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The Role of Music in the Development of Emotional Granularity in Children:
A Literature Review and Proposed Applications

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ABSTRACT

This thesis is an amalgamation of research supporting and supplementing how music can be used to increase emotional granularity (EG). Emotional granularity refers to the ability to make fine-grained differentiations in describing one's emotions— an important skill for mental health and wellbeing. A central theme in cultivating EG through music lies in developing a nuanced sensitivity to the qualities of musical elements and acoustic cues and prosodic patterns in vocalization and speech. Elements taught in music education, such as developing rhythm, melody, movement, improvisation, and storytelling, act as stepping-stones in the process of the cognitive appraisal of emotions and granularity. Reasons for individual differences in the affective response to music are also explored, including trait emotionality, temperament, age, gender, neurodivergence, cultural and linguistic background, and musical expertise. Music therapy applications for developing EG in children with autism are also explored.

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1. An Introduction to Emotional Granularity

Emotional granularity (EG) refers to the ability to make fine-grained differentiations in describing one's emotional experience. For example, someone with high emotional granularity can differentiate feeling angry from other negative emotions, such as feeling fearful, exhausted, lonely, or helpless (Wilson-Mendenhall, Dune 2021). Emotional granularity falls under the umbrella of *emotional expertise*. Emotional expertise encompasses skills of understanding, experiencing and regulating emotions (Zeidner et al., 2012; Hoemann et al., 2020).

Recent research highlights the importance of emotional granularity for mental health and well-being and the adaptive value of putting feelings into words (Kashdan et al., 2015; Smidt and Suvak, 2015). When experiencing negative emotions, those with high EG are less likely to resort to maladaptive behaviors to self-regulate, such as binge drinking, aggression, and self-injury, and experience less severe anxiety and depressive disorders (Kashdan et. al 2015). Using fMRI scanning, verbal affect labeling has been found to decrease activity in the brain's emotional centers such as the amygdala (Lieberman et. al 2007), allowing for more control of reasoning by the frontal lobe. Recent research has found that emotional granularity is a skill which can be developed through interventions such as meditation (Van der Gucht et. al 2019).

Labeling emotions is crucial in understanding and processing them, writes researcher Brené Brown in her recent book *Atlas of the Heart*. When painful feelings remain unprocessed, people tend to cause pain to others and abuse their power. She argues that our lack of understanding of our emotions is what causes us to be disconnected from ourselves and each

other. Brown argues that finding language that we can use to describe emotions is crucial to understanding them in ourselves and in others.

Emotions have been studied from a wide variety of perspectives, ranging from philosophy to neuroscience to mental health to genetics. Emotions are generally categorized on a scale of positivity and negativity, and/or valence— high or low arousal. Julie Beck, an author at the Atlantic, asked her colleagues to define emotion. The responses greatly varied, but followed the theme that they are individual, intangible feelings, and reaction to experiences. Despite the mutual consensus on the uniqueness of emotional experience, paradoxically, 80% of emotion experts agree that certain vocal and facial patterns are universal in reflecting on emotional experiences, says researcher and psychologist Paul Ekman. Ekman believes there is evidence for seven universal emotional families, and believes this list is currently growing. Researchers Alan Cowen and Dacher Keltner believe there are at least 27 emotions needed to convey the range of human experience (Cowen & Keltner, 2017), while Brown argues this number should be as high as 87 to account for the range and nuance of the human experience. Brown has found in her research, however, that most people can only label three emotions— happy, sad, and angry.

Emotion Appraisal Theories

The current emotion appraisal theories distinguish feeling from emotion. Feeling is the mental experience of emotion (Damasio, 1999); it involves the perceived experience of changes in body state and cognition, alongside the simultaneous mental images of what might have triggered these changes (Damasio, 1994; Scherer, 2004). This integration of different aspects of

emotion forms the basis for the conscious representation of emotion (Scherer, 2004), which is the state of feeling made aware (Damasio, 1999).

