In G. MacPherson (ed.) The child as musician: Musical development from conception to adolescence. Oxford, U.K. Oxford University Press.

What Develops in Musical Development? A View of Development As Learning

Jeanne Bamberger

> And we must bear in mind that musical cognition implies the simultaneous cognition of a permanent and of a changeable element, and that this applies without limitation or qualification to every branch of music. We shall be sure to miss the truth unless we place the supreme and ultimate, not in the thing determined, but in the activity that determines. (Aristoxenus, cited in Strunk, 1950, p. 31)

> But in our zeal to explain music, it has been tempting to forget the hypothetical and constructed nature of such categories and to imagine that it is these ideas themselves that have the power to produce our experience (Hasty, cited in M. P. Soulsby, et al, 2001, p. 3).

Introduction

Re-visiting my earlier studies of musical development now from a greater distance, I find that many aspects need to be re-thought. For example, in the case studies of children from which most of my results have been drawn, the influence of cognitive developmental theory tempted me to focus more on the regularities I could find in their behavior, while underplaying the anomalies and enigmas that are often more telling with respect to development. Further, I find that I stopped too soon — specifically, before the emergence of aspects that would help to illuminate later phases in the course of musical development. What, for instance, might we mean by *musical complexity* and what are the apparent *simplicities* from which it grows?

In this chapter I expand the field of interest to provide a broader and also more detailed framework for thinking about musical development. For example, in the quote that heads this chapter, the 4th century, B.C.E. music theorist, Aristoxenus, confronts head on a paradoxical presence in musical cognition—the simultaneous presence of a permanent and a changeable element. Asking, what do we take to be "progress" in musical development, there will be a primary focus on the tension between the permanence of the score and the perceived changeable meaning of entities it encodes. In turn, I will ask: how is "progress" related to notions of musical complexity—in the unfolding of a developing composition, and in developing a "hearing" and a performance of it, as well?

Hasty raises a related enigma: What is the role of our analytic categories and what are their implications in coming to understand the development of musical *experience*? What assumptions are implicit in a particular analysis and how do these influence our understanding of how musical experience develops in expected and unexpected ways?

Enigmas and Organizing Constraints

In confronting these enigmas of musical development, I will make a first and basic assumption: developing a "hearing" of a composition as it unfolds in time is a *performance* and performances (both silent and out-loud) involve a process of active, sense-making occurring in real-time.[1]

[1] The basic sense of a "hearing" which I use throughout the chapter derives from common practice among musicians. For example, one member of a quartet might say to another, "But how are you *hearing* that phrase—beginning on the downbeat or on the upbeat of the previous measure?"

But to say this only raises more enigmas: First, a hearing as it is happening is, perhaps paradoxically, a silent affair; by its very nature it is private, an internal experience. And since one cannot hear the hearings that another makes, how can we study how hearings develop and change?

Second, and it is to this that much of what follows is addressed: If, in our performances, we are actively organizing incoming musical phenomena as it is occurring through time, what are the present, momentary constraints we bring to bear in guiding these generative organizing processes? How do these constraints evolve, develop, and change, and how can we find out? Putting it another way: in our creative responses back and forth with material out there, what are the productive interactions and even tensions among organizing constraints that shape our potential for making coherence in particular ways?

In using the term, constraints, I am influenced, in part, by Stravinsky (1947) who couples the term not with a sense of restriction or containment but rather with a role in creating freedom. He says, in *The Poetics of Music:* "The more constraints one imposes, the more one frees one's self of the chains that shackle the spirit" (p. 64).

Cognitive Developmental Traditions

Despite the wide and varied studies of cognitive development over the last several decades, certain criteria for "progress" are generally shared among them. Briefly, cognitive developmental progress is characterized as transformations that occur over time in how individuals organize their perceptions and the strategies they bring to bear in constructing their understandings of the world around them:

- Initially, young children participate primarily in present, but passing contexts in which properties, events, and relations change their function and meaning in response to their unique embedding in these immediately experienced situations.
- Subsequently, the older child is able to subsume the flux of the passing moment through the mental construction of outside fixed reference systems in relation to which properties are abstracted from a present context, invariantly named, placed, classified, and their relations consistently measured.

It is not surprising that in the spirit of these traditional trajectories, musical developmental studies have typically focused on "progress" as meaning the capacities of children to abstract, name, measure, and hold musical elements constant (e.g., pitch, duration, interval) across changing contexts (For an overview of this research, see R. Shuter-Dyson, 1982**.)** In response, much early music instruction tends to give primary attention to musical "literacy." It is at least tacitly assumed that through learning to recognize and produce a notated pitch and to name it as the same when or wherever it occurs, the child will learn to overcome earlier responsiveness to the continuous fluctuation in the properties of objects according to the change of situation.

It is important to remember, in this regard, that because of their power and efficacy in providing stable "things to think with" and shared means of communication, professionals and educators in all disciplines give privileged status to symbolic notations and theoretic categories associated with their domain. However, the utility of these symbolic expressions depends importantly on the cogent and effective selections made over time with respect to the kinds and levels of phenomena to which symbolic expressions in a discipline are to refer.

As a result of this evolving selectivity, symbol systems associated with all disciplines are necessarily partial and they are so in two senses: they are incomplete and they are also "partial-to" certain features while minimizing the importance of others. At the same time, by giving privileged status to these symbol systems,

their referents, and their modes of description (sometimes thought to be explanations), users run the risk of coming to believe that the features and relations to which the symbols refer are the only "things," the only objects that exist in the domain. At the most extreme, this implicit ontological commitment has the potential of becoming a kind of ontological imperialism.

An Essential Tension: Both The Same and Different

Traditional views of musical development together with the ontological commitments implicit in our notational systems become more explicitly problematic as we juxtapose them with descriptions of performance practice by professional musicians such as Schnabel, Here is Soyer (1986), the former cellist in the Guarnari String Quartet, talking about his development of a "hearing" and performance of a passage in the Beethoven Quartet Op. 59 #2:

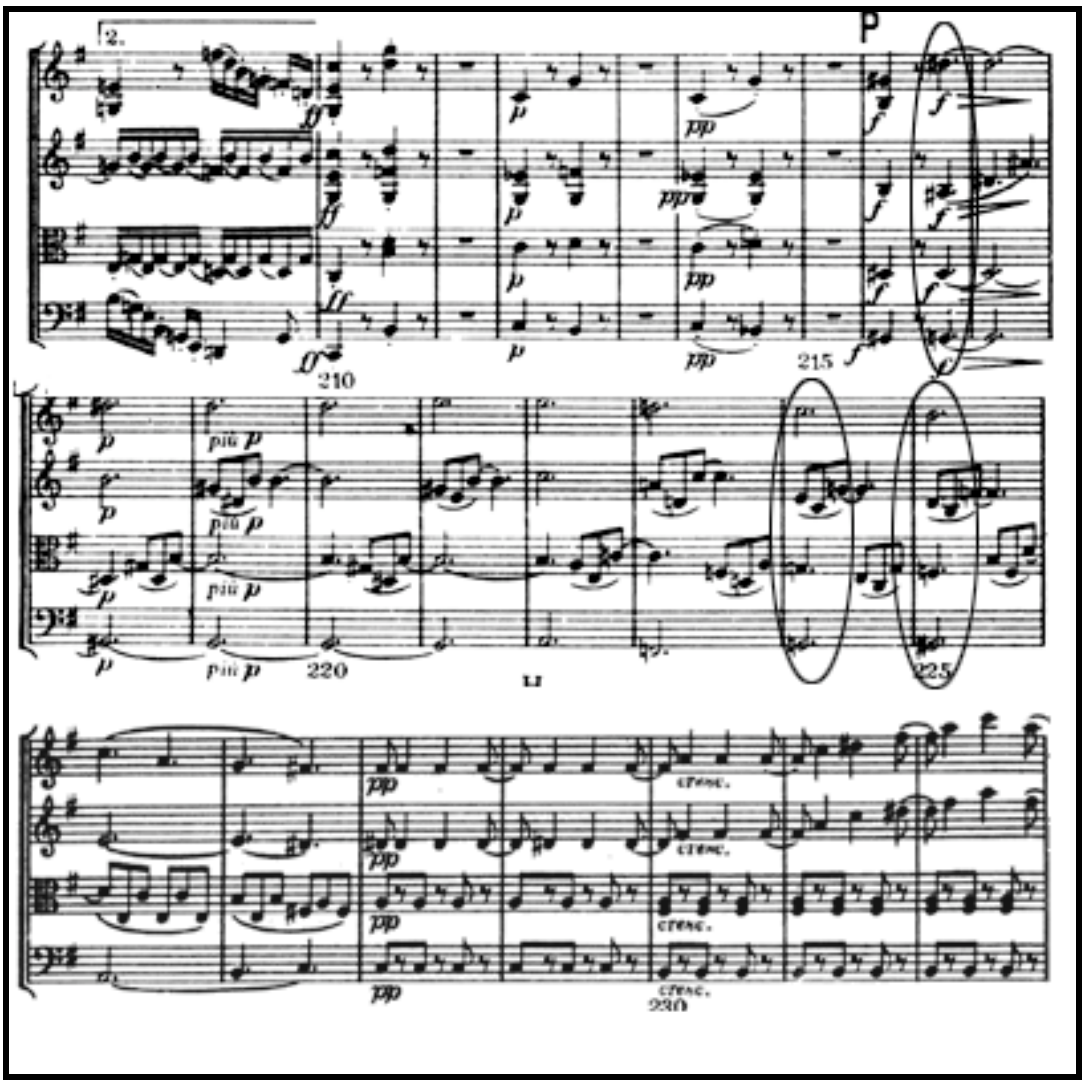


Fig. 1: Beethoven, Op. 59 #2: first movement, coda

> The passage begins (at P) in the key of G-sharp minor; the G natural in bar 216 is clearly a simplified way of writing F double-sharp, which, as the leading note, has an upwards attraction towards the tonic G sharp (m. 218). For this reason I'd avoid using the open G-string and would play the passage on the C string. When G natural comes again [bar 224], its harmonic function is altered; it's now the fifth degree of C major and thus not sharpened. The subsequent G sharp [bar 225] is no longer the tonic but acts as the leading note in a minor and should be sharpened. This is the explanation from the harmonic standpoint, but your hearing once sensitized to such things, will often be able to put you there quite of itself without your needing to think it out. (cited in Blum, 1986: 33)

Stressing specifically the importance of developing "a sensitivity" to the changing function of the same notated pitch in response to a change in its contextual embedding, Soyer's description raises the paradoxical issues of musical development and the fixity of notation to a new level of complexity. How does a performer benefit from the invariance of pitch class notation and still use it as a means for projecting change in functional musical meaning? The question suggests a further paradox: It would be impossible even to notice the remarkable shifts in meaning that the same notated pitch may undergo, if one were unable to recognize that, indeed, it is the same pitch.

Reflections on Development

In the light of these comments, how are we to approach the questions and enigmas raised with respect to the study of musical development? As an admittedly tentative first approximation, I propose that:

> Musical development is enhanced by continuously evolving interactions among multiple organizing constraints along with the disequilibrium and sensitivity to growing complexity that these entanglements entrain.

Thus, I argue that rather than being a uni-directional process, musical development is a spiraling, endlessly recursive process in which organizing constraints such as those above are concurrently present creating an essential, generative tension as they play a transformational dance with one another.

However, we often see this generative tension rather as a "from-to" progression and favoring abstraction, we often miss moments when organizers are in tension and significant learning is going on, chalking up the behavior to students' confusion or just "getting it wrong."

In the first two examples that follow we see children, working with the most spare, commonplace music, actively confronting such real time tensions between situational and abstract organizing constraints. The final example shifts to much more complex music-- three students' descriptions of their very different hearings of a Beethoven Sonata Movement. Illustrating three phases in the course of musical learning and development, the differences among the hearings again embody tensions among organizing constraints seen already in nascent form in the children's work.

> To suppose, because one sees day by day the finger-holes the same and the strings at the same tension, that one will find in these harmony with its permanence and eternally immutable order—this is sheer folly. For as there is no harmony in the strings save that which the cunning of the hand confers upon them, so is there none in the finger-holes save what has been introduced by the same agency. (Aristoxenus, cited in Strunk, 1950, p. 32)

PART II

TUNE BUILDING

> The conception of maturation as a passive process cannot adequately describe these complex [developmental] phenomena. Any psychological process, whether the development of thought or voluntary behavior, is a process undergoing changes right before one's eyes. The development in question can be limited to only a few seconds, or even fractions of seconds (as is the case in normal perception). It can also (as in the case of complex mental processes) last many days and even weeks...one can, under laboratory conditions, provoke development (Vygotsky, 1978, p. 1).

Vygotsky's comments point to a particularly contentious and very basic question — how is "development" to be differentiated from "learning?" In discussing the children's work I finesse this question by following the implications of Vygotsky's remarks. That is, I resist a view of *...maturation as a passive process*, instead ascribing to the notion that *...one can, under laboratory conditions, provoke development.* Thus, I will claim that there is at least imminent musical development *right before one's eyes* as the children carry out these tasks.... In short, I will view learning and development as instrumentally interactive—that is, as a "single system."

In the first two examples I return to my previous reports of research on children building commonplace tunes with the Montessori bells.[2] However, I intend the examples now to illustrate most sparely and unambiguously a fleeting moment in which a child confronts and creatively resolves an emergent tension. Thus, it is not whether or not the child can successfully complete the task because almost all can, but rather the process through which he does so: "With all of these procedures the critical data furnished by the experiment is not performance level as such but the methods by which the performance is achieved" (Vygotsky, 1978).

In each case, while the child continues to deal with the same musical material, his behavior shows him initially invoking situational organizing constraints and subsequently invoking (if only tentatively) abstract, invariant property constraints.

In working with participants in these task situations I make a beginning assumption: no matter how obscure or confused a child's actions, decisions, or descriptions may seem, there is reason in what he has done; it is my job to probe for and to find the sense made. This is particularly important when a participant's observed behavior seems most anomalous with respect to some deeply embedded musical assumptions. Barbara McClintock, the Noble prize winning biologist, puts it this way in describing her observations of cells:

> Anything...even if it doesn't make much sense, it'll be there.... So if the material tells you, 'It may be this,' allow that. Don't turn it aside and call it an exception, an aberration, a contaminant....That's what's happened all the way along the line with so many good clues (Quoted in Keller, 1983, p.179).

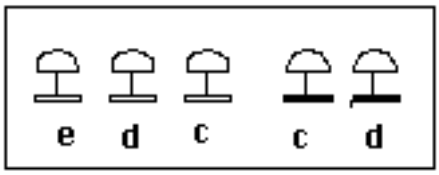
To find out and to appreciate what "the material is [telling] you," the adult and the child have an advantage over McClintock's cells—they can speak to one another. Thus, the participants can work together bringing issues to the surface that otherwise might remain hidden, with the result that adult and child could unknowingly pass one another by.

[2] Bamberger, 1991/1995; 1986, 2000, in press

JEFF: PARALLEL PLAY

The first example is borrowed from the stories of Jeff in *The Mind Behind the Musical Ear* (Bamberger, 1991/1995). Given five Montessori bells, nine-year-old Jeff had built a bell-path for *Hot Cross Buns.* His construction was typical of young children and even some musically novice adults (Figure 1):

Figure 1



Hot Cross Buns
Bell-path

Characteristic of novice tune-builders, Jeff's focus was on the emerging present situation: he built the tune cumulatively with each bell added as it was needed in order of occurrence in the tune. With the important exception of repeated figures, as well as immediately repeated single pitches, there is a bell standing for and playing each event as it comes along in the tune.

In his performance of *Hot* on the bells, the tune as sounding events of course continues ever onward in time. But Jeff's action path "turned back" in space as he played the repeating first figure and later its return. His actions are evidence that through immediate repetition, he implicitly recognized the integrity of motivic groupings, marking them and making them in action, as bounded entities. The structural entities were also spatially marked by the gap Jeff made between bells separating the middle figure from the beginning and ending figures.

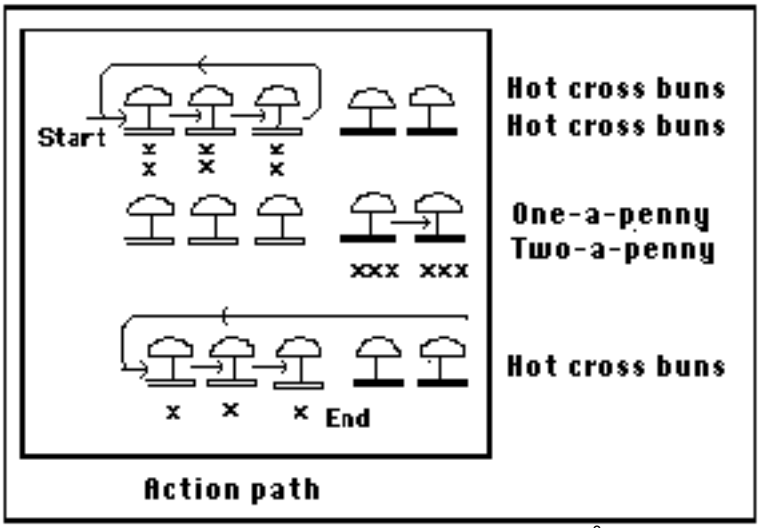


Figure 2: ActionPath: Bounded entities[3]

[3] Note: The graphics I have used reveal, in their inadequacy, the difficulties encountered in making a static representation of actions moving through time: There are, of course, only 5 bells and not 15 as in the picture; the bells, themselves do not "happen" again; nor in traveling the action path are you able, as in the picture, to see the past, present, and future all at the same time. But how else can one represent "after" or even "next" in a flat, two dimensional, fixed printing surface?

Again, Werner gives critical importance to membership in a group as giving meaning to an object or event.

> In all these cases the grouping depends not on objectively similar characteristics, but on the membership of parts of the group in some naturalistic situation. It is hardly possible for [the child] to conceive of a thing detached from the totality of the concrete situation in which it is embedded. (Werner, 1948/1987, p. 135)

To probe and test my understanding of Jeff's focus on groupings and the situational functions of the bells as events within groups, I made an on-the-spot experiment: Pointing to the first brown bell in the second group, I asked Jeff if he could find a match for it among the white bells. The matching C-bells were, of course, positioned adjacent to one another but across a spatial and structural divide. I wanted to see if I could provoked Jeff's hearing/seeing the bells as situated, functional tune events to comparing the bells as "property-holding" objects--anonymous, functionless, and position-less. Could Jeff *conceive of* [the properties of] *objects detached from the concrete situation in which [they were] embedded?*

In response to my request, Jeff played the now isolated brown bell, tested and rejected the white E and D bells, tried the white C-bell and, with an expression of some surprise, looked up and nodded his head in recognition that they sounded the same.

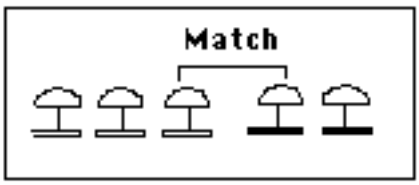


Figure 3: A Match

At this point, Jeff was faced with two ways for giving meaning to the two bells—ways that I believed were incommensurable:

- The two bells were different: Situationally, they stood for and played tune events that were unique in their starkly different functions (an ending and a beginning) along the action and bell paths.
- The two bells were the same: Extracted from their embedded context along the action and bell paths, they were simply objects that "sounded the same"—they shared the same invisible property, pitch.

To again probe my understanding, I made another on-the-spot experiment, this time to probe further into what seemed an implicit tension between the two disparate meanings. I asked:

> "Well, since those brown and white bells you just played sound the same, I bet you could play HOT without the brown bell since you have a white one that matches it already."

Jeff paused, then quietly produced a solution that ingeniously dissipated the tension I had presumed and implicitly reconciled the potentially conflicting meanings (Figure 4): Taking one bell in each hand, he simply switched their positions!

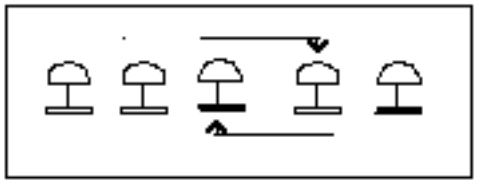


Figure 4: Switch

Jeff's solution to my inquiry suggested multiple organizing constraints in imminent transaction: The comparison task had been successful in helping Jeff extract properties from their functional roles but his ingenious solution allowed him to maintain his strongly held situational stance, as well:

- The two bells were the same thus they could be exchanged; they could stand in for one another.
- The two bells were different thus both bells needed to be present. Each was a place-holder along the action and tune paths, and each was necessary to performing its unique, situational function in the unfolding of the tune.

