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*The Psychology of Music:
From Sound to Significance*

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1 The scope of psychology of music

People everywhere and at all times for which we have records have picked out certain patterns of sound for particular attention. Some of these patterns are the stuff of what we call 'music.' What are the characteristics of the sound patterns we recognize as music? Why is it that these sound patterns have had a special significance for human beings?

All perceptible sounds begin with a propagation of energy into the environment. It may be a light breeze setting into motion a thousand fluttering leaves, the plucking of the strings of a harp, or the striking of a bass drum. What makes the particular dance of air molecules 'musical' in some instances, while other disturbances of air molecules seem to give rise to mere sounds? Or noise?

It is not always desirable to try to give a formal definition of the topic of a program of study. We will not try to answer the question 'What is music?' in a neat, short formula. However, there are paradigm cases of music which most people in a particular culture can recognize. We can start with some exemplary cases from our own culture about which most would agree. A symphonic performance by an orchestra is music. Rock concerts are music. Advertising jingles are music. Many hear church bells, ringing out a simple melody, as music. However, not all sound is music. Could we give a similar catalogue of sounds that everyone would agree are not music? Perhaps the noise of a road drill or the sound of a lawn mower would be sound patterns that are exemplary of nonmusic. The whine of a vacuum cleaner or the gurgling of a dishwasher might strike us as obvious cases of nonmusic. But what about the sound of waves breaking on the beach? The howl of a wolf? Or the song of a bird?

While the extremes seem clearly distinguishable, there is no sharp line to be drawn between music and sounds that are not music. Though we can fairly easily identify paradigm cases of music and nonmusic, there are many patterns of sound that are not easily classified as one or the other. Whether they are taken up as music or not depends in part on the context in which they occur. Debussy imitated the sounds of breaking waves in *La Mer*. Messiaen composed remarkable imitations of birdsong in *Des Canyons aux Étoiles*, while Respighi's score for *The Pines of Rome* included a recording of a real

nightingale's song. The blasts of real car horns punctuate Gershwin's energetic orchestration in *An American in Paris*. And Malcolm Arnold's *Grand, Grand Overture* included three vacuum cleaners among the orchestral instruments! There is also John Cage's *4' 33"*, a composition in which the performer does nothing for 4 minutes and 33 seconds to allow ambient and incidental sounds to define the composition. Here, the boundaries between sound and music, and the very definition of music in the absence of sound controlled by the composer or musician, are questioned.

All-encompassing definitions of music may be elusive. Nevertheless, despite the fuzzy boundaries of the domain of music, it seems that there are auditory phenomena which we can generally agree are music, and on which there has been agreement in many cultures and historical epochs. Music is produced and perceived by human beings. Performers must learn the necessary skills to create ordered sound in meaningful patterns. Through exposure or training, listeners must learn to perceive those features of ordered sound patterns as music. There is clearly room for a systematic study of all these skills, as diverse as they are. The merging of psychology and music leads the way to such examination, and opens avenues to numerous and diverse topics for study. Newcomers are often surprised at the breadth and scope of this expansive field.

The scope of the field

The psychology of music as it is practiced in the twenty-first century is concerned with a great many questions. Among other things, it is concerned with *the processes by which people perceive, respond to, and create music, and how they integrate it into their lives*. These topics range from the way in which the ear extracts the pitch of a tone, to the way in which music is used to express or transform moods. Though this field of study makes important use of cognitive psychology, it also draws on many other branches of psychology such as sensation and perception, neuropsychology, developmental psychology, social psychology, and applied fields such as educational psychology.

The perspectives of each of these domains within psychology have shaped this book to some degree, as evident in the overall plan: Our exploration begins with a consideration of the physical properties of a sound wave, the transmission of sounds to the ear, and the neural bases of the perception and cognition of music. We then examine more closely the perception and cognition of melody, rhythm, and musical structure. Next, we trace the emergence and development of auditory capacities and musical abilities, and the acquisition of musical expertise, culminating in musical performance. Finally, we consider the question of meaning in music, and the social, emotional, and universal significance of music.

The psychology of music attracts not only psychologists and musicians, but scholars and researchers from a wide range of other disciplines. The present volume is also informed by perspectives from fields such as acoustics, neuro-

science, musicology, education, philosophy, and ethnomusicology. We provide a brief overview here.