The Role of Language in Emotional Appraisal

The way in which we perceive our feelings is influenced by the categorical knowledge we possess about emotions when we identify our affective state (Barrett, 2006). In this way, our experiences, as well as our cognitive appraisal of a feeling in our past, influences our labeling of an emotional experience in the present. Our culture and language profoundly shape our emotional experience. Terms for different emotional experiences vary across languages, such as the Russian words *toska* (melancholy-yearning), and *žalet'* (to lovingly pity someone), the Ifaluk *fago* (sadness/compassion/love), or the German *Schadenfreude* (the feeling of satisfaction at someone's misfortune). Russian does not have a word for guilt, and English does not have a term for *toska*. Translation of these terms cannot replace experiential familiarity with them, and consequently the accessibility of their identification (Wierzbicka, 8). Linguistic differences across cultures depict what speakers see as a feeling which can be differentiated.

2. Music Under the Model of Language

This thesis highlights how music can be leveraged to increase emotional granularity. This section sheds light on the research on the recognition of emotions in the human voice and in music, as well as investigates the relationship between these two types of auditory communication.

Music is found in virtually every human culture (McDermott & Hauser, 2005). It is thought to have evolved as a tool for experiencing shared intentionality, and maintaining social cohesion (Cross, 2016; Kirschner & Tomasello, 2010; Patel, 2008). Some cultures link the evolution of music with the evolution of primitive affective vocalizations. Helmholtz—one of the pioneers of music psychology—noted that “an endeavor to imitate the involuntary modulations of the voice, and make its recitation richer and more expressive, may therefore possibly have led our ancestors to the discovery of the first means of musical expression” (Markham, 2014). Music is a method of communication that likely was derived from vocalization, and that complements spoken language. It is perceived in categories of pitch, timbre, and harmony (Sacks, 2007)

Prosody and Acoustic Cues

Speech prosody refers to the sounds, rhythms and tones that accompany language (Vidas, 2018). The way in which emotion is recognized in speech prosody has been studied much more extensively than emotion interpretation in music, but it is theorized that recognition of emotion in speech prosody and music are related evolutionarily (Juslin & Laukka, 2003; Scherer, 1995). It is suggested that music and language coevolved as complementary methods of

communication, and studying emotion recognition in speech prosody will give us information about emotion recognition in music.

In speech, acoustic cues are specific properties of sound waves that carry information about speech, such as shades of meaning, various regional or in-group accents, and show individuality in various manners of speaking. Musicians also use acoustic cues to express emotions by varying tempo, sound level, timing, intonation, articulation, timbre, vibrato, and pauses.

Similarities in Acoustic Cues and Prosody in Speech and in Music

There are also ways that acoustic cues in speech and music are similar (Juslin & Laukka, 2003). For example, both angry music and angry speech are associated with a fast tempo, high volume, and high pitch, while sad music and speech are associated with slow tempo, low-volume, and low pitch (Juslin & Laukka, 2003). It is also noted that recognizing emotions from prosody in speech develops later than facial emotional recognition. While recognition of emotion in faces reaches adult levels by 11, and emotional recognition from speech prosody continues to develop past this age (Chronaki, Hadwin, Garner, Maurage, & Sonuga-Barke, 2015). Children as young as four, however, can recognize happiness and sadness when hearing a foreign language or low-pass filtered speech (Morton & Trehub, 2001).

Past research suggests that children's patterns of understanding emotions in music are related to their understanding of speech prosody, although the research on the exact mechanism of how music evokes emotions is limited. In both tonal (ex: Chinese, Thai, Vietnamese) and atonal languages (ex: English, French, German) the characteristics of speech prosody mirror the tonal characteristics in the music of each respective culture (Sundararajan et al., 2011).

A study conducted by Vidas et al. (2018) concluded that children's recognition of emotions in speech and music develop in parallel, and recognition of both of these auditory stimuli improve with age. The process of understanding the emotion portrayed in music and speech recruit overlapping networks in the brain (Scoffier et al., 2013). There has also been research showing a link between musical training and vocal emotional recognition in the form of speech prosody and affect bursts, but not in the visual expression of emotions (Martins et al., 2021). The precise mechanism of the musician-advantage remains in question; auditory-perceptual enhancements may play a role, but a causal relationship lacks concrete evidence.

