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by Ryan M. Hourigan and Alice M. Hammel

Understanding the Mind of a Student with Autism in Music Class

Abstract: This article offers a unique look into the cognitive processes of students with autism spectrum disorder in music classrooms. Concepts include theory of mind, weak central coherence, executive function, joint attention, and social attention. Behavior implications are also examined. Specific examples of support tools for the music classroom are provided.

Keywords: ASD, autism, cognitive processing, executive function, joint attention, music, social attention, theory of mind (ToM), weak central coherence

In March of 2014, the Centers for Disease Control and Prevention (CDC) released the latest data on the prevalence of autism in America. According to the CDC, 1 in 68 children (1 in 42 boys and 1 in 189 girls) in the United States has Autism Spectrum Disorder (ASD).¹ Autism is defined as “a complex developmental disability; signs typically appear during early childhood and affect a person’s ability to communicate and interact with others. ASD is defined by a certain set of behaviors and is a ‘spectrum condition’ that affects individuals differently and to varying degrees.”² Through our national and international travel, we have heard from many music teachers who have been assigned to teach students in self-contained autism classrooms for the first time, many without necessary training or guidance. This article is designed to provide a look into the mind of a child with autism and

present strategies that lead to a more effective teaching environment for students with ASD who are in inclusive or self-contained classrooms. We hope this knowledge- and research-informed best practice will provide practical ideas for music educators as more children with autism enter our classrooms and ensembles.

One of the most fascinating parts of working with students on the autism spectrum is watching them make sense of the world. Often, the scope of our daily lives appears different to students with autism. There are some cognitive progressions we take for granted, such as processing information, decoding body language, or other social cues, that do not come naturally to these young people. This article divides these processes into different areas of consideration. These areas are theory of mind (ToM), central coherence, executive functioning,

How can educators help their students with autism succeed in the music classroom? Understanding the students’ perspective is a good start.

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Mr. Jimenez was hired to teach in a small school district. He is the only K–8 music teacher, and his schedule includes elementary general music as well as middle school choir and band. He described a particular Thursday to a colleague, wondering if there were things he could do to be a better teacher for his students.

My day begins with the fourth- and fifth-grade choir. They come to school early and are preparing for a PTA performance. We are working on [the songs] “Danny Boy” and “On Top of Spaghetti” as our salutes to Ireland and Italy. I was trying to get the kids to talk about the meaning of the songs to help them really start singing musically. As we were discussing “Danny Boy,” Thomas says the song is about bagpipes and begins to do a long monologue about the history of bagpipes and how they are made. I didn’t want to interrupt him because I know he has difficulty expressing himself, but the other kids started laughing and whispering. I asked him if he could finish after class, and he had a meltdown right there. It was frustrating. Then, when we started talking about the silly “On Top of Spaghetti” song, Michael got really upset because he couldn’t remember the words and didn’t understand how the meatball ended up a tree. A couple of the kids tried to explain that it is supposed to just be funny. Michael didn’t like that and began telling us all about Kylo Ren and was reciting words from the *Star Wars* movie *The Force Awakens*. It seemed like he was trying to calm himself down. I was very confused. I tried to get the kids back on track by asking them to audiate and then sing the resting tone to “On Top of Spaghetti.” Thomas is usually really good at this, but he looked confused and then just sat down when I asked him to sing the resting tone. When I asked whether “On Top of Spaghetti” was in twos or threes, Michael just started repeating more *Star Wars* script. It was a rough class.

My next class of the day is the middle school choir. It took them forever to get their music in order. I said it like four times. Finally I wrote it on the board for them. Some of the kids were completely distracted by my new posters about posture and breathing. I had to keep asking them to look at me instead of the wall behind me. I have to get them ready to sing “Carol of the Bells” for the winter concert, and I feel like I spend most of my time getting them organized and trying to get them to pay attention. After spending twenty-five minutes on “Carol of the Bells,” we were out of class time again.

