THE MIND

BEHIND THE

MUSICAL EAR

HOW CHILDREN

DEVELOP MUSICAL

INTELLIGENCE

JEANNE BAMBERGER

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The Mind behind the Musical Ear

HOW CHILDREN DEVELOP MUSICAL INTELLIGENCE

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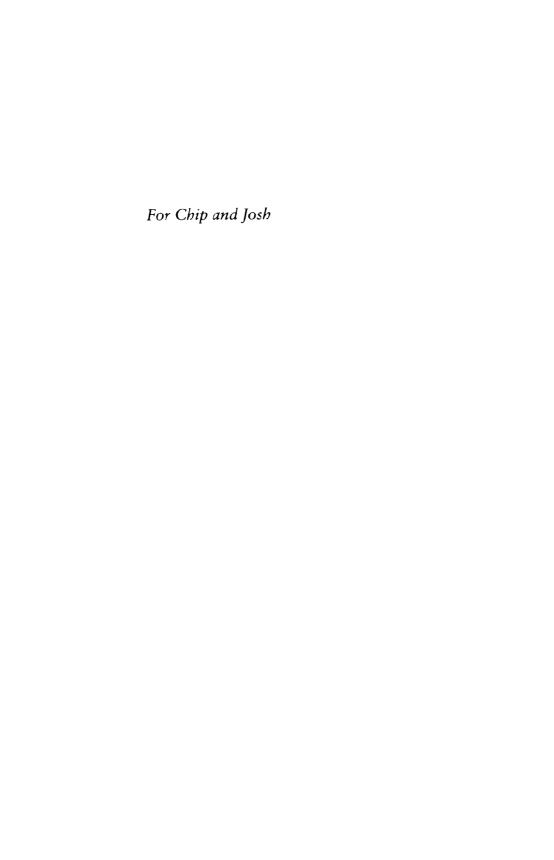
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The Mind behind the Musical Ear

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Introduction: The Players

THIS BOOK is the result of my continuing efforts to understand the everyday knowledge with which we make sense of the common music of our culture and how this knowledge develops in both ordinary and extraordinary ways. The themes that run through the book knit together concerns that are often associated with self-contained disciplines: musical performance, music theory, cognitive development, philosophy, and education. If they have become a single network for me, it is probably because the questions that I have found the most compelling characteristically emerge (unlike more traditional research questions) in the course of my everyday work with students in the classroom, or in working on a composition in preparation for teaching or performing it. Once I recognize an issue, and when I find it impossible to turn a question or puzzle aside, it is then that I am led to the design of more formal experimental situations. But saying that suggests other puzzles as well: for instance, what attracts my attention to these "happenings" in the first place? How do they evolve into an experimental design? What is the character of these designs? In turn, what do I take as evidence for a resolution of these puzzles or answers to my compelling questions?

Perhaps the simplest but most correct answer to the first of these questions is to be found in my eclectic background and experience: I am a performing musician with a penchant for (and some training in) philosophy and psychology, and I have had formal training in music theory

together with many years of teaching it. These activities have been accompanied by a collection of questions that have haunted me from childhood (Why do people listen to music, anyway? Why do people not listen to the music I care most about? What is it that I know when I have learned how to play a Beethoven piano sonata or a Chopin ballade?). This eclectic mix of interests has resulted in my attraction to moments in which they all converge. More specifically, when the qualities of an ordinary event intersect this network of interests in an unexpected way, often creating conflict or tension, these moments are somehow marked for attention.

As a result, the design of experiments as well as the research questions that motivate them have taken on particular characteristics. In contrast to more traditional methodology associated with objective, controlled, often artificially contrived experimental situations, my experimental designs include rather open-ended task situations that are often closely related to the musical activities that generated the puzzles in the first place. Further, the tasks are rich in possibilities for the active participation of subjects and sensitive interventions by the researchers. The carefully recorded ongoing work of subjects becomes, then, the material for study and analysis. Interestingly, there is rarely a question of whether a subject can succeed in completing a certain task, because almost all can; what is important, rather, are the particular characteristics of a participant's work. For instance, in observing an individual constructing or reconstructing a melody, I am concerned with the decisions made along the way, the strategies used, the shifts in focus, including shifts in what the participant may be seeing as the problem to be solved, as well as the final product. In turn, although analysis of a subject's work often leads to insight, it just as often spawns new surprises and new questions.

Throughout my work, teaching, learning, and research are closely intertwined: research questions arise in the course of teaching; subjects are learning as they participate in the experimental task situations; and in noticing a puzzling response, I will often make an on-the-spot miniexperiment to test a hunch about how the participant may be representing the situation to herself. And the results of experiments are taken back into the classroom to inform, perhaps transform, how and what I am teaching there.

Finally, in working with participants in task situations I make a critical beginning assumption, namely that the participant in these tasks is somehow making sense in his or her actions, decisions, or descriptions, and it is my job to probe for and find the sense made. This is particularly

important when a participant's observed behavior seems most anomalous with respect to my own deeply embedded assumptions. Barbara McClintock, a 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).