Affect Bursts and their Corresponding Musical Cues

Although distinguishing emotions from speech prosody develops throughout childhood, children become proficient at judging affect bursts—non-verbal vocalizations— by the age of five (Sauter et al., 2013). Examples of affect bursts include laughs, grunts, and sniffles, which can be used to convey emotions of pride, happiness, surprise, anger, disgust, fear, and sadness. A set of these human non-verbal human vocalizations was accumulated in Montreal Affective Voices (MAV) list (Belin et al., 2008). Music also uses affect bursts to express emotion. A musical analog to the MAV was created called Music Emotional Bursts (MEB). In this set of sounds, instruments portrayed certain emotions by primitive-sounding improvisation or imitation of an MAV stimulus (Paquette et al., 2013). Although not as accurate as the MAV, the MEB recognition accuracy was still high at 80%. Additionally, recognition of emotion in speech prosody and affect bursts predicted emotion recognition in music stimuli independently of age and musical training (Vidas et al., 2018). This is an interesting finding when we consider the transferability of emotion recognition in a setting outside of music.

Recognition of Affect in Music in those on the Autism Spectrum

Despite the evidence showing parallel development of emotion recognition (ER) in music and the human voice (Vidas et al., 2018), a study done by Sivathasan et al. (2023) found that children on the autism spectrum (AS) score higher in ER in music compared to children with typical development (TD). This is interesting in the context of findings that children on the AS score lower than TD children in vocal ER and facial ER (Uljarevic & Hamilton, 2012).

One possible explanation for the relative strength of those on the AS in identifying emotions in music lies in the differences in processing information. Individuals with AS tend to process perceptual features of stimuli using a bottom-up approach, focusing more on local rather than global aspects. This does not imply that global processing is impaired in AS individuals; instead, it is relatively deprioritized. In contrast, TD individuals generally employ a top-down approach, prioritizing global or holistic processing while giving less attention to local perceptual details. In this case, examples of local aspects in music include tempo, timbre, pitch, and mode, while global aspects can be the emotional and cultural subtext of the music. Sivathasan et al. (2023) concludes: “compared to typically developing children, music may readily invoke the enhanced perceptual processing styles of children on the AS.”

[Further implications of developing EG for those on the AS will be discussed on pg. 16]

Individual Differences in Affective Responses to Music

In the context of using music to improve emotional granularity, it is important to recognize the individual differences in the affective responses to music. These differences can be influenced by trait emotionality, temperament (Kantor-Martynuska & Bigand, 2013), age (Vidas, 2018), previous experiences (Innes-Ker & Niedenthal, 2002), gender (Terwogt & Van Grinsven,

1988), neurodivergence (Sivathasan et al., 2023), cultural and linguistic background (Wierzbicka, 8), and musical expertise (Martins et al., 2021). High emotional granularity in the affective responses to music refers to a high degree of specificity in the understanding of the emotions it evokes (Barret, 2004). In a study conducted by Kantor-Martynuska & Bigand (2013), granularity was determined by how many emotional clusters were identified when listening to a music.

The way in which we process emotional information has been found to be impacted by emotion relevant traits (Rusting, 1998). One trait that was strongly associated with high granularity in the affective responses to music was neuroticism; specifically those who score high on rumination. This suggests that it is the analytic, self-focused attention that is inherent to rumination that is responsible for this finding (Kantor-Martynuska & Bigand, 2013). Additionally, music has been found to trigger heightened responses in physiological activation in listeners with high Behavioral Inhibition Systems, or BIS. Individuals with high BIS experience heightened sensitivity to potential threats, novel situations, and anxiety (Kallinen & Ravaja, 2004). Unsurprisingly, there is an association between temperament and reactivity and perceived tempo and loudness in music (Kantor-Martynuska, 2009).

Other studies suggest that emotional categorization of music is influenced by the tonal patterns in the speech of the listener's language. It is also possible that linguistic categorizations— labels for emotions in the listener's native language, influence their perceived categorization of emotions within music. For example, in Brené Brown's book *Atlas of the Heart* (2021), she mentions that the Finnish language has more words to describe joy compared to

English. This difference in language broadens the ability to articulate various joyful experiences. It is plausible that breadth of emotional lexicon generalizes to describing affect in music.