I have elementary music next and was sure I had a perfect lesson planned. We started with the birthday song, and I asked the kids to say what they thought their partner wanted for a birthday present. Jeremy was partnered with Beth. He said he thought Beth wanted a Bionicle from *Pokemon*. Beth replied that she thought that was what Jeremy wanted, not what she wanted. Everyone laughed, and Jeremy rolled around on the carpet for a few minutes while I tried to get the class back on track. My next game was *Billy Sad*, where the kids take turns trying to get one kid to laugh when he is pretending to be sad. When it was Jeremy’s turn, he sat on the floor and smiled. I kept asking him to be serious and play the game the correct way. He kept repeating that he was playing the correct way. Was he being sarcastic? I wasn’t sure. Finally, I had to stop the game and we moved to the Orff instruments. I gave the kids five minutes to create an improvisation to add to the middle of our *Missy La Massa La* game. When I asked Allison to show me hers, she started crying and said she wasn’t finished. She asked for more time, but I can’t do that without making the rest of the class wait. I was sorry she was upset but didn’t know what to do. To end the class, we did some back-and-forth improvisation to *My Mother, Your Mother*. Jonathan did one response rhythm to Joachim’s call and then just refused to play anymore. Instead, he kept staring at the Boomwhackers right in front of him. It was another frustrating class. I think the kids were frustrated, too.

My last class of the day is band. Brian was just standing in the middle of the room staring at the fundraising prizes poster. He does that every day instead of looking at me for what to do. I really should move that poster. We have been working on concert C major, and Brian is having a really tough time with his D-major fingerings. I have told him and told him, but he keeps forgetting which pinky to use. At the same time, Ayana can never remember how to put her flute together. I know it’s embarrassing for her, but it is seventh grade, and she should know that by now. The flute often drops, or she comes to me with bent keys because she grabs them when assembling. I forgot to put the order of tunes on the board, and the kids took forever to do it— just like this morning. Is it Friday yet? I hope so, because Thursday was a disaster!

cognitive processing, and engagement. By understanding something of how music students with autism think, we can more easily find appropriate ways to provide musical opportunities for them.

Theory of Mind

One challenge students with autism face is theory of mind, “the ability to process information from another’s perspective.”³ In other words, students with autism struggle with understanding

the emotional intent or desires of other people. The key in this definition is separating self-beliefs and desires from the beliefs and desires of others. For example, if you ask a child with autism what a friend might want as a birthday present, the individual might answer by telling you what he or she wants instead. It is a difficult step to look or think of a peer, think of what he or she might want, and express that to someone else. This often takes practice and motivation.

Another challenge connected to ToM is emotion. Students with autism have trouble interpreting the emotions of others. For example, a student with autism may not pick up on body language, glances, looks, or other emotionally charged social cues. They also may not understand slang or simple gestures that other students exhibit. For example, a child with autism may not be able to perceive that someone might be angry, happy, or sad based on watching that person’s body language.

Music Education Implications

Music allows us to explore our emotions and is appropriate for all students, not just those with autism. When exploring a piece of music with a class or ensemble, be sure to provide detail about the intentions, emotions, and subject matter with students. Coordinate appropriate social exchanges necessary to include everyone in this study of repertoire. These types of explorations and explanations are good practice for students, especially with those who struggle to understand abstract concepts. For example, one of the authors teaches students with autism through a program at Ball State University (Muncie, Indiana) called The Prism Project.⁴ When practicing theory of mind, we used the song “I Love to Laugh” from the 1964 musical film *Mary Poppins*. As a part of this process, we explored things that make people laugh, such as jokes. We realized that many of our students had never learned how to tell a joke. The process evolved into learning how to tell knock-knock jokes and other socially appropriate techniques for inducing laughter.

As students get older and continue to learn age-appropriate literature, it becomes essential to discuss relationships, love, death, violence, and other themes found in the text or musical intent of repertoire. For some students, these discussions are natural and thought-provoking and not necessarily difficult to comprehend. There are other students, however, who need to practice and learn about the “mental states such as memories, beliefs, [and] desires” of others. We are assisting the development of their theory of mind by constructing discussions that lead to better understanding of emotional intent and the desires of others.

Weak Central Coherence

Another fascinating cognitive function that can appear in students with autism is *weak central coherence*, defined as “a tendency to focus on the local rather than the global aspects of an object of interest.”⁵ This is thought to come from

an inability to organize incoming information. Students who struggle with weak central coherence might exhibit this in two ways: First, they may have trouble organizing information. For example, the class may sing a piece of music that has a story line in the lyrics. Students on the autism spectrum may have trouble stringing together the entire story and can only tell you small segments. They may spend more time decoding or listening information about the piece than putting together the larger, more important global theme of the piece.

Another way students with autism exhibit weak central coherence is through hyperfocusing on a topic while seeming to neglect the larger ideas. For example, you might encounter a student who is really into *Star Wars*. He or she may be able to list all the *Star Wars* characters in a particular movie. This student can name them, tell you what planet they are from, and all the facts that go along with the character. However, when you ask about the story line or how the characters connect with each other, the student gets confused or cannot tell you. In addition, larger abstract concepts are also difficult for students with ASD. When you ask the same student to tell you which characters are allies and which are enemies, who loves whom, and so on, he or she may not understand your question.

Music Education Implications

Visually mapping themes or story lines in music can be very beneficial for students with autism (and frankly, for all students). An example of a song that can challenge the central coherence abilities of students with autism is “On Top of Spaghetti” (see the lyrics in Figure 1).

For students with ASD, the continuing saga of the meatball can be very confusing. It is important, however, that they begin to learn to follow story lines, even absurd ones, as that is what their same-age peers are doing. By creating visuals for each portion of the story, we can show students who have strong affinities for visual presentation the meatball as it travels through the verses

FIGURE 1

Lyrics for “On Top of Spaghetti”

(To the tune of the American folk song “On Top of Old Smokey”)

On top of spaghetti
All covered with cheese,
I lost my poor meatball
When somebody sneezed.

It rolled off the table
And onto the floor,
And then my poor meatball
Rolled out of the door.

It rolled in the garden
And under a bush,
And then my poor meatball
Was nothing but mush.

The mush was as tasty
As tasty could be.
And early next summer
It grew into a tree.

The tree was all covered
With beautiful moss.
It grew lovely meatballs
And tomato sauce.

So if you eat spaghetti
All covered with cheese,
Hold on to your meatballs
And don't ever sneeze.

of the song. This visual adaptation is one that all students will appreciate and is an excellent example of an inclusive technique that also meets the needs of students with ASD.

In addition, if we embrace topics of particular interest (e.g., animals, dinosaurs, *Star Wars*), the theme can make for an interesting project. For example, let's say a student in a class is highly interested in clocks. This student can tell you about all the major clocks in the world, where they are located, and so on. A music educator may decide to assign a project based on clocks. What kinds of sounds come from clocks? How can clocks make music? Can we

TABLE 1**Prefrontal Functions of the Brain (Related to Executive Dysfunction)**

Working memory: The term *working memory* refers to a brain system that provides temporary storage and manipulation of the information necessary for such complex cognitive tasks as language comprehension, learning, and reasoning.

Planning: A scheme, program, or method prepared before the accomplishment of an objective.

Impulse control: An inability to control actions. Impulse actions are typically preceded by feelings of tension, rage, and excitement and followed by a sense of relief and gratification, also—but not always—accompanied by guilt or remorse.

Shifting set: Shifting set refers to the process of updating or “shifting” cognitive strategies in response to changes in the environment.

Initiation and monitoring of action: Refers to the ability of a person to initiate and monitor their own actions.

Inhibition of prepotent response: Involves deliberately inhibiting dominant, automatic responses. Persons with autism can have difficulty inhibiting a dominant response for a correct response.

compose a song based on sounds of clocks?

These projects allow us to gain engagement from a student who might otherwise have difficulty participating. For a student with autism, this can increase his or her ability to globalize a topic of interest and broaden the individual’s knowledge base as the student learns how to better communicate with others.

The added benefit of projects like the clock project is there may be other students with an interest in clocks. To know you have a common interest with another student in the class creates much needed social interaction between students regardless of disability. Assigning a project to present to the class benefits both students. Clocks can also be interdisciplinary. Collaboration with a science or math teacher who is also addressing central coherence and engagement goals can enhance the experience for everyone.

Executive Function and Cognitive Processing

Executive function refers to the use of several functions in the brain and includes planning, working memory, impulse control, shifting set,

and cognitive flexibility.⁶ Table 1 was adapted from *Teaching Music to Students with Autism* to clearly define these functions.⁷

When viewing Table 1, many connections to the music classroom become apparent. For instrumental music classrooms, executive function affects executive skills. These include fingerings, posture, hand placement, breathing, bow technique, and other skills that require cognitive flexibility. In vocal music classrooms, executive function can affect tone quality, posture, breathing, standing when singing, text memorization, dynamics, blend, and balance. In a general music classroom, executive function includes posture, instrument positioning, singing in a head voice, part work, remembering folk dance steps, and blend and balance when singing.

Another important challenge for students with autism is *cognitive processing*. Many students on the spectrum have processing delays and need more time to decode and plan as they process instructions and prepare responses. These delays are connected to areas of function listed in Table 1. For example, students who have difficulty remembering terms and phrases used during class will take longer to process a question and provide

TABLE 2**A Task Analysis for Preparing to Play the Flute**

Ayana’s Band List

1. Walk to the band room.
2. Get flute from the instrument room.
3. Get folder from the cabinet.
4. Sit in the chair with the purple seat.
5. Put the folder on the stand.
6. Put the flute case so the happy face is on top.
7. Open the flute case.
8. Get the head joint out of the case.
9. Hold the body of the flute at the top away from the keys.
10. Put the head joint into the body of the flute.
11. Hold the foot joint away from the keys.
12. Put the body into the foot joint.
13. Line the head joint and foot joint with the green stickers.
14. Put the case on the floor under the chair.
15. Open the folder.
16. Read the list on the board and put the music in the correct order.
17. Put a pencil on the stand.
18. Show the teacher a thumbs-up.

a response. Because of this delay in processing, it is necessary that these students be provided additional time when asked to engage in recall of information and when immersed in generative creativity.

Music Education Implications

A task analysis is a great way to break down a set of information into small steps for students who struggle with executive function and cognitive processing. Table 2 is an example of such an analysis for a student in band class.

Another concept to consider is time. Many IEPs of students with ASD include the requirement that the student have more time to complete tasks. There are several ways to implement this,

including the use of technology. For example, when teaching scales to instrumental students, use a smartphone to video record a student playing the scale correctly. Rerecord the video from the angle of the hand showing the fingers for correct fingering. Post or text this video to the student or parent and allow the student to rewind and review as often as needed. This simple and accessible technology can enhance the learning environment for students with ASD while demonstrating appropriate instrumental executive skills. It also provides necessary cognitive processing time.

Joint or Social Attention

“Social interaction starts with a child’s ability to be attuned to others’ faces, read expressions, listen to verbalizations, observe body gestures, and integrate all these stimuli into meaningful interaction.”⁸ This type of interaction is similar to music interaction between a music student and teacher. We need to be attuned to the conductor’s face and hands, read facial expressions, listen to verbalizations, and observe body gestures for a meaningful musical experience to occur. However, many students with ASD struggle to put these concepts together. Research has shown that the challenge for students with ASD arises because of the presence of weak central coherence as it applies to joint and social attention. The social attention of students on the spectrum gravitates to visual items that are nonsocial in nature (e.g., trains, vehicles, road signs, or items of hyperfocus) instead of faces, body language, and so on.⁹

It is important to reduce distracting items from visual sight lines of students with ASD. For example, removing brightly colored hand drums, egg shakers, or anything that encourages distraction can increase time on task and music-making.