I could, of course, have easily seen Jeff's performance in response to my probe as simply a confusion or just a kind of tease. But making the assumption that there was reason in Jeff's response, on reflection I recognized it as a potentially generative moment. It was a kind of "parallel play." Jeff's invention was also a source for mutual reflection and for further experimenting—the kind of moment that is generative of musical development. (For Jeff's further development, see Bamberger, 1991/95.)

CONAN: DOUBLE CLASSIFICATION

This second example illustrates essential tensions playing out in a quite different context—the work of a gifted violinist who has already achieved significant musical recognition. 10-year-old Conan was a member of the Young Performers Program, a special program for musically gifted children in a community music school in Cambridge, MA. Conan, had recently played an impressive performance of a Mozart violin concerto with the school orchestra, and of course read music fluently.

Over a period of six months previous to enlisting Conan along with 5 other young violinists as participants in bell tasks, I attended the children's private violin lessons, chamber music rehearsals, coaching sessions, and sat in on theory classes, orchestra rehearsals and public performances.

Most memorable in these observations was the persistence with which teachers and coaches encouraged children to shift their focus among what I have called "fields of attention." The strategy was in an effort to encourage the children to experiment with playing a passage in differing ways.[4] This, in turn, contributed to the young performers' development of a network of multiple ways of actively understanding, thinking about, and performing a passage, a motive, or even a single note (Bamberger, 1986). In short, the teachers and coaches were nurturing the kinds of transactions that I have suggested are fundamental to musical development. It is not surprising, then, that in Conan's work we see a three-way transaction occurring among possible organizing constraints.

Conan was asked to build *Twinkle Twinkle Little Star* with the Montessori bells. He was given 9 bells—the C-Major set plus two G's and two C's. It was expected that, given his experience with reading music notation and performing, Conan would begin by simply building the C-Major scale. Indeed, slightly older children in the program (11-12 year olds) did exactly that. But surprisingly, Conan began just as Jeff and other

[4] In retrospect, I see the following four fields of attention that I identified, as closely related to what I am now calling kinds of organizing constraints. (see Bamberger 1986):

- The instrument and actions on it--technique
- Notation—the score
- Sound
- Musical structure

musically novice children did—cumulatively searching for and introducing bells as he needed them in building up the tune.

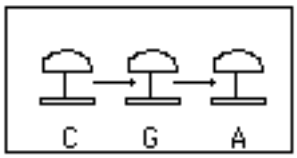
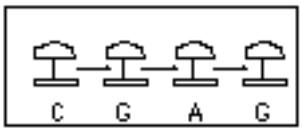


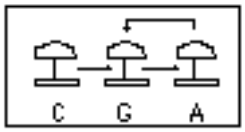
Figure 5: In order of occurrence

However, at the end the first phrase Conan deviated from this strategy: turning back (left) along his tune-ordered bell path, he struck the G-bell again thus giving the same bell dual function in the tune: initially an "on-the-way, middle event," the same bell served also as a "phrase ending." In contrast, most musical novices of any age continue their initial organizing strategy by simply adding another G-bell, giving it unique function as the ending of the phrase and of the currently cumulating bell-path.[5]

Figure 6



Novice
New event, new function, new G-bell



Conan
Giving G-bell a dual function

Conan's "turn-back" move, which already suggested his potential for invoking mixed organizing constraints, provoked a moment of direct confrontation between organizers. By turning back (left) to strike the G-bell again Conan's bell-path (the sequence of bells in table-space), and the tune-path (the sequence of events unfolding in time) were no longer in correspondence; there was no longer a single, ordered series unified by a common direction and chronology in space and time.

Moreover, for Conan, the move left also had the implication of "going down."[6] As if following the downward momentum of a well-practiced scale, Conan continued his action path on "down" to the left. He obviously expected to find the F-bell there--the next lower in the scale after G and the bell he needed for the next event in the tune. Instead, he struck the C-bell that was, of course, still there as first-in-tune (see Figure 7).

[5] Conan's "turning back" differs from Jeff's in its function—Jeff's "turn-back" involved literal repetition of a whole structural element--thus no change in function; Conan's "turn back" gave new meaning to a single pitch.
[6] Conan, like the other children in the Program, had also played the piano.

Figure 7: Confronting organizing constraints

Multiple organizing constraints were almost blatantly in confrontation. With one critical move, Conan's view of the line-up of unmarked bells had transformed from a row of uniquely situated, order-of-occurrence tune-events (C-G-A) to an invariantly ordered pitch series arranged high-to-low, right-to-left.

On hearing the C-bell, Conan hesitated, backed off, and swinging his mallet between the C and G bells, said, "Yah, it has to go there" (see Figure 8). Opting for the fixed reference scale organizer, the "it" was clearly the F-bell.

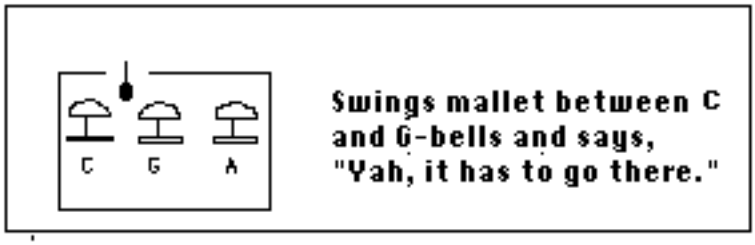


Figure 8: Opting for the fixed reference organizer

Finding an actual F-bell among the remaining, unused bells on the table, Conan broke open the tune-ordered bell-path, moved the C-bell to the left (for "down"), and inserted the found F-bell in the space he made for it (see Figure 9).

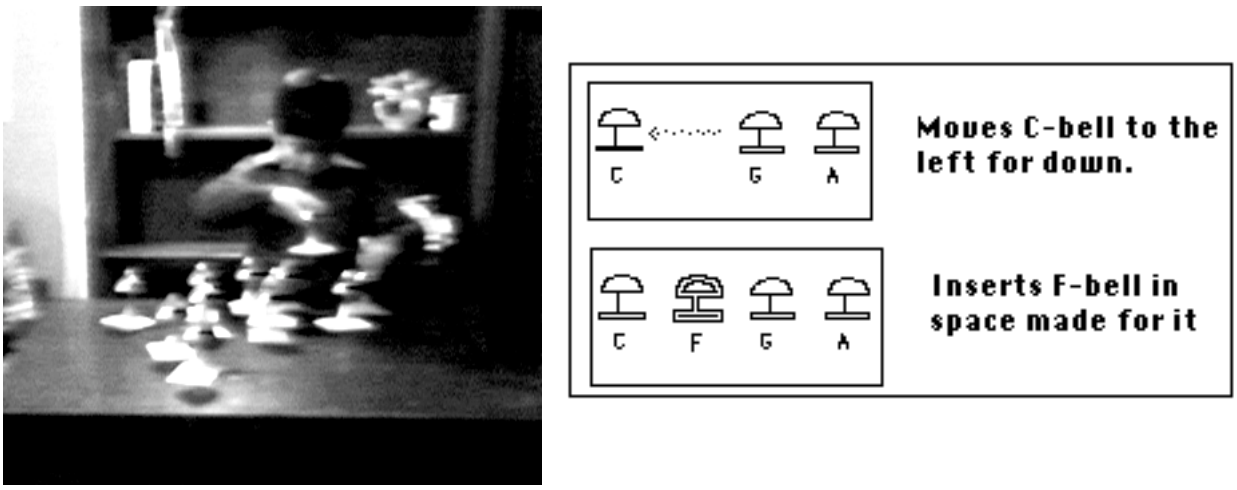


Figure 9: Inserts F-bell in the space between C and G

With this and his next moves Conan ingeniously resolved tension and confusions by inventing a scheme that, like Jeff's, invoked both kinds of organizing constraints simultaneously. Using his initial organizer, he continued to add bells to his bell path in order of occurrence (F->E->D). And simultaneously, using his

subsequent organizer, the fixed reference scale, he positioned each new bell to the left of the previous one as next lower (D<-E<-F).