Other differences lie in the distinction between identifying the content quality of a certain piece of music and the affect that it evokes in the listener. For example, angry sounding music has been found to elicit fear. There are also differences in reported affect related to gender. In a study done by Terwogt & Grinsven (1988) females identified fear in music more accurately than males. In Terwogt & Grinsven (1988), this difference was attributed to the societal pressure for males to deny fear. It is likely the difference in social acceptance of emotional openness between genders also plays a role in expressed and felt emotional response to music

3. Techniques in Music Education and Music Therapy

Despite all of the research that has been conducted on music and vocalization, research on the exact mechanisms of how it evokes emotion has been largely unexplored. Nevertheless, there is significant research of the benefits of music therapy and music education in the emotional development of children. Music offers a medium through which to engage with emotions by paying attention to the physiological and imaginative responses to sound, both of which are important in the process of the cognitive appraisal of emotions—that is— emotional granularity.

The Carl Orff Approach To Music Education

The Carl Orff Approach, also known as *Orff Schulwerk*, is a method of teaching music that was developed by German composer Carl Orff and his colleague Gunild Keetman (Orff, & Keetman, 1950s). Its early development began in the 1920s, but spread internationally in the 1960s and 70s. Now, it has become a widely integrated approach to teaching music in classrooms across the world.

The central element of the Orff Approach is to teach music in a way that centers around play. He believed that the activities which lead children to internalize musical concepts should stem from what feels most natural and intuitive for them— simple songs, improvisation, dance, and storytelling. Orff believed that music education should not be limited to singing or playing instruments alone. He emphasized the importance of integrating music, movement, drama, and speech, into a cohesive learning experience.

In an example of a lesson using the Orff Approach, children listen to a story, then interpret elements of that story using instruments—a few children in the class go to choose an instrument that imitates the sound of rain, others find a happy sounding instrument, and others find sounds for the sun and the moon. This personification of the elements of a story into sound draws parallels of the senses and the imagination, deepening the conceptualization and understanding of music as a language; elements of our surroundings, our emotions and imaginations become more acutely translated into expressions of sound.

Other children in the class are invited to provide background music to the story using percussion instruments such as xylophones, metallophones, and glockenspiels. These instruments are often tuned to the pentatonic scale because it consists of just five notes that sound harmonious together, making it easier for children to improvise without sounding distant. An example of a background improvisation can include a drone of alternating pitches (such as C and G) to symbolize a walking tempo for the character. While a part of the class creates these musical elements, others act out the plot of the story. The whole class ‘performs’ with an ‘orchestra.’

Another key method in the Orff approach is improvisation. Within parameters set by the teacher, the child can successfully internalize the elements of rhythm, melody, and movement/dance.

Orff begins with the most basic of these elements— rhythm. Orff derives the most elementary rhythms from those naturally occurring in speech through spoken word and chanting. Rhythmic patterns in speech help the child to internalize rhythmic concepts. This allows for a more organic transition into other rhythmic activities such as body percussion (clapping, snapping, stomping),

playing on percussive instruments, movement/dance (marching, skipping, waltzing, and other ways of movement which align with other musical styles).

Similarly, the concept of melody can be taught from simple intervals from words. This can grow into visualizing a melody using solfege hand signs, or showing the relationship between pitches by growing tall for high pitches and shrinking for low pitches, or drawing a pitch contour drawing to understand and visualizing melodic lines. These activities help to reinforce the concept of melody visually as well as kinesthetically, and allows for an organic transition into reading music from a staff.

Activities using movement are also important to the Orff Approach. Movement integrates awareness of rhythm and melody. Early activities involve familiar, every-day movements to express these elements such as walking, running, jumping, and skipping. These movements are then structured and rhythmically organized to match musical patterns. Examples of such activities include moving or swaying to the instrument they are playing or listening to, performing simple choreography, or interpreting a character of a story through movement. These activities improve their confidence in expressing their emotions physically (Classics for Kids, n.d.).