Reciprocation and Joint Attention

Students with ASD need practice exchanging thoughts and ideas to increase joint attention. Keeping track of the number

of exchanges or times a student reciprocates a verbal or musical exchange is an important part of assessing joint attention. Increased exchanges lead to longer engagement and therefore more time in the moment during music.

An early childhood example is the use of a ball as you and the student, or two students without a teacher, sit on the floor facing each other. While singing, the ball can be rolled to the student. The student is then asked to roll the ball back to the teacher or other student. The number of successful exchanges can be tracked as they gradually increase with time and practice.

Cognition, Emotion, and Behavior

Through careful attention to theory of mind, central coherence, executive function, cognitive processing, joint attention, and social reciprocation, classroom behaviors can be greatly improved. Of course, classroom behavior and ASD is complicated and would require an entirely new article (or set of articles). For the purpose of this article, we examine how cognitive challenges affect behavior.

Many students with autism have a comorbid (simultaneous) diagnosis of anxiety disorder.¹⁰ This causes them to limit the number of risks they take in the classroom and can inhibit their ability to process and provide appropriate responses during instruction. Therefore, anything we can do to support and encourage students as we indicate they are progressing and doing well will promote further positive behaviors. Most important, our efforts can create a feeling of safety within the classroom and a positive culture that encourages participation and risk taking. For example, in the area of executive function, providing a clear set of multimodal instructions and a consistent schedule can promote student well-being and lessen anxiety. Schedules of daily class activities and repertoire order listed as text or pictures can be very helpful.

Students with autism can express discomfort and anxiety within a learning environment in ways that differ from

Some Exceptionalities Resources for Music Educators

- A. M. Hammel and R. M. Hourigan, *Teaching Music to Students with Autism*, 2nd ed. (New York: Oxford University Press, 2017).
- A. Hammel and R. M. Hourigan, *Teaching Music to Students with Special Needs: A Label-Free Approach* (New York: Oxford University Press, 2011).
- E. Sobol, *An Attitude and Approach for Teaching Music to Special Learners*, 3rd ed. (Lanham, MD: National Association for Music Education/Rowman & Littlefield, 2017).
- *Children with Exceptionalities Special Research Interest Group* Website: <https://sites.google.com/site/exceptionalitiessrig>
- R. M. Hourigan and A. M. Hourigan, “Teaching Music to Children with Autism: Understandings and Perspectives,” *Music Educators Journal* 96, no. 1 (2009): 40–45.

the way their peers do this. In addition, students with ASD may not have the same level of emotional understanding as their peers do.¹¹ The key to classroom management success and students with autism is structure. Students with ASD rely on structure to curb anxiety. The anxiety must be manageable before they can learn. We can continue to improve our ability to provide comfort as we create appropriate ways for students to appropriately express feelings when they are frustrated or anxious. Some teachers have had success using a picture card that can be shown to the teacher or a verbal cue that demonstrates the need for a break. If the student attends music with a paraprofessional, the signal can be managed through that relationship. Whatever the tool is, discussing procedures in advance and creating as much consistency as possible with plans used in other parts of the school day will be most effective.