The book is divided into three parts. Preceding these is a Prologue in which I suggest that knowing how may be different from knowing about. I ask the reader to ponder what might contribute to differing "hearings" of the same piece, and in doing so, I illustrate what will be a central theme of the book, namely, the notion that a "hearing" is itself a performance, an active process of making meaning.

In Part I my concern with different hearings focuses on rhythm, as seen through children's drawings of simple rhythms. From the differences found in the drawings, I derive a general distinction between figural and metric/formal hearings of rhythms. Interestingly, those whose drawings focus on one aspect of a rhythm find it difficult if not impossible to make sense of drawings that focus on a different aspect of the same rhythm. It is this finding that leads me to argue for the importance of *multiple hearings*.

Parts II and III are concerned with melody and specifically with tunebuilding. These studies focus on the development of one eight-year-old child. Jeff, with whom I worked on tune-building tasks over a period of six months. I begin with Jeff's initial project, in which he uses a computer as the medium for constructing tunes, and move on to his initial constructions and notations of tunes using the Montessori bells. Part III traces Jeff's learning and development as his construction strategies change and with them his invention of a whole series of evolving notations. Through Jeff's work I am able to see aspects of development that usually remain hidden in one-time experimental situations-for example, to observe in detail and in situ the disequilibrium of transition and the nature of subsequent transformations. As a result I am also able to account for what otherwise might appear to be abrupt changes from one developmental stage to another. And most important, I argue that the changing mental organizing structures that guide hearings, constructions, and descriptions at various ages and stages of musical development do not constitute a unidirectional progression in which earlier mental

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structures are replaced by later ones. Rather, foci of attention among relevant aspects of musical structure shift but also cumulatively build on one another. I conclude that the goal of musical development is to have access to multiple dimensions of musical structure, to be able to coordinate these dimensions, and most important, to be able to choose selectively among them, to change focus at will.

Central to Jeff's development are our mutual efforts to make sense of and to make explicit what he knows how to do already. Using this knowledge, I help Jeff confront confusions associated with changes in his inner understanding so that he can expand and elaborate his initial intuitions. Because I feel that this process is fundamental to significant learning, I return in the final chapter to the classroom: looking back and drawing on the implications of the rhythm studies and Jeff's work, I make some proposals for teaching and learning that apply not only to music but to education in other domains as well.

The book proceeds in four different modes. The first is largely descriptive: I describe the setting in which one or more children worked, what motivated the task, and the problem as it was set; I then provide a finegrained narrative account of the children's actions, decisions, confusions, and productions—a drawing, the construction of a tune, or instructions for playing the tune. Second, analysis and discussion of these events take the form of a dialogue between two imaginary college students and myself. Third, looking back at the dialogue, I often make comments on it. And fourth, I pause from time to time to make a didactic digression about specific musical aspects of the material the children are working with. These didactic interludes may clarify work the children have already done, or they may prepare the reader for what is to come. Each of these formats contributes another layer of interpretation, all of them together making up a cumulatively developing picture of the data.

Since I see the dialogues as a central part of the book, a word about why I have chosen this format is in order. I initially adopted the dialogue format to address a difficult problem to which I could find no other solution. It is this: a hearing, like a momentary "seeing," is most often experienced all-at-once and as something immutable. How, then, could I help listeners/readers become aware that their hearing of even a simple rhythm might be only one possible way of organizing the material; and how could I help them to participate in, to experience, a hearing that differed from their own? Moreover, to make a hearing different from one's own often requires a fundamental restructuring of the material—

for example, regrouping, making new boundaries, giving priority to different features, perhaps even liberating features that were previously left unnoticed, even inaccessible. And to tell a reader about the possibilities of such restructuring by, for instance, naming features or relations that are not yet included in his or her hearing of a piece almost necessarily fails because these names will refer to entities that have no referents within the music as perceived. Finally, I was also aware that restructuring one's hearing is risky—it is disorienting, queasy, confusing; it attacks the very roots of previous coherence.

It seemed, then, that the only way to help readers with what was to be a crucial aspect in understanding developmental changes among my subjects was to help them live through these developmental processes themselves. To do so, I created two imaginary college students whom I thought of as typical of those students in my classes at MIT who make specifically contrasting hearings of simple rhythms. One, whom I call Met, was so named because he heard rhythms metrically; the other, whom I call Mot, gained her name because she heard rhythms motivically (or what I call more generally a figural hearing). In the first dialogue I ask the reader to follow as I encourage Mot and Met to confront the differences in their respective hearings. Through this process, the two students eventually succeed in making sense of each other's hearings, but only after struggling with and revealing some of the fundamental assumptions that each of them holds. And since my experience strongly suggests that one or the other of these hearings is that of the reader as well, it is my hope that in following these conversations, the reader too will come to hear in a new way. However, I am also quite aware that to do so may require just as much work on the part of the reader as it does for Met and Mot. For, while a hearing may seem instantaneous, ineluctable, it is, in fact, a construction—an active play between the tacit, often unintended mental activities that we bring to bear, and the yet to be organized stuff out there. What we hear depends on what we are able to think of to hear—even though we are quite unaware that thinking is going on at all.