In the context of emotional granularity, helping a child to become familiar with and aware of music's tempo, pitch, and their own physiological changes and intuitive movements, which is the first step in developing an understanding of what images, feelings, and emotions

arise from them, and, reversely, how to communicate these emotions using elements of movement, pitch, and tempo.

Prokofiev's *Peter and the Wolf*— A Symphonic Fairytale

If we delve deeper into how storytelling has been used in music education, a dominant and culturally significant example is *Peter and the Wolf*, composed in 1936 by Sergei Prokofiev. With the encouragement of Natalya Sats, the stage director of the Moscow Children's Theatre, Prokofiev composed the music and words for this 'symphonic fairy tale,' the goal of which was to introduce young children to the instruments of the orchestra. Sats recalls Prokofiev's words:

“In our story, there ought to be kind characters and evil ones, grumbling ones and joyous ones, difficult moments, and lighthearted moments. Children need to start with stark contrasts so they can more easily differentiate musical elements” (Inna Strelnikova, 2021).

As such, Prokofiev wrote a narrated text supported by a symphonic orchestra, wherein both of the elements of narration and music form bring the story to life. From a theoretical perspective, storytelling is a technique which can help with the development of emotional granularity; Construction of detailed personal narratives as well as practice in perspective taking develops a more precise use of language around emotion.

The story opens with the narrator setting the scene: “early in the morning, Peter opened the gate and entered the open green field.” The strings play a lighthearted, happy interlude to

support this imagery (Museum of Theatre and Music, 2020). Then we are introduced to a bird which is personified by a flute motif (below).



As the story continues, other animals enter with their respective instruments and motifs reflecting their characterization and action. Changes in timbre and tempo of these personified instruments signify changes in the mood.

Bird— fast, shrill, fleeting (flute)

Cat— sneaky, dangerous, low pitch (clarinet)

Duck— large, full sound, confident (oboe)

Introducing a child to the different instruments and their corresponding variations in style supports the development of sensitivity to acoustic cues in music. It is reasonable to hypothesize that sensitivity to these variations in acoustic cues generalizes to the non-musical context as is suggested in past research (Martins et al., 2021).

Improving Vocal Emotional Sensitivity using Musical Acoustic Analogues

As discussed in previous sections, advantages have been found for recognizing emotions from tone sequences that mimic the prosody of spoken sentences (Thompson et al., 2004). Additionally, characteristics of speech prosody mirror the tonal characteristics in the music of both tonal and atonal languages (Sundararajan et al., 2011). It is a well supported hypothesis that the cues used to express emotion in music and speech are highly similar (Juslin & Laukka,

2001b). This is interesting in the context of musical training, which has been found to strengthen vocal emotional recognition in the form of speech prosody and affect bursts (Martins et al., 2021). This finding provides solid support in leveraging music education in improving vocal emotional recognition.

The figure below appears in a paper by Juslin, Friberg & Bresin (1999), and shows how acoustic cues are expressed in music. This figure provides categorizations of emotional labels with musical elements and techniques, and can be a particularly useful aid in having concrete guidance in developing EG through music education. With the goal of even more complex granularity than the emotions listed below, more distinct emotions can be added, as well as their acoustic and prosodic musical analogues.

