's name), directing (i. e., directing a child's attention to a target by saying "Look at this") or a combination of eliciting and directing (e. g., "Peter, look at this"), which contains increasing attention-specific information in sequence. In this study, all attentional cues were combined with gaze shift. For the highest level of attentional cue, a pointing gesture was added to a combination cue of eliciting and directing with gaze shift, to provide highly redundant information of attentional cueing (see Table 2). These four levels of attentional cues were presented musically and verbally.

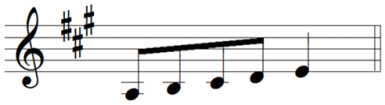
〈Table 2〉 Attentional Cues Presented during RJA Assessment Trials

Type	Level of Attentional Auditory Cue	Visual Cue	Index
Musical	Elicit	Gaze	M (E)
	Direct	Gaze	M (D)
	Elicit + Direct	Gaze	M (E+D)
	Elicit + Direct	Gaze + Pointing	M (E+D+P)
Verbal	Elicit	Gaze	V (E)
	Direct	Gaze	V (D)
	Elicit + Direct	Gaze	V (E+D)
	Elicit + Direct	Gaze + Pointing	V (E+D+P)

* Note: With the index, the first letter represents the type of attentional cue: musical (M) or verbal (V). The letters in parentheses indicate the level of attentional cue depending on the information conveyed, which is referred in the second column of this table.

For musical attentional cues, a short melody was added to the corresponding verbal cues. Rhythm and melodic contour were considered in such a way to reflect the function of cueing (i. e., calling one's name or eliciting orientation toward a new object) and to enhance perception of different levels of cue (i. e., eliciting versus directing cues). Examples of musical cue were summarized in Table 3.

〈Table 3〉 Attentional Cues Presented during RJA Assessment Trials

Cue	Example
M(E)	 O O 야 (name calling such as "Chris")
M(D)	 이 것 보 세 요 ("Look at this")
M(E+D)	 O O 야, 이 것 보 세 요 ("Chris, look at this")

* M(E): musical eliciting cue; M(D): musical directing cue; M(E+D): musical combination of eliciting and directing cues

3. Procedure

Each participant received an approximately 20-minute of RJA assessment session. Singing a hello song and a goodbye song was implemented as opening and closing to build a rapport with each child and facilitate his/her transition to a new environment. RJA assessment was designed with the structure, starting with free exploration of an instrument and then administrating attentional cues trials. Each child was provided an opportunity to explore a presented instrument for the first 30 seconds of the assessment trial. Once it was ensured that the child was engaged with the instrument, the first RJA trial began by introducing a new instrument and giving an attentional cue (e. g., "Look at this"). The child was expected to shift his or her attention from the pre-occupying instrument and orient to newly presenting instrument by locating the attentional cue accurately. The next attentional cue was

given 15 seconds after the previous trial. Each child received a total of eight different attentional cues during the assessment session (see Table 2). The order of provision of instrument presentation and each attentional cue was randomly determined for each child.

4. Data analysis

Each observed behavior of a child was identified as correct response (CR), attentional shift but incorrect location (IR), or no response (NR). If a child engaged in movements or gestures immediately after an attentional cue was given, but the response did not happen in the correct direction, the response was categorized as "IR" differentiated from "CR". "NR" was rated when a child showed no attentional shift to the introduced stimulus.

Each response was coded and analyzed in terms of the presence of attentional shift and RAS accuracy. Attentional shift was identified by any behaviors indicating disengagement from the previous stimulus. Neither correct nor incorrect location was differentiated in this data analysis. Accordingly, a score of 1 was given to each of two measures, "CR" and "IR", while a score of 0 was given to the measure of "NR". When determining the accuracy of RJA, scores of 1, 0.5, and 0 were respectively given for "CR", "IR", and "NR", with higher scores indicating increased accuracy of RJA.

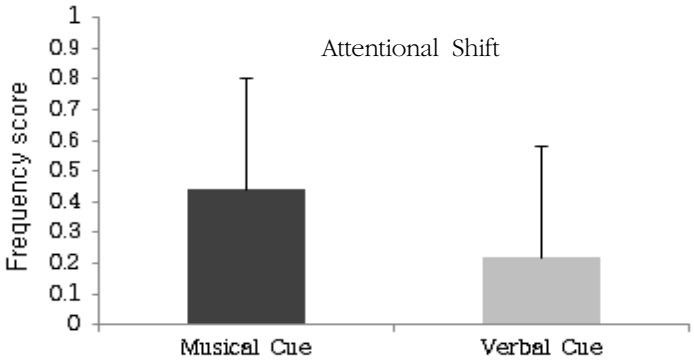
To corroborate the validity of the investigator's data analysis, the data were randomly selected and coded by the second observer, a board-certified music therapist who was blind to the purpose of this study. The observer was provided the recording data with the elimination of sounds to minimize the potential bias when assessing behaviors following musical cues. An interrater reliability calculated was found to be Kappa = .89 ($p < .001$), indicating the strong agreement between the investigator and the second observer. The coded data were analyzed using Statistical Package for the Social Sciences (SPSS) version 17.0.