More than 2000 years ago it was realized that the musical possibilities of sound as heard were shaped and constrained by the physical properties of sound waves as they interacted with the amazing powers of the ear. Pythagoras linked the weight of a vibrating object to pitch, while his followers extended his intuitions to include the vibrations of strings linking pitch to the length of the string, and harmonics to the simple numerical ratios of those lengths. *Acoustics* is the science of the production, propagation and reception of those vibrations in the air that are relevant to hearing in general and music in particular. But it is also more – as discussed in chapter 2, the way that musical instruments and the human voice shape the physical processes that reach the listener, as well as the properties of the venues where music is produced and enjoyed, are also parts of the science of acoustics.

With respect to *neuroscience*, recent times have seen a surge of interest in the neural underpinnings of human musicality, and the current volume considers the way that neural activity may constrain or enhance our experience of music and music making. In order for us to experience music, the brain must pick up and import physical patterns from the auditory signal. Our studies must include an introduction to auditory neuroscience, beginning with the anatomy and physiology of the ear as presented in chapter 3. Of course, music is a complex and often multimodal experience. That is, it is not limited to hearing but involves other senses, such as sight and movement. Thus we must extend our discussion of neuroscience beyond audition, which we do in chapter 4. Recent discoveries from the field of neuroscience of music are also presented in subsequent chapters on perception of melody and rhythm, music practice and performance, and emotion in music in chapters 5, 6, 10, 11, and 14 respectively.

Insights from the field of *musicology* (the study of the structure and history of music) also continue to be essential to psychology of music, as evident in chapters 5, 6, and 7 on perception of melody, rhythm, and musical structure, and in chapter 14 on the emotional power of music. For example, in studying the power of music to 'express' emotions and its capacity to 'induce' emotional states in the listener, musicologists have addressed intriguing questions such as: How do musical structures give rise to emotions in listeners? Further, how does music come to have 'meaning' for the listener? The latter question is explored in chapter 13. A study of the basic theory of a practice involves bringing at least some of the underlying presuppositions to light as explicit principles, and subjecting them to critical examination. This is one of the ways that *philosophical* analysis is also an indispensable part of the psychology of music, bringing out certain presuppositions in the practices by which psychologists try to reach an understanding of music as a human phenomenon.

Within psychology of music, developmental psychologists are concerned with the emergence and maturation of musical behaviors. How these

emerging abilities may best be supported and refined is a question for *music education*, the focus of chapter 9. Musical performance requires the development of a set of highly elaborated skills, and a growing base of knowledge that allows for the sensitive interpretation of music. Before a composition can be performed it must be composed. This too requires a highly sophisticated cluster of skills. Then there is the creative undertaking of improvisation; Western jazz and performances of Indian classical movement are notable examples. Innovative music education methods assume that all children are musical, and intensively immerse young children in creative and sensitive engagement with music with the aim of laying the foundations for lifelong musicality.

Finally, music is differentiated into a wide variety of musical cultures across the world, and as such, an anthropological perspective highlighting the study of distinct human cultures and their 'musics' is also relevant to an understanding of the psychology of music. Finding out what is common to all musical cultures and what seems to be unique to each one throws a great deal of light on psychological questions. These studies help us to differentiate between cultural sources of the features of a particular musical repertoire and those which may derive from the biological bases of musical perception. The application of anthropology to music is *ethnomusicology*, the theme of our final chapter. In the concluding chapter, we consider music as it is represented in a variety of societies around the world. But we shall not pretend to have answered entirely satisfactorily the enduring questions of what music *is*, how exactly it is created and received, and how music brings about the powerful effects that it does.

Range of research methods

Although the present discussion by no means exhausts all the questions and topics subsumed by the study of psychology of music, the richness and expansiveness of this field should already be apparent. Psychology of music is also distinguished by the scientific research methods commonly employed to study musical phenomena of interest, which leads one to a certain kind of explanation for the phenomena under investigation. There are many different kinds of explanations developed in the natural sciences, accompanied by various methods, and psychologists of music make use of many of them.

Throughout this book we will encounter a great variety of empirical studies, as various methodologies are needed to explore the whole gamut of musical experience. For some purposes, experiments manipulating specific experiential or phenomenological variables in carefully controlled conditions are useful. A researcher may manipulate the tempo (or pace) of a song to determine if it alters listeners' interpretations of the emotion that is being expressed. For other purposes, the recording and analyzing of real-time phenomena of musical production and experience is appropriate, such as when identifying the steps a concert pianist takes to learn and memorize a

complex piece of music. In some instances, physiological methods or brain-imaging techