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How Do You Hear That? Autism, Blindness, and Teaching Music Theory

Jon Kochavi

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On Hearing

[1] In the documentary film *Touch The Sound*, which examines Evelyn Glennie's life as a deaf percussionist, Glennie remarks,

> If someone asks me: 'Oh well, how do you hear that?' — then I simply say: 'I really don't know, but I just basically hear that through my body, through opening myself up. How do you hear that?' . . . So, when you try to bounce the question back to a so-called hearing person, then they simply do not know how to answer these questions. So therefore, why should I be put in that position?

[2] Hearing is very much a subjective experience, difficult to put into words. As "hearing" people, we find it very difficult to understand Glennie's experience with music. The question "How do you hear that?" is really a substitute for the more dubious question "How *can* you hear that?" Reinterpreting the question using the former, more inclusive meaning, Glennie still casts doubts on its intentions. Her experience with music is different, but no less valid than that of a "hearing" person's.

[3] Music theory is often taught to reflect "normative" hearing. Alternate hearings are discouraged, or are at least marginalized in the classroom. Where does this leave people like Glennie whose aural understanding of music falls so far out of the norm?

[4] Autism and blindness both carry with them particular experiential differences that extend to multiple perceptual realms. Normative hearing is profoundly redefined for people with these "disabilities." In this paper, I would like to make some observations about experiences I have had with two people named Noah and Laura. Diagnosed with autism at age 19 months in 2005, my son Noah developed a deep sensory connection to music and sound early in life. One year after Noah's diagnosis, Laura, a blind student with special musical talent, enrolled in my first year music theory course at Swarthmore College. I don't wish to suggest the approaches that Noah and Laura take to understanding music are generalizable to all members of their respective demographics; it is enough to understand how their modes of hearing are deeply affected by their "disabilities," which can give us some insight into the wider spectrum of musical understanding.

[5] In searching for ways to connect with my son, whose verbal and social communication skills are limited, I have found music to be an invaluable resource. I would like to address my experience as a father trying to make sense of his son's world, viewing it through the prism of his understanding of and experience with music. My experiences with Noah have had a

strong effect on my approach to teaching Laura, and I would also like to compare her modes of hearing and experiencing music to his.

Theories of Autism

[6] In current psychological literature, there are three prevailing theories of autism designed to subsume the condition's many symptoms and diagnostic criteria. The first identifies a *lack of theory of mind* in individuals with autism, the inability to ascribe mental states to others. *Impairment of executive function* highlights the difficulty with hierarchizing thoughts and actions, producing obstacles towards initiating or inhibiting immediate actions. Finally, *weak central coherence* (WCC), which I will concentrate on here, posits an inability to see things holistically, finding a focus on details to the exclusion of the big picture. A classic example of WCC in autism is found in Daniel Tammet's book *Born on a Blue Day* (2006), in the diagram reproduced in **Figure 1**. When asked to identify the letters they see, autistic individuals are more likely to see an A on the left and an H on the right than their typically developing peers, who will see the opposite.

[7] Note that all three of these theories are deficit models of autism, emphasizing inability over difference. Indeed, in the research literature, there is a tendency to position even seeming strengths resulting from cognitive difference as weaknesses. This is most clearly evident in the theory of WCC. It is not difficult to imagine how WCC could be advantageous for certain tasks. A simple example involves visual illusions, to which individuals with autism seem less susceptible. Studies have shown that those with autism are more likely to correctly identify the two horizontal lines in **Figure 2** as having the same length. In fact, a recent article summarizing this result (Rajendran and Mitchell 2007) indicates that the typical autistic interpretation goes beyond simple WCC-aided accurate processing of the visual illusion: "Individuals with autism succumb to visual illusions . . . when asked 'which line looks longer,' but not when asked 'which line is longer.'" Of course, there is no "succumbing" here at all – the top line does indeed 'look' longer than the bottom one, and the varying answers emerge from a keen awareness and literal interpretation of the wording of the question itself. The authors' assumption that there is no meta-processing going on in the mind of the autistic person as she views the illusion is seriously flawed, resulting from a bias towards equating difference with deficit.[(1)]

Absolute pitch and temporal gestalt

[8] While it is difficult to isolate and categorize many of the ways in which an autistic person experiences music differently from the typically developing listener, one discrete ability can at least be isolated: absolute pitch (AP). It is estimated that the occurrence of AP in the general North American population is approximately 1 in 10,000. While the rate of incidence is higher among those with early musical training (beginning between the ages of 3 and 7) as well as those with family members who have AP, the ability is still considered rare among these demographics. The limited data on autistic individuals indicates that the rate of AP in the population is as high as 1 in 20. So we can use AP to at least point us in the direction of how the hearing experience may differ among those with autism.[(2)]

[9] Traditionally, possession of AP in an autistic individual is seen as a manifestation of WCC: the attention of the autistic listener is diverted to the individual notes at the cost of understanding the musical whole. I first became aware of Noah's AP shortly after he turned three, and even at that early stage, it was clear that the WCC portrait of musical understanding was too simplistic and narrow to encompass his mode of hearing. Well before turning two, Noah had demonstrated an extraordinarily receptive musical memory that was tied to neither linguistic cues (for most typically developing children, words reinforce melody recall and vice versa) nor particular keys (transposition posed no problem to his melodic recognition skills).