Ⅲ. Results

The purpose of this study was to examine the responding to joint attention (RJA) behaviors following attentional cues that differed in the level of information and type of auditory modality. Measuring the frequency of attentional shift showed that children with ASD made little response to joint attention cues across the trials ($M = 0.33$, $SD = 0.47$). One sample t test

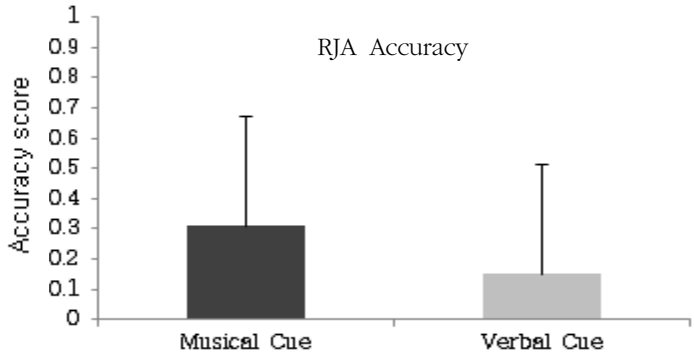
exhibited that the mean of RJA was significantly less than 1, $t(71) = -11.9$, $p < .001$.

A Mann-Whitney test was conducted to examine if the occurrence of attentional shift was different between musical and verbal conditions. The result showed that significantly different numbers of attentional shift occurred between providing musical cues and verbal cues ($Z = 1.986$, $p = .047$). Attempts to shift attention to newly presented stimuli occurred more frequently with musical cues ($M = 0.44$, $SD = 0.50$) than with the verbal cues ($M = 0.22$, $SD = 0.54$). The result was displayed in Figure 1.



〈Figure 1〉 Frequency of Attentional Shift During Musical and Verbal Cues Conditions

With regard to RJA accuracy, there was also a difference between musical and verbal conditions ($Z = 1.948$, $p = .051$). The mean accuracy rate of RJA under the musical cue condition ($M = 0.31$, $SD = 0.38$) was higher than in the verbal cue condition ($M = 0.15$, $SD = 0.31$). The result was displayed in Figure 2.



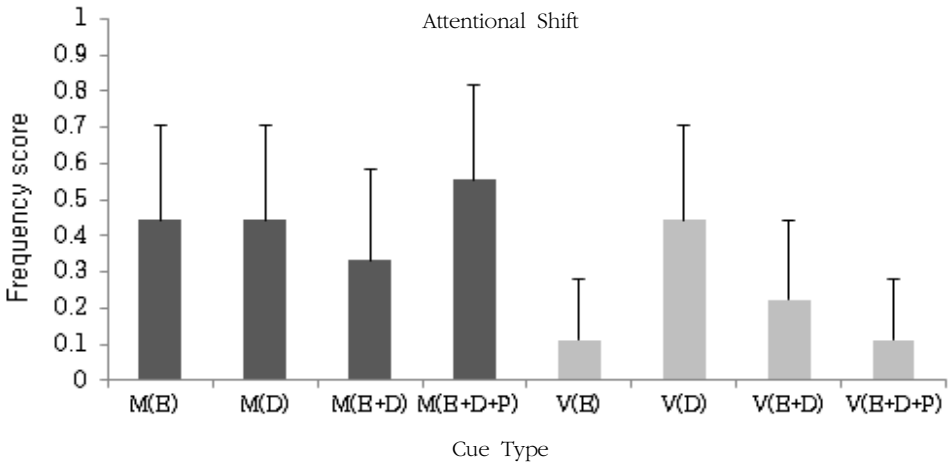
〈Figure 2〉 RJA Accuracy during Musical and Verbal Cues Conditions.
A score of 0, 0.5, and 1 were respectively assigned to no response, incorrect response, and correct response.

Furthermore, this study examined whether the frequency of attentional shift and the accuracy of RJA behaviors were affected by the level of attentional cues provided. M(E+D+P) elicited the highest occurrence of attentional shift, followed by M(E), M(D), and V(D). Meanwhile, V(E) and V(E+D+P) produced the least number of attentional-related behaviors (see Table 4 & Figure 3). A Friedman analysis of variance was conducted, showing statistically significant differences were not found among eight different cue types, $\chi^2(7) = 5.979$, $p = .542$.

〈Table 4〉 Ranking of Mean Frequency of Attentional Shift Depending on the Cue Type

Level of Attentional Cue	RJA frequency	
	M	*SD*
M(E+D+P)	0.56	0.26
M(E)	0.44	0.53
M(D)	0.44	0.53
V(D)	0.44	0.53
M(E+D)	0.33	0.50
V(E+D)	0.22	0.44
V(E)	0.11	0.33
V(E+D+P)	0.11	0.33

* M(E): musical eliciting cue; M(D): musical directing cue; M(E+D): musical combination of eliciting and directing cues; M(E+D+P): musical combination of eliciting and directing cues accompanied with pointing; V(E): verbal eliciting cue; V(D): verbal directing cue; V(E+D): verbal combination of eliciting and directing cues; V(E+D+P): verbal combination of eliciting and directing cues accompanied with pointing

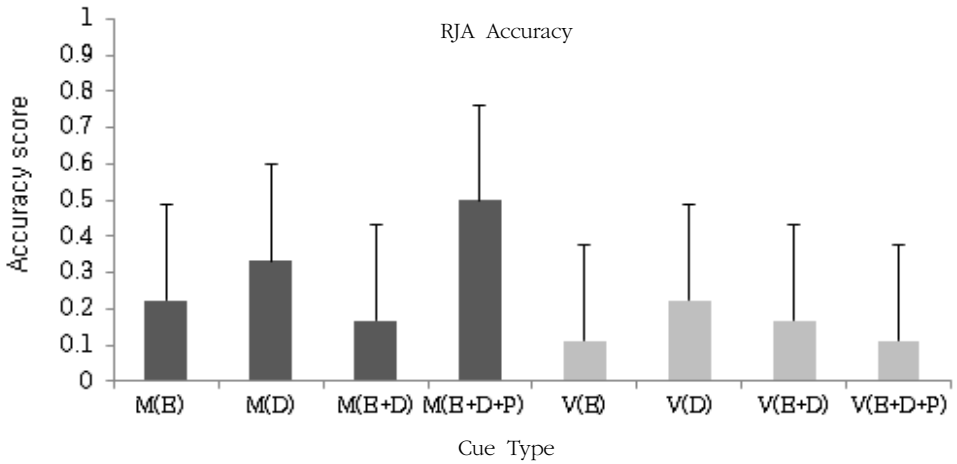


〈Figure 3〉 Mean Occurrence of Attentional Shift Depending on the Cue Type

With regard to the accuracy of RJA behaviors, the highest was observed with M(E+D+P), followed by M(D). The least accuracy of RJA was scored when V(E) and V(E+D+P) were provided. The ranking of the accuracy scores showed similar tendency to the frequency ranking (see Table 5 & Figure 4). A Friedman analysis of variance demonstrated that there were no significant differences in RJA accuracy depending on the cue type, $\chi^2(7) = 8.352$, $p = .303$.

〈Table 5〉 Ranking of RJA Accuracy Depending on the Cue Type

Level of Attentional Cue	RJA accuracy	
	M	*SD*
M(E+D+P)	0.50	0.50
M(D)	0.33	0.43
M(E)	0.22	0.26
V(D)	0.22	0.26
V(E+D)	0.17	0.35
M(E+D)	0.17	0.25
V(E)	0.11	0.33
V(E+D+P)	0.11	0.33



〈Figure 4〉 Mean RJA Accuracy Depending on the Cue Type

IV. Discussion

The results of the study showed that children with ASD showed little response to joint attention cues across the trials. They turned their heads or eyes immediately following the investigator's attention-directing cues in limited trials, corroborating the previous research findings regarding overall impaired responses to joint attention in children with ASD (Whalen et al., 2006).

Regarding the type of attentional cue, children with ASD attempted to control attention more frequently and accurately with the provision of musical cues than with verbal cues. This finding indicates that the musically-cued information addressed impairment in orientation to social stimuli (i. e., intentional gestures or verbalization initiated to share an object or an experience with a partner) of this population. With the addition of musical elements, external cues as social stimuli may be delivered and processed effectively over competing stimuli that preoccupy the attention of children with ASD.

However, the general rate of accurate orientation to attentional cue was still low. Even if a child shifted his or her attention from a previously engaged stimulus, the child's location processing toward the new stimulus was not correct in more than half of the trials. This indicates that simply creating a musical stimulus may not be sufficient in itself to facilitate the child's processing of the information to the full extent. Considering that this study was implemented as a one-time assessment, further study will be needed for more conclusive evidence. Still, significant increases in both RJA frequency and accuracy with the use of musical cues suggest the potential of musical cues to produce more frequent and accurate RJA behaviors of children with ASD.

Lastly, this study also demonstrated that there are noteworthy differences in RJA behaviors depending on the attentional cue types. In terms of disengagement from preoccupied stimuli and attentional shift to target stimuli, musical combination of eliciting and directing accompanied with pointing, M(E+D+P) elicited the highest number of target behavior, while verbal eliciting cue (V(E)) and verbal combination of eliciting and directing accompanied with pointing (V(E+D+P)) led to the least. A similar trend was found in RJA accuracy, with the highest accuracy in M(E+D+P) and the lowest accuracy in V(E) and V(E+D+P). Furthermore, when four levels of attentional cues were compared in terms of presented type (musical versus verbal presentation), musical cues tend to produce increased attentional shift and RJA accuracy than corresponding verbal cues. Previous research demonstrated that while

children at risk for autism showed fewer RJA behaviors with a moderately redundant cue (directing cue and combination of eliciting and directing cues) than typically developing children, they did as well as their peers with multiple attention-directing cues and prompts (i. e., combination of eliciting and directing accompanied with pointing; Presmanes et al., 2007). The researchers proposed that sufficient redundancy of information within a cue increased RJA behaviors. Based on the previous research findings, observed increases in RJA behaviors with the use of musical cues in this study imply that incorporating musical elements into an attentional cue may add enough information to improve RJA.

When name calling was used as an initial cue to direct attention, as in verbal eliciting cue (V(E)) or verbal combination of eliciting and directing accompanied with pointing (V(E+D+P)), the frequency of attentional shift decreased compared to specific attention directing verbal cues (i. e., a directing cue of "Look at this"). Even the cue with the highest redundancy of information, V(E+D+P), produced the least number of RJA behaviors. This supports previous studies reporting that children with autism showed impairment in their responses to social stimuli such as calling a child's name more than in response to non-social stimuli (Leekam & Ramsden, 2006; Mundy & Stella, 2000). Furthermore, specific and direct information seems necessary in order to facilitate the child's processing of social information. Of note is the finding that musical eliciting cue (M(E)) produced similar levels of attentonal shift as when musical directing cue and verbal directing cue were presented. The observed improvement in RJA performance with M(E) indicates that the use of a musical cue may address the limitation of verbal cues as the social cue (i. e., a name call) in effectively catching the initial attention of a child with autism, accordingly facilitating the processing of further social information input and affecting the successful communication of the partner's intent.

This study yielded interesting results that suggest promise for the design of effective music therapy intervention for joint attention behaviors of children with ASD. However, such intervention should be applied and generalized with caution. Further studies should include larger sample sizes to attain more reliable results. The inclusion criteria of participation in this study was limited to age and diagnosis, without consideration for other diagnostic assessment and the developmental levels of each child. Further study examining the different responses of children with regard to the current joint attention and social-communicative development as well as specified diagnosis will provide more critical information regarding the effect of musical cues on RJA behaviors.

It should be also considered that this study was designed to assess the behaviors of children during a one-time observation. Because of the nature of autism, the variables of an unfamiliar adult present and a new environment may also have contributed to the weak RJA performance. Future studies should be structured to address the need to build initial familiarity with both a partner and an environment. In addition, the extent to which such familiarity affects the responses of children with autism should be considered. Further, an investigation on the threshold necessary to induce remarkable changes in relation to the level of each musical element is also needed.

In summary, this study corroborated the potential use of musical cues for RJA behaviors of children with autism. Musical attentional cues were found to be effective in eliciting attention from children with ASD and facilitating them to process the intention of a cue initiated by a social partner accurately. As a successful initial trial, this study suggests that the use of musical cues is one of the most effective choices among different cues for acquisition and improvement of joint attention behaviors in children with ASD.

References

한성은 (2006). 사회적 상황 중심의 노래활동을 통한 자폐아동의 언어 표현 증진에 관한 사례연구. **음악치료교육연구**, **3**(1), 13-28.

Carpenter, M., Pennington, B. F., & Rogers, S. J. (2002). Interrelations among social-cognitive skills in young children with autism. *Journal of Autism and Developmental Disorders, 32*(2), 91-106.