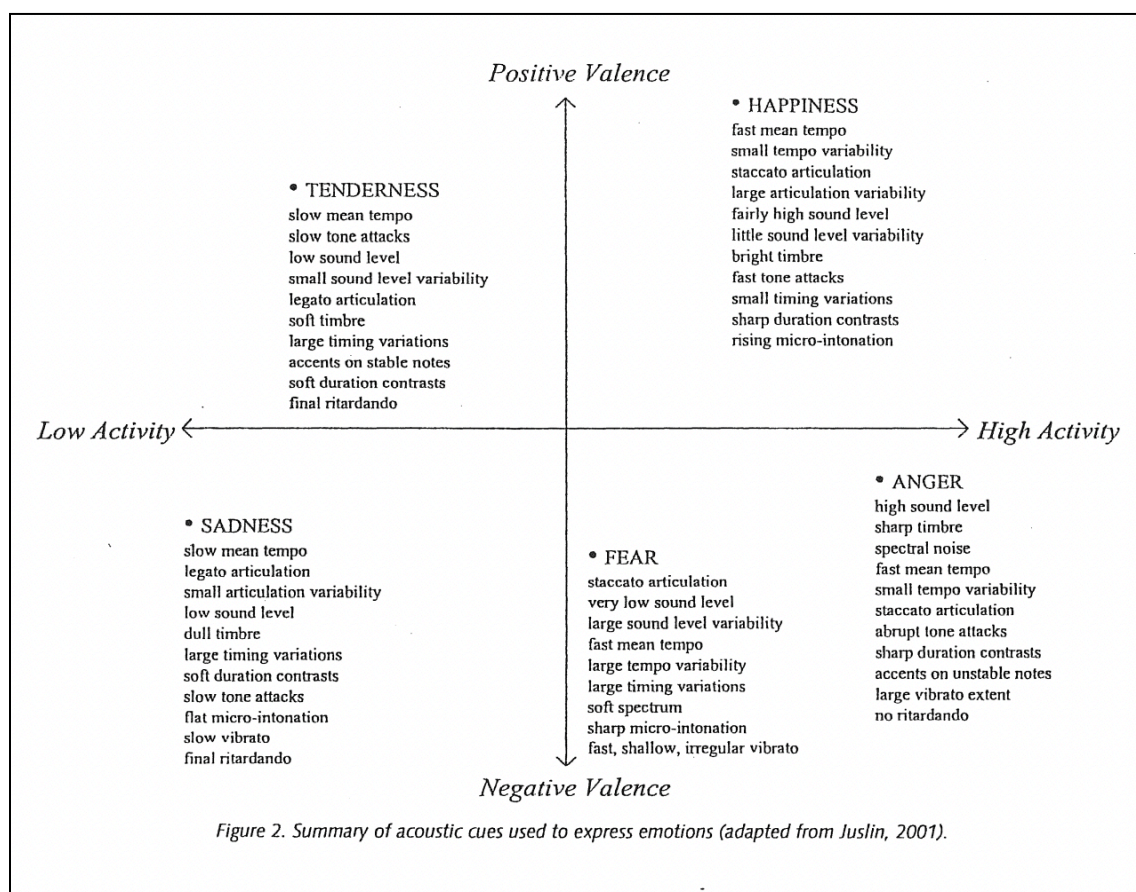


Figure 1. Summary of Acoustic Cues Used to Express Emotion

Music Therapy Techniques and Applications

Music therapy can help special needs children learn to identify and express their emotions, particularly for kids who have difficulties with verbal emotional expression. One technique used in music therapy is called the ISO principle, in which the music therapist plays music that matches with the mood and emotional state of the client, and gradually transitions to music of the desired mood state. This helps the client feel understood and establishes a connection between them and the therapist. For example, if the child feels chaotic, agitated, or confused, music can be played that reflects this state: many different instruments, a faster tempo, dissonance, and stark dynamic changes. Gradually, the music becomes more uniform, calm, and pleasing. In turn, the client becomes more centered and at peace (Berklee Online, 2018).

Another exercise used in music therapy uses improvisation techniques. In an exercise called *Emotion Radio*, a group stands in a circle and thinks of a certain word— this can be a color (ex: red), an emotion, feeling, or state (ex: hungry, tranquil), or a quality (ex: innocence). Everyone can freely express themselves using their voice, in song or not, and with movement and body language such as stomping, dancing, skipping, and facial expressions (Berklee Online, 2020). The goal of this exercise is to directly translate these ideas, adjectives, and concepts into sound.

Music Therapy for those on the Autism Spectrum

The research on the benefits of music therapy for those with ASD is well-explored, and it is recommended as an effective treatment intervention to promote social interaction, verbal communication, and social emotional reciprocity. It is theorized that emotional processing takes

longer for those with ASD due to there being more sensory information to process, which delays emotional responses. Due to differences in the rate of processing, approximately half of those with ASD have Alexithymia, a condition where individuals have trouble recognizing and describing how they are feeling which causes significant challenges in regulating emotional responses (Reframing Autism).