Increasing Engagement

Research has shown that 40 to 50 percent of school-age students with autism

have comorbid cognitive deficits.¹² Once we grasp the unique cognitive processes of a student with autism, it becomes easier to find content and provide a learning environment that is appropriate for them. The added benefit is that students can be more engaged and find meaning in music. Behaviors can be much easier to manage when we find where cognitive interruptions occur, additional processing time is available, and emotional and social cues can be decoded. Allowing students to pursue some of their own interests can also increase potential engagement for students with ASD (and all students). International researcher Nirit Bauminger-Zviely states, “Making sense of social and emotional needs requires accurate processing of a ‘bank of knowledge’ about social norms and rules, and emotional recognition and understanding capabilities.”¹³ Assisting students with autism with a “bank of knowledge” based on appropriate musical, social, and cognitive cues will enhance their musical

experience as they move through the K–12 music curriculum.

NOTES

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2. Autism Society of America, “What Is Autism,” accessed July 27, 2016, <http://www.autism-society.org/what-is>.
3. Brook Ingersoll and Allison Wainer, “The Broader Autism Phenotype,” in *The Handbook of Autism and Pervasive Developmental Disorders*, 4th ed., ed. Fred R. Volkmar, Sally J. Rogers, Rhea Paul, and Kevin A. Pelphrey (Hoboken, NJ: John Wiley and Sons, Inc., 2014), 28–56.
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6. Ingersoll and Wainer, “Broader Autism Phenotype,” 39.
7. Alice M. Hammel and Ryan M. Hourigan, *Teaching Music to Students with Autism* (New York: Oxford University Press, 2013).
8. Nirit Bauminger-Zviely, “School-Aged Children with ASD,” in *The Handbook of Autism and Pervasive Developmental Disorders*, 4th ed., ed. Fred R. Volkmar, Sally J. Rogers, Rhea Paul, and Kevin A. Pelphrey (Hoboken, NJ: John Wiley and Sons, Inc., 2005), 150.
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10. Connor M. Kerns and Phillip C. Kendall, “The Presentation and Classification of Anxiety and Autism Spectrum Disorder,” *Clinical Psychology: Science and Practice* 19 (2012): 323–47.
11. Bauminger-Zviely, “School-Aged Children,” 154.
12. Ibid.
13. Ibid., 153, 154.

Mr. Jimenez studied some articles about ASD and followed the suggestions. He was surprised at how quickly his days, especially Thursdays, improved. He asked the same colleague if they could meet for coffee after school a few months later to talk about the differences in his teaching:

Things are so much better! Here’s a rundown of today. The preparation for the PTA program got much better. I started getting pictures from Google Images to go with the songs we are doing and used them to help the kids understand the meanings behind the words and phrases. This was especially funny as I went through what I called the life cycle of a meatball for “On Top of Spaghetti.” The kids loved it, and I let Thomas sing and hold the pictures while we performed it. “Danny Boy” went really well also after I took small parts of it at a time and related it to their lives. We also ended with a composition Michael helped write that goes through the journey Kylo Ren takes in the film *Star Wars: The Force Awakens*. He loved working with some of the other boys on this, and the other boys were really good about reminding Michael of the story line when he would start stating facts and saying the script.

Choir got much better after I rearranged the risers so they weren’t facing the colorful posters and bulletin board. I always put the order of songs on the board now, and it saves a lot of class time. I am also doing more than one piece during a rehearsal, and things actually go faster that way. The kids are much better behaved, too.

The most improved class, though, is my third-grade elementary music class. I started doing many more activities during class and now include visuals and kinesthetic activities for everything. I review appropriate responses before we do an activity and have been giving Jeremy and Allison extra time to answer questions and complete their improvisations. I put the Boomwhackers in the closet and have been counting Jonathan’s rhythmic improvisation responses. He is up to three times now! I am going to be sure to tell his teacher before his next IEP meeting.

The band has shown a big improvement as well. I made a video of the D-major scale for Brian and sent it to his mom’s phone. He started watching it every night and copying the fingerings. His tone has gotten better as well. He was really proud when he checked that scale off in class one day. Oh, and for Ayana, I made a list of the steps she needed to do to put her flute together. She used it for about three weeks and now doesn’t even need it anymore. I feel like a better teacher and am nowhere near as frustrated anymore. Thanks for your support!