Ceponiene, R., Lepisto, T., Shestakova, A., Vanhala, R., Alku, P., Naatanen, A. R., & Yaguchi, K. (2003). Speech－sound-selective auditory impairment in children with autism: They can perceive but do not attend. *Proceedings of the National Academy of Sciences of the United States of America, 100*(9), 5567-5572.

Charman, T., Baron-Cohen, S., Swettenham, J., Baird, G., Drew, A., & Cox, A. (2003). Predicting language outcome in infants with autism and pervasive developmental disorder. *International Journal of Language and Communication Disorders, 38*(3), 265-285.

Dawson, G., Toth, K., Abbott, R., Osterling, J., Munson, J., Estes, A., & Liaw, J. (2004). Early social attention impairments in autism: Social orienting, joint attention, and attention to distress. *Developmental Psychology, 40*(2), 271-283.

Iarocci, G., & McDonald, J. (2006). Sensory integration and the perceptual experience of persons with autism. *Journal of Autism and Developmental Disorders, 36,* 77-90.

Kim, J., Wigram, T., & Gold, C. (2008). The effects of improvisational music therapy on joint attention behaviors in autistic children: A randomized controlled study. *Journal of Autism and Developmental Disorders, 38*(9), 1758-1766.

Leekam, S. R., & Ramsden, C. A. H. (2006). Dyadic orienting and joint attention in preschool children with autism. *Journal of Autism and Developmental Disorders, 36*(2), 185-197.

McDonald, R., Anderson, J., Dube, W. V., Geckeler, A., Greena, G., Holcomb, W., … Sanchez, J. (2006). Behavioral assessment of joint attention: A methodological report. *Research in Developmental Disabilities, 27*, 138-150.

Mundy, P., & Crowson, M. (1997). Joint attention and early social communication: Implications for research on intervention with autism. *Journal of Autism and Developmental Disorders, 27*(6), 653-676.

Mundy, P., & Neal, A. R. (2001). Neural plasticity, joint attention, and a transactional

social-orienting model of autism. In L. M. Glidden (Ed.), *International review of research in mental retardation: Vol. 23. Autism* (pp. 139-168). San Diego, CA: Academic Press.

Mundy, P., Sigman, M., & Kasari, C. (1990). A longitudinal study of joint attention and language development in autistic children. *Journal of Autism and Developmental Disorders, 20*, 115-128.

Mundy, P., Sigman, M., Ungerer, J., & Sherman, T. (1986). Defining the social deficits of autism: The contribution of nonverbal communication measures. *Journal of Child Psychology and Psychiatry, 27*(5), 657-669.

Mundy, P., & Stella, J. (2000). Joint attention, social orienting, and nonverbal communication in autism. In A. M. Wetherby & B. M. Prizant (Eds.), *Communication and language intervention series: Vol. 9. Autism spectrum disorders: A transactional developmental perspective* (pp. 55-77). Baltimore: Brookes Publishing Co.

O'Loughlin, R. A. (2000). *Facilitating prelinguistic communication skills of attention by integrating a music stimulus within typical language intervention with autistic children* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses A & I. (UMI No. 9965033)

Osterling, J. A., Dawson, G., & Munson, J. A. (2002). Early recognition of 1-year-old infants with autism spectrum disorder versus mental retardation. *Development and Psychopathology, 14*, 239-251.

Presmanes, A. G., Walden, T. A., Stone, W. L., & Yoder, P. J. (2007). Effects of different attentional cues on responding to joint attention in younger siblings of children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 37*, 133-144.

Reitman, M. R. (2005). *Effectiveness of music therapy interventions on joint attention in children diagnosed with autism: A pilot study* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses A & I. (UMI No. 3195248)

Tomasello, M. (1995). Joint attention as social cognition. In C. Moore & P. J. Dunham (Eds.), *Joint attention: Its origins and role in development* (pp. 103-130). Hillsdale, NJ: Erlbaum.

Toth, K., Munson, J., Meltzoff, A. N., & Dawson, G. (2006). Early predictors of communication development in young children with autism spectrum disorder: Joint attention, imitation, and toy play. *Journal of Autism and Developmental Disorders,*

36(8), 993-1005.

Whalen, C., & Schreibman, L. (2003). Joint attention training for children with autism using behavior modification procedures. *Journal of Child Psychology and Psychiatry, 44*(3), 456-468.

Whalen, C., Schreibman, L., & Ingersoll, B. (2006). The collateral effects of joint attention training on social initiations, positive affect, imitation, and spontaneous speech for young children with autism. *Journal of Autism and Developmental Disorders, 36*(5), 655-664.

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