[10] Noah's form of AP is particularly robust. He can identify pitches instantaneously with perfect accuracy in any timbre, be it piano, strings, brass, or car horns. When his non-AP possessing father sings him a note that is outside of the A440 chromatic scale, he will inform Noah that his note is a little higher than an F, or halfway between a B and a C. In addition, Noah can sing a named note out of context, without hesitation (sometimes called "active AP").

[11] Less consistent with WCC's pat explanation of musical understanding is Noah's contextual interpretation of pitch. By age four, he could identify intervals and chord types upon hearing them, with a speed that precluded the possibility that he was comparing individually-heard pitches to an abstract template. He also displayed functional understanding by correctly identifying typical (unsounded) resolutions to tendency chords played in context (e.g., dominant-seventh chords). This understanding of functional progression perhaps contributes to his hierarchical interpretation of pitches in the scale: he can determine the key of a given piece, even if it is a complex orchestral score (as long as the tonality is clearly projected). Finally,

his AP has no detrimental effect on his conceptualization of relative pitch. One of his favorite activities at age three was to walk around the house improvising melodies, singing each note on a number corresponding to diatonic scale degree. Adjusting the particular note that corresponded to the scale degree numbers (effectively employing a moveable-do system) posed no difficulty, indicating that he was hearing his melodies hierarchically within the context of the reference scale he chose. While the theory of WCC predicts a discrete approach to processing, Noah's understanding clearly exhibits features of grouping that Jeanne Bamberger calls a *temporal gestalt*. While Bamberger uses the term primarily in the context of chunking rhythmic units of music together, here I expand on the meaning to encompass contextual understanding of pitch across the two dimensions of time and register.

[12] There are elements of Noah's musical processing that do fall outside a typical gestalt approach to musical perception. He pays less attention to long-range melodic motion, contributing to a disinclination to hear melody primarily in terms of phrase and period. In addition, associating melodic gestures with rhythms is not natural for him and he tends to separate these two components. For typically developing listeners, rhythm is instrumental for memorizing and thus recreating melody, but Noah relies on other features of the melody itself, such as scale degree and the presence (or absence) of conjunct motion. Playing the altered melody in **Figure 3** for a listener familiar with the source tune would likely not affect their ability to identify the melody. Phrase beginnings and endings are present, and the characteristic dotted rhythms at the ends of the phrases are maintained. However, for Noah, this altered melody has extracted the most aurally significant feature of the tune, the conjunct descending line in the middle of the two phrases, drastically altering the nature of the melody to his ears. Since phrase and rhythm are much less prominent as musical markers for his expressive recreation of melody, Noah will often make what a typically developing person would identify as errors when he tries to sing a melody, even a very familiar one, from memory. Of course, his own evaluation of the correctness of a typically developing singer's recreation of a melody is likely to reveal "errors" that are typically glossed over (e.g., relative dynamic level and articulation).

[13] In short, despite its superficial application to AP, a blunt theory of WCC fails to reflect Noah's nuanced experience with music. Not only do features of his musical experience directly conflict with the basic principles of WCC, but the theory's unwavering perspective equating its explanatory power with the identification of deficit negates the validity of the elements of his experience that are consistent with the theory. From the vantage point of both a father and a music theory educator, I find this unhelpful at best, dangerous at worst.[(3)]

AP and Blindness[(4)]

[14] There is also a strong connection between possession of AP and blindness (or more accurately, early-onset blindness), although even fewer research studies have investigated this phenomenon as compared to the AP-autism correlation. One recent study (Hamilton, Pascual-Leone, and Schlaug 2004) observed a 57% rate of AP occurrence among blind musicians, and pitch discrimination among the blind appears to be significantly more acute than among sighted populations (Gougoux et al. 2004).