In writing the dialogues I suspect I have been influenced by my reading of Galileo's *Dialogues on Two New Sciences*. Quite aware that his "new sciences" were in serious conflict with the beliefs of the time, Galileo created the dialogues with his two students to help readers live through the messy, groping evolution of these new ideas. In contrast to most publications of new discoveries, where the reader is presented only with clean, elegant results, as if they arrived full-blown from the head of their

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maker, Galileo does not obscure the work, the confusions, the roads taken that seemed to lead nowhere; and most of all he engages his students' participation (and through them, the reader's) in the design of questions, problems, and experimental situations. By letting readers in on the process, Galileo also helps them through the disequilibrium that often accompanies such fundamental conceptual restructuring. While the dialogues with my two imaginary students are hardly of the same scope or significance, I, like Galileo, reenact through these conversations the rocky routes that we traveled and that the reader is asked to travel along with us.

The dialogues serve one more function: through the evolving course of Met and Mot's conversations and their confrontations with each other, they also learn, and as they do so, they gradually become participants in helping me understand the surprises and puzzles in the work of others. Thus, as readers follow the dialogues, they are also following the development of a research methodology as it is embodied by the two students in learning how to practice it. As a result, I am also able to use the conversations with Met and Mot as a vehicle for working out some of the more difficult questions raised by the data, for making proposals concerning answers, and for speculating on their broader implications. Of these questions, the most central is: What are the circumstances that generate fundamental ontological shifts associated with perceptual/conceptual restructuring—how do we ever come to see/hear in a new way? This is the question that remains the unifying thread throughout the book.

Prologue: The Themes

I BEGIN with a conversation that will most likely sound familiar to many readers, and yet its very familiarity continues to puzzle me. It starts with a person's casual remark that, like most people, she enjoys listening to music and can make sense of most of what she hears. Upon questioning, she agrees that she can clap simple rhythms, recognize tunes she has heard before, even sing or whistle at least some of them. But then, in quick response to the other's quizzical glance, she hastens to add: "But of course, I don't know anything about music."

These remarks are so familiar that, like much that is commonplace, the puzzles in them pass by unnoticed. But if for some reason they catch our attention and we turn back to look at them, we may be surprised by what we see. Wittgenstein puts it like this: "The aspects of things that are most important for us are hidden because of their simplicity and familiarity. (One is unable to notice something—because it is always before one's eyes.) The real foundations of his enquiry do not strike a man at all. Unless *that* fact has at some time struck him.—And this means: we fail to be struck by what, once seen, is most striking and most powerful" (Wittgenstein 1953, p. 50).

The puzzle that catches my attention in the conversation is this: How can a person say that she can remember, enjoy, sing, and understand the music she hears every day and still say that she "doesn't know anything about music"? Is it the difference between knowing how to do something

in contrast to knowing *about* it? Or perhaps the distinction isn't in the "knowing" at all, but in the "it"—the music itself. Could "music" stand for two different kinds of things—one kind that you sing, dance to, recognize, and enjoy; and another kind that you "know about"? Or could it be both: when you "know about music," the music itself changes?

The conversation is important because it raises in a quite natural way some of the fundamental questions of the book: What do we mean by "knowledge"? Or, more specifically, what does it mean to know, to have, or to use musical knowledge? And even if we could come to some agreement about that, we are quickly led on to other questions. How does musical knowledge develop? What, for instance, is the difference between what you and I hear in listening to the same piece of music? Why do even professional musicians so often disagree in their "interpretations" of the same piece of music? Or, as just suggested, can we even talk about the "same piece of music"?

Musicians are more apt to talk to one another about their "hearings" of a piece rather than about knowledge. In rehearsing a string quartet, for instance, the violist might say to the cellist, "How do you hear that last passage?" And the cellist might answer, "Well, the second phrase begins on the downbeat of bar 19." To which the violist might answer, "No wonder we aren't together; I hear it beginning with an upbeat starting in the middle of the previous bar." Or among music theorists you might hear one saying of another's analysis of a piece, "Your hearing just doesn't make sense to me." What, then, is meant by a "hearing," and how can we characterize the differences among them? Or, even better, how can we try to elicit and account for the usually tacit underlying assumptions that give rise to these differences?

In what follows, I shall try to do just that. However, my evidence for such hearings consists of descriptions of them. And this raises a very knotty problem: since a hearing is by its nature a necessarily private, internal experience, an out-loud description can provide only impoverished clues to it. Further, as we shall see, descriptions are influenced in interesting and often very specific ways by the terms—the "units of description"—that the hearer has available. We need to ask, then, what the relations are—often reciprocal relations since terms also influence hearings—between these units of description and what I will call the hearer's "units of perception." And since a hearing is, perhaps paradoxically, a silent affair, how can anyone know? In any case, I shall argue that a hearing is a performance; that is, what the hearer seems simply to find in the music is actually a process of perceptual problem solving—an active process of sense-making something like that evoked by the comments of