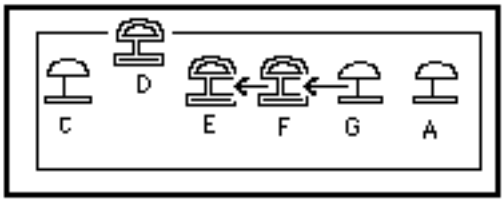


Figure 10: Double classification

Merging situational with abstract meanings Conan resolved conflict between organizers by inventing a *double classification strategy.* And as a fortuitous function of the "gap-fill" structure of the melody, the history of Conan's construction mirrored the history of the unfolding tune[7]--an emblematic case of analysis-in-action.

Once the first part of the tune was built, and the bell-path now the embodiment of the familiar scale, Conan quickly completed the rest of the tune by simply moving about on it. Indeed, if a visitor had come into the room at this point, they might have assumed that Conan had begun his tune construction by first building the C-Major scale.

Demonstrating his experience with musical problem-solving and engaging the complexity of multiple representations, Conan had moved through transactions among three organizing constraints:

- a cumulative bell-path--finding and placing bells to the right as they occurred temporally in the tune;
- going "backward" (left in space) to give double function to a single (G) bell;
- joining order of occurrence in the tune with the fixed reference scale to make a *double classification* organizing scheme.

The other five young violinists confronted much the same conflict among situational and abstract organizing constraints at the same moment in the tune construction. Probably it was more than chance that the conflict occurred at a structural boundary as it had with Jeff. All of the children also found ingenious ways to resolve the tensions they confronted but each did so in a different and unique way (Bamberger 1986, in press).

Thus the work of both Jeff and Conan could be seen as a spontaneous performance that held generative potential, but only if noticed as such and encouraged. Instances such as these are emblematic occasions for mutual reflection between teacher and student, for drawing out the multiple perspectives and even the tacit analysis implicit in the children's spontaneous actions. For the gifted violinists, such conversations might productively develop into questions such as those that emerged from Soyer's (1988) comments: How can they, as performers, benefit from the invariance of pitch notation and still use it as a means for projecting change in functional musical meaning?

[7] "Gap-fill melodies consist of two elements: a disjunct interval—the gap—and conjunct intervals which fill the gap." (Meyer, 1973, p. 145)

PART III

Evolving Complexity:

Three Hearings of a Beethoven Sonata Movement

As the previous examples have shown and as experience tells us, individuals with no formal music instruction spontaneously invoke powerful organizing constraints guiding their apprehension of the familiar music of our culture. In the example that follows, I introduce descriptions of hearings made by three students who are at differing stages in their musical experience. In doing so, I return to some of the questions that motivated this essay: What characterizes the organizing constraints at different phases in musical development? What do we take to be "progress" and how is "progress" related to experience and training? In turn, how are these factors related to notions of musical complexity—in the unfolding of a developing composition, and in developing a "hearing" and a performance of it, as well?

I argue that we enter into complexity through the door of untutored commonplaces embodied by the tunes we all learn as children. These are the shared bases for developing organizing constraints upon which our earliest musical sense-making depends. Of these, *Twinkle Twinkle Little Star* is probably the most emblematic—a kind of *ur*-tune. Calling them "archetypes," Rosner and Meyer (1982) point out that "[Archetypes] establish fundamental frameworks in terms of which culturally competent audiences... perceive, comprehend, and respond to works of art... [T]hey may be and usually are internalized as habits of perception and cognition operating within a set of cultural constraints*"* (p. 318).

Composers, listeners, performers do not discard these common cultural organizing constraints, rather complexity, as I am using the term, is functionally dependent on them. That is, these "generative primitives" are the scaffolding for the development of musical complexity—both its apprehension and its evolution as manifested in the "working out" of those compositions. Complex compositions thus depend on, but are not limited to, musical commonplaces. For example, in developing a hearing of an unfamiliar and complex work, we initially seek out just these familiar pitch-time relations, only later constructing them anew as features unique to the particular work. As the musicologist, Wolff, in his biography of the great pianist, Artur Schnabel, points out:

> The thematic material used by Haydn, Mozart and Beethoven is very often no different than that used by lesser composers of the time, but as the material is developed..., it acquires its individual shape. As Schnabel said in jest, "The genius of a composer begins with the fifth bar." (Wolff, 1971, p. 60)

As a result, it is not surprising that musically novice listeners tend to hear only the most familiar aspects and to be satisfied that they have made of a composition all that is to be made. To make a hearing of a complex piece, then, involves building on these commonplaces while going beyond to construct them anew as the unique particulars of each unfolding composition.

This final example focuses on how this process may evolve and how its development may be seen as already emergent even in the relatively quiet internal conflicts that Jeff and Conan faced. The students' accounts of their hearings that I give here are not verbatim transcripts as the previous examples were, but rather an amalgam of those I have heard over the years among somewhat more mature students in my music classes whose music backgrounds tend to be quite diverse.

Once again I will propose that learning and development should be joined, this time suggesting a three-stage progression illustrated by the perceptions of the three typical students with varied backgrounds in formal music instruction: Clem has had no formal music instruction; Peter recently completed an introductory music analysis class but does not play an instrument; Anya has been through the sequence of music theory courses in her high school and has performed the Beethoven Sonata movement. I want to emphasize, as I have with the previous examples, that despite their differences, each description reflects a focus on real, possible, and legitimate features of the music--those that contribute to the coherence that each student has made. At the same time, the scenario is intended to demonstrate distinctive aspects that characterize hearings at different phases during the process of learning and development.