[15] Laura lost her sense of sight after illness when she was only 15 months old. She entered my class as an accomplished singer and pianist, but with no knowledge of sighted or Braille musical notation, having learned repertoire exclusively by ear. She also has AP, but her form of AP differs significantly from Noah's. First, it is timbrally specific: unless a pitch is played on a piano, Laura has a difficult time identifying it precisely. However, on the piano her AP is highly reliable and instantaneous. Furthermore, unlike Noah's AP, Laura's is purely receptive: she can't sing a named note out of context, although she can usually come fairly close, probably due to proprioceptive awareness and memory.

[16] Both her blindness and her AP have deeply affected Laura's sense of temporal gestalt. Like many possessors of AP, Laura initially found it difficult to hear intervals and chords as units themselves as opposed to groupings of individual notes.[(5)] However, the WCC-type processing strategy was balanced by Laura's striking gestalt approach to musical phrase and form. In order to learn to perform vocal and piano music, Laura needed to chunk and group units in a musically meaningful way from very early on in her musical training. Her keen awareness of period, phrase, and subphrase was unaffected by the artificial divisions built into traditional sighted notation, such as barlines. Long-range melodic hearing was natural for her. Indeed, cadences and musical division markers took on special prominence for her, not simply perceptually but practically as well, carrying with them an imagined physical implication difficult for sighted musicians to completely understand.

[17] Although well-versed in repertoire, Laura approached music with no preconceived notion of metric categorization. That is, being unfamiliar with standard time-signature indications, Laura mentally organized the metric hierarchy of a piece based on her own gestalt interpretation of rhythm and accent (in the broadest sense of the term). While her metric "chunking"

would correspond to the notated measure in some music, in other contexts it would encompass hypermeasures. In still other works, her chunks would correspond to divisions of the notated beat. Metric understanding that departs from notated meter is not unusual for typically developing listeners, of course (the scherzo from Beethoven's *Ninth* being a familiar example), but most experienced listeners who read music have been trained to identify and organize the tactus based on time signature. Laura's metric understanding of a piece was not immediately tied to tactus, but instead grew out of a combination of musical elements (surface rhythm, melodic gesture, phrase structure, etc.) influenced by her approach to learning a piece for performance.

[18] It is clear that while both Noah and Laura have AP, the ways in which their AP and their disabilities affect their musical experience are quite different. In fact, the aspects of their experience that seem connected to WCC are nearly complementary, speaking to the wide range of musical interpretation embodied even in just two individuals.

Approaching disability

> Should I begin to think of myself not as a person disabled by a defect but empowered by a capacity?
>
> – John Hull, *Touching the Rock* (1991)

[19] The deficit model of disability equates disability with deficiency. The "normal" is upheld as the ideal. Remediation of the afflicted is achieved through compensatory mechanisms; in other words, the attempt is made to change the individual as much as possible in order to bring them closer to the spectrum of "normalcy." The social model of disability, on the other hand, expands the definition of what normal is to encompass a wider array of human experience. Rather than marginalizing and explaining away these individuals' experiences, we can embrace them and validate them as legitimate interpretations of the subjective world in which we all live. While members of disabled groups must adapt to some degree to function in a society that by and large views them as "others," in the microcosm of academia we must be acutely aware of the biases that we bring to the classroom as representatives of the "typical" demographic (if that is indeed where we identify ourselves). This is particularly true in the music theory classroom, in which the degree of subjectivity of hearing is especially high. While my son's unusual conception of music did not jibe well with Laura's, awareness of his difference contributed to my much more inclusive approach to teaching music theory in a classroom with her. Encouragement and exploration of alternate hearings—whether a product of disability or not—has become a staple in my theory courses since this time.

Jon Kochavi
Swarthmore College
jkochav1@swarthmore.edu

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Footnotes

1. Some recent research has proposed an alternative hypothesis, "intense world syndrome," to explain autism without resorting to the deficit assumption. H. Markram, Rinaldi, and K. Markram 2007 identify "excessive neuronal information processing and storage in local circuits of the brain... [causing] hyper-perception, hyper-attention, and hyper-memory that could potentially explain the full spectrum of symptoms in autism" (77).
Return to text

2. There is evidence that the connection between AP and autism emerges from common genetic and neuropsychological processes. See Brown et al. 2003.
Return to text

3. For an argument detailing the potential startling benefits of viewing the autistic experience of music as a particular cultural response (as opposed to a defective hearing), see Headlam 2006.
Return to text

4. I gratefully acknowledge Laura for her willingness to share her personal experience, as detailed in this section, with me, as well as her enthusiasm for communicating this experience to others through this paper.
Return to text

5. See Miyazaki 1993 and 2004, which actually position AP possession as a disability based on difficulties with relative pitch tasks, and Marvin 2007 for ways in which classroom adaptation can mitigate this seeming disadvantage.
Return to text

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