It is suggested that music may act as an external cue helping children with ASD feel a sense of organization and predictability (Jones, Carr, & Klin, 2008; Klin, Jones, Schultz & Volkmar, 2003). Music therapy provides a balance between a predictable framework— time signature, call and response patterns (in musical terms, antecedent and consequent), anticipation of resolution (cadence)— and individuality— improvised melody and modality, length of phrase, dynamics, among others. Music therapy can be used to improve social communication skills by facilitating natural turn taking, joint attention, non-verbal expression of emotional state, and increasing engagement (Reframing Autism).

A prior study done by Sivathanan et al. (2023) found that children on the autism spectrum score higher in emotional recognition (ER) in music compared to typically developing (TD) children. This is interesting considering that children on the AS score lower than TD children in vocal ER and facial ER. (Uljarevic & Hamilton, 2012). This suggests an intact— even strengthened— processing of musical emotions. It is possible the comfort in predictability of music, along with increased organization of neural firing by listening to or engaging in music, allows for better emotional recognition.

Other research has found that children with autism obtain significantly better understandings of emotions when they are described verbally while emotion-congruent music

plays in the background compared to verbal explanation alone (Katagiri, 2009). This has positive implications for the role that music therapy can play in the improvement of emotional recognition and granularity for those with ASD; Music can be a window to develop a deeper understanding and relationship with emotion, and consequently improve wellbeing, communication, and connection.

4. Conclusion: Notes for the Teacher

In a world increasingly dependent on technology, children are not receiving adequate guidance in communicating and understanding their emotions. Emotional granularity— or the skill of describing one’s emotional state with precise verbal accuracy— is vital for processing and regulating one’s emotions and connecting with others. We as music teachers have a toolbox—a toolbox which can now be supported, supplemented, and modified by research— with ways to teach a child about emotions through music. My hope is that the information presented in previous chapters will provide a new perspective on how music education can incorporate lessons in emotional granularity.

The first note for the teacher is to be cognizant of the fact that we all process emotional information in different ways. Children on the autism spectrum tend to focus on perceptual features of stimuli (such as tempo, timbre, pitch, mode) rather than more general features (such as the greater meaning of the music, or the imagery it evokes). Accommodating differences in processing may involve giving the student guidance in areas where they need support, such as in working through holistic aspects of music, or by teaching emotions in a way which targets their strengths, such as starting with localized perceptual features and then growing to a more holistic picture. Children on the autism spectrum have been found to understand emotions better when the verbal descriptions are supported by emotion congruent music. This is important information when we consider how to develop emotional granularity with this population.

It is also important to consider the linguistic and cultural background of the child. Having different vocabulary for certain emotions may influence how quickly or acutely an emotion is conceptualized and identified. Additionally, the prosodic and acoustic elements of a language-culture influence its music; children with different backgrounds may have various emotional associations with musical elements than you may assume. Lastly, the cultural and experiential background of the child influences the images that certain music evokes. Imagery plays a role in the cognitive appraisal of emotion, thereby impacting the affective response and identification in music.

Developing granularity through music is a process which should occur as naturally as possible. The Orff Approach, centered around discovery and play, integrates this idea well. Through sequential teaching methods for understanding rhythm, melody, and movement, the child becomes familiar with their intuitive inclinations for how to express and identify emotions. Bringing awareness of changes in physiology (heart rate, breathing rate, antsiness), as well as associations like memories or imaginative imagery, is a big stepping-stone in the process of the cognitive appraisal of emotions and granularity. As the child progresses in instrumental study, more nuanced elemental techniques, such as articulation and vibrato variability, can be taught in parallel with vocabulary of corresponding acoustic cues and emotional states.

I do believe that music teachers are fundamental in cultivating emotional granularity in children in today's society. Music is arguably one of the most intuitive ways a child can become comfortable expressing their emotions and become familiar with them. It is our responsibility to not just teach musical proficiency, but to instill in our students the emotional skills which will allow them to be strongly connected to themselves— and to each other.

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