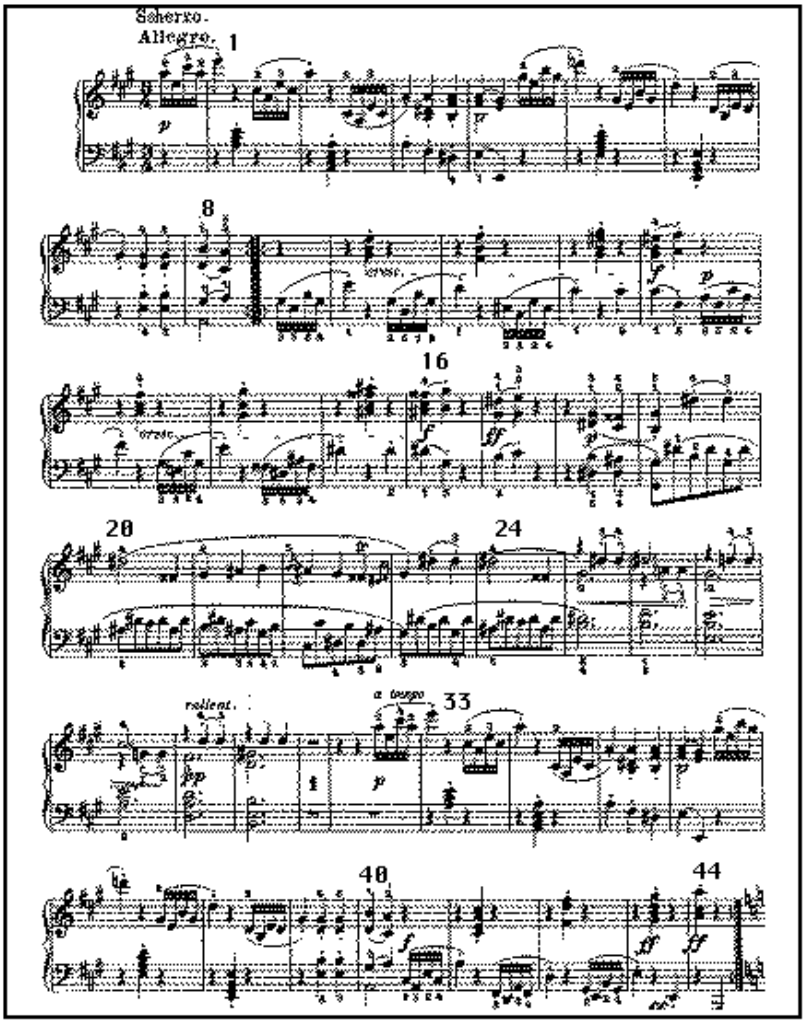


Figure 11: Beethoven Sonata, Op 2#2, Scherzo

After listening to a performance of the movement played twice (with repeats), the students were asked simply to "tell me what you heard in the piece." The score was available for the students but only as a reference to check out disagreements. [Bar numbers are inserted for the convenience of the reader.]

Clem

I heard three parts in the piece. In the first part I heard the same tune most of the time [bars 1-16]. Then, after what seems to be an argument going on, another tune starts that sounds different, sadder. The argument seems to get resolved, here, but not happily. This new sad tune makes up the second part [bars 20-25]. Then the first part comes back again much like it was at the beginning [bars 33-44]. After that, something else happens, I'm not sure what. Then the sad, second tune comes back followed by the first part again. So, as I said, there are really three parts--the second one is different and the first and third are alike. Or you could say that there are just two parts, if what you are counting are kinds of things.

Peter

My hearing is quite different from Clem's. I heard three parts, as well, but they aren't the same three parts. For instance, since the piece is a minuet or scherzo it's in 3/4 time, and as I expected, it turns out to have the typical minuet form (he draws):

||: A :||: B + A' :||

The A section has two phrases, both the same length, the whole A section is in the major mode and it stays in the same key.

The B section is a development [bars 9-33]. It begins with a change in key and there are several more key changes. What you called the new tune, Clem, isn't a new section at all. It comes in the middle of this development section, and it's in the minor mode. Maybe that's why you heard it as sadder.

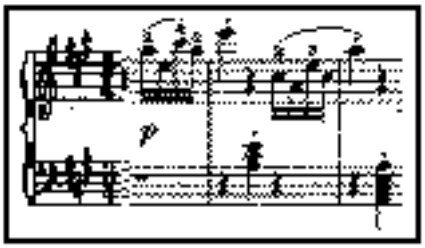
The third part, "A'," ends with a short coda and then (B + A') is repeated exactly. It's interesting that Clem was able to hear the return to A and the repeat of his "sad tune," so I don't understand why he didn't hear that the whole B and A' sections are just repeated, exactly.

Anya:

Well, I'd say that Peter stopped where my hearing begins. I also heard those three large parts, but it's more how Beethoven makes them that I'm paying most attentionto when I'm playing. For instance, the little motive right at the beginning:

[Anya plays opening motive.]

Figure 11



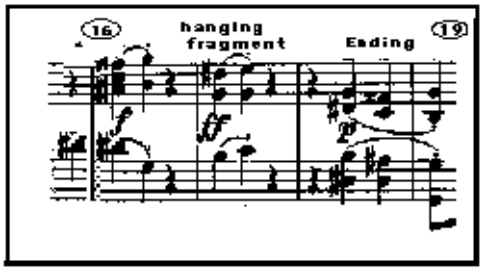
Opening motive

Beethoven plays with that opening motive through the whole movement, transforming it to change the role it plays as the piece goes along. In playing the piece, it's as if I keep learning about that opening motive

through the multiple forms it takes. For instance, there is one place that I find particularly amazing-- the transformations Beethoven makes as he gets into Clem's "sad tune."

Remember, at the beginning of the devewlopment, we heard those two balanced phrases [plays bars 9 - 17]. But, going on, Beethoven really disrupts this regularity by moving very quickly through a series of transformations. He takes the very end of the second phrase, just the last two notes, including the weak-beat ending (bar 16), moves this two-note little figure down a little, and uses it to form a stand-alone, 2-note hanging fragmentstill ending on a weak beat (bar 17). Then, in a kind of slight-of-hand, he turns it into an end-accented motive (bar 19) that feels like a resoution--anarrival at momentary stability (plays bars 16-19).

Figure 13



A series of transformations

But instead of letting you stop there, Beethoven takes the 3-beat rhythm of the end-accented fragment, plays it now as 3 repeated notes, and this becomes the head of the new “sad tune” (plays bars 18-23).

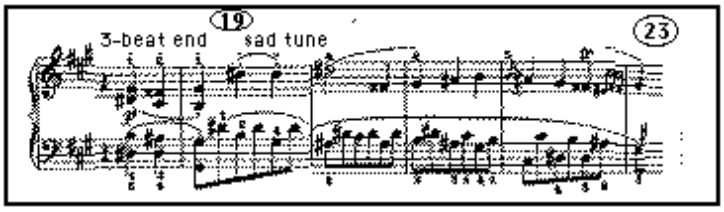
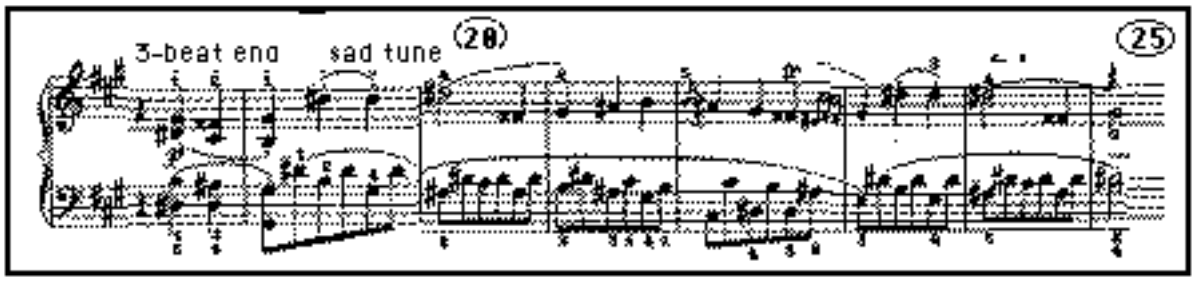


Figure 14: Sad tune

And so the important thing is that, in a way, it isn't a new tune at all; it's simply the last in this series of transformations. It’s really hard to play that passage, by the way: after what seems like a stop, you have to quickly go on, shift into the very different tune, slow down, and at the same time make it feel like a continuing development.

Anya: The feeling that the argument is resolved when you hear the sad tune, as Clem said, is partly because there’sa melody with a clear accompaniment, and also because the melody has a clear phrase boundary (plays bars 20-25).

Figure 15



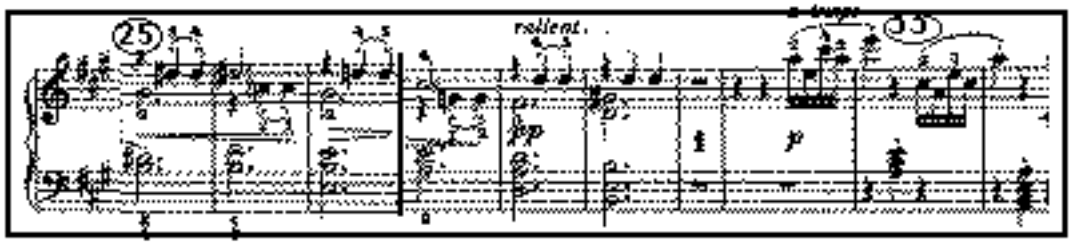
Clear phrase boundary

Anya: Peter is focusing on the piece as an example of a type, collapsing its unique details into this prototype.

Peter: Well, I think it's important to hear the piece as an example of a type, too. After all, you couldn't even talk about "unique details" if you didn't have the general scheme in your head already.

Anya: Yes, but, for instance, it's not just that the first part comes back again, but rather the way Beethoven gets there. He makes the transition to the return by taking that same three note motive, tossing it around and shortening it until it disappears into silence. And out of this tense silence the opening motive reappears just like it was in the beginning. But, you know, when I play the opening motive here, it always sounds different to me. I guess it's because so much has happened to it along the way. (plays bars 25-33).

Figure 16



Transition to the return

Peter: I think you're making too much of this transformation business, just look at the score!

Anya: O.K. I suppose I hear it as both the same and as different; but the same notes in a new context,a new situation, sound different to me. And I think I play it differently, too. As for the coda, all of a sudden it seems like we're in duple meter instead of triple (plays bars 41-44). As a result, you get the feeling that the whole thing speeds up to a running finish.

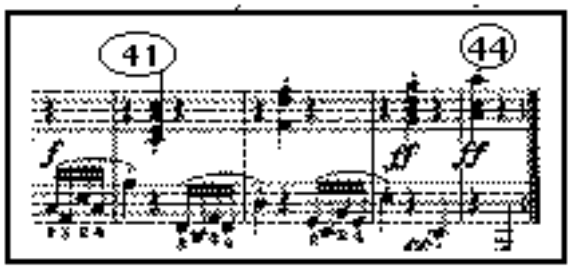


Figure 17: Duple meter

Peter: Besides, can you really hear all that or are you just making a lot of it up?

Anya: You see, as a performer thinking about what I want the listener to experience, it just doesn't work if you reduce the whole process to a type or scheme so you can say, "Oh yeah, it's one of those." It reminds me of something I read in a book by Polya called How to Solve It: "This principle is so perfectly general that no particular application of it is possible."

Peter: And another thing: are you going to tell me that Beethoven knew he was doing all that transformation while he was writing the piece?

Anya: There's no way we'll ever know; and what difference would it make anyhow? It's how we hear the finished product that's the point.

Clem: But do you really need to go into all that detail to play the piece?

Anya: Actually, in truth, when I'm learning a piece and when I'm playing it, it's all in experimenting with how it sounds as I listen back, and how the piece feels in my hands. I never actually said any of those things out loud before, or even to myself, for that matter. It was really interesting trying to put it into words.

Revisiting the Scherzo

The three hearings of the Beethoven movement were meant to be, first of all, a view-in-action of my argument that a hearing is itself, a performance: what each student believed he or she simply found in the music is, instead, an active process of making sense. Keeping in mind that these were amalgams of real students' reports, what, then, are the salient differences in the aspects that students attended to? How are these influenced by learning and experience, and what might this tell us about "musical development" and "musical knowledge?"

The most telling disagreement among the three students was with respect to their hearings of similarity or difference. Clem, being typical of a musically novice student, focused on "tunes" thus a difference with respect to register at the beginning of the B section was not a difference that made a difference for him. Anya, who represented an experienced performer, singled out the change in register as a salient feature marking the moment as the beginning of a new section. Peter, as the musically "schooled" student, also heard the passage as different from the preceding passage, but selected change of key as the significant difference. Thus, hearings of similarity or difference, along with preferred objects of attention, also importantly affected differences in the hearing of structural boundaries within the larger design.

In another example, Clem failed to hear similarity, actually the literal repeat when the beginning of the B section was played again after the Coda. In a classroom situation it would be tempting to say that Clem and others who fail to hear literal repeats (a common issue among novice students), are simply getting it wrong. But

on pointing out their "mis-perception," students, themselves, will often attribute it simply to "bad memory." But if it were simply a question of "bad memory," how can we account for why Clem had no trouble remembering the "sad tune" and also the return to A when they were played again? This is a critical issue for development.

Bartlett (1932), in his seminal book, *Remembering*, has taught us that *what* we remember, and thus what we are able to recognize as the same thing when it occurs again, depends upon *how* we have made sense of the phenomena in the first place, and particularly *when* it occurred--in what context. Memory, then, rather than being a kind of simple recording device which is sometimes defective, might better be construed as a process of active re-construction. Bartlett says:

> Every incoming change contributes its part to the total "schema' of the moment in the order in which it occurs...So in order to maintain the 'schema' as it is, it must continue to be done in the same order. (p. 201)

In the light of Bartlett's emphasis on serial order, consider the differences in the contexts in which the passage in question occurs. The sad tune (bar 22) and the return of the A section (bar 33) both of which Clem recognizes, reappear in exactly the same context, the same order of occurrence as when they occurred originally. Moreover, the sad tune and the return of A both appear after an unstable, fragmented transition passage out of which they emerge as an arrival at welcomed stability. But the repeat of the B section does not occur in the same serial order. In its second appearance, B occurs immediately after new material has been introduced in the Coda and without any interruption or preparation. Moreover, for Clem the beginning of B was not marked as a boundary in his initial schema. With all this in mind there is good reason why Clem heard the literal repeat as "something else."

Comparative Cultures

Let me propose, now, that it might be useful to look at the students' hearings as anthropologists might look at the behavior of individuals belonging to different cultures. For instance, in considering the issue of boundary making, or "segmentability," the ethnomusicologist, Agawu (1999, p. 145) says:

> The issue of music's physical segmentability is less interesting (...) than what might be called its cultural segmentability. To segment culturally is to draw on a rich culturally specific body of formal and informal discourses in order to determine a work's significant sense units. Such units are not neutrally derived; nor are they value-free. (p.142-3)

Following Agawu, we might think about the disagreements among the students' differing hearings of "segmentability" and the related disagreements about similarity and difference as arising from their membership in different "developmental cultures." This would be a way of viewing their perceptual disagreements in terms, for instance, of ontology (what each is taking to exist), along with their belief systems, values, and preferences--the importance given to selected features and relations such as favoring invariant structural "types or schemes," over valuing transformations, changing meanings and functions in response to context.

All of which might well lead us to re-consider our actual live experience of the continuous unfolding of music moving through time. For example, once having learned as part of our professional culture simply to respond to the sign :|| as if by a conditioned reflex, we easily wipe out the fact that this is an instruction for the performer to "turn back" in the score; but for the listener, music, like time, can never "turn back." Moreover, if we think only in terms of "go back and do it again," we fail to notice what Clem intuitively responded to: a new "joint" is created when the tail of the surprising Coda attaches itself to the head of the B section. Perhaps Clem's hearing should serve as a reminder that, as more knowledgeable musicians, the ease with which we easily "go back" in paper space, may impoverish our more culturally educated hearings.

Indeed, "going back" in space while "going on" in time harks back to Conan's confrontation (can we say "culture conflict") between his initial situational focus and his abrupt shift to an abstract, scale oriented focus. Conan's confrontation might be compared with the conflict between Peter and Anya where Peter's familiarity with the symbols of music notation and his familiarity and belief in the playing out of the "typical minuet form" were confronted by Anya's resistance to "reducing the whole process to a type or scheme." In this sense, the primary elements of the piece for Peter are almost determined beforehand--static and invariant. In Conan's case it points to his engagement with multiple organizers, which Peter, within his schooled culture, seemed reluctant to engage.

But not to forget, the schooled culture with its invariant naming of kinds of properties, relations, and forms, is also a critical means through which to gain the ability, which Bartlett points to as fundamental to our views of "progress:"

> An organism. which possesses so many avenues of sensory response as man's, must find some way in which it can break up this chronological order and rove more or less at will in any order over the events which have built up its present momentary 'schemata'. If only the organism could hit upon a way of turning round upon its own 'schemata' and making them the objects of its reactions, something of the sort might become possible. (Bartlett, 1932, p. 203)

This is what Peter had learned to do. Learning to classify, name, and identify objects and relations, helped him to recognize passages as the same even when they occurred in different chronological order. And this ability is, of course, just what the canons of developmental theory along with familiar ideas of musical development tend to associate with "progress."

Anya, who had also acquired this body of knowledge, used it to move further along developmentally in another way; namely, to go beyond the learned conventions to hear the unique details that characterize complexity and to construct multiple, interacting views of this small universe. These included kinds of objects named, such as those reminiscent of commonplaces, objects that remained invariant such as constituents of the germinal motive, as well as "the many forms it takes" making it also unique to this piece.

For example, Anya pointed out in playing the return to A that she heard it as both the same and different. Thus, while it is useful to learn to listen selectively for "the same thing again," we do so at the risk of losing the dynamic effect of new contexts where the same thing may also be different. Thus, learning and knowledge about music, can take different forms, be put to different uses, result in different hearings, and be seen as evidence of developmental progress or not depending on the theories to which you ascribe.

Harking back to Jeff's work, while he initially did not recognize even single pitches as the same when they occurred in different situations, and especially when they occurred with different functions on either side of a structural divide, he was able momentarily to hear the two bells as both the same and different. Unlike Peter, and more like Anya, he used this confrontation between situational and abstract organizing constraints to invent a way to coordinate them.

Finale

At the outset of this essay I confessed the need to re-think some of my earlier views about musical development. I mentioned that, in my efforts to follow in the traditions of cognitive developmental psychology, I had underplayed observed anomalies and enigmas that are often more telling with respect to development, and that I had stopped too soon—specifically, before asking, for instance, "what might we mean by *musical complexity* and what are the apparent *simplicities* from which it grows? The comments of Aristoxenus quoted at the top of this essay, turned out to be a kind of mantra for the arguments and examples that followed.

The first two examples, Jeff and Conan, illustrated children's shifts in focus between "changeable" and "permanent" elements (situational and abstract organizing constraints) within the musically spare environment of commonplaces. The last example was meant to illustrate hearings within a complex musical environment in which "changeable" and "permanent" features were characterized by the different hearings of Clem and Peter, respectively, while Anya was meant to illustrate "progress" through her ability to shift, differentiate, and amalgamate these and other kinds of elements and relations, as well. I proposed that one might think of them as belonging to different developmental cultures. In this light, we could give reason to each of the students' hearings and, as a next step, consider how they might, in an ecumenical world, learn to productively interact with one another's views and perceptions.

And yet, the distinctions were, of course, not so clean. Clem's "culture" shared certain qualities with Anya's and also with Peter's: like Anya, he was sensitive to the moment's context, to situational functions along with the feelings they evoked. Jeff's ingenious "parallel play" invention saw him amalgamating both permanent and changing features. Conan, too, invented in his "double classification" strategy the means for using both situational and abstract organizers. These are all examples of what I have argued stimulates learning as musical development.

What then, are the educational implications if, as I have argued, learning and development are inextricably intertwined? I propose that we should notice and appreciate organizing constraints such as those of Jeff and Clem that are naturally acquired through familiarity with the commonalities of our culture and not be tempted to *turn them aside and called them an exception, an aberration , a contaminant.* On this view, if students are helped from the beginning to reflect on their hearings, including the puzzles and conflicts that might be emerge, they are more likely to build on rather than foregoing their musical intuitions. In doing so, they are more likely to gain Anya's capacity to embrace conflicts, to make multiple hearings, and perhaps after passing through a stage such as Peter's schooled culture, learn to choose selectively among possibilities depending on when, where, and what for.

So, as educators and as researchers, rather than arguing about what counts as progress in the course of musical development and what determines a hearing that counts as better than another, it seems more productive to follow the view of Clifford Geertz, the cultural anthropologist, when he proposes that "...progress is marked less by a perfection of consensus than as a refinement of debate. What gets better is the precision with which we vex one another" (Geertz, 1973, p.).

Looking onward and outward from this reflective turn, progress is potentially inherent, then, in our experience of each new hearing and each new performance if we engage them as unique encounters and if each of their inevitable puzzlements is seriously embraced:

Artur Schnabel:

> I am quite content to be one-sided....I love those works which never cease to present new problems and therefore are an ever-fresh experience. (cited in Saerchinger, 1957, p. 309).

Roger Sessions:

> I would prefer by far to write music which has something fresh to reveal at each new hearing than music which is completely self-evident the first time, and though it may remain pleasing makes no essential contribution thereafter. (cited in Prausnitz, 2002, p. *vii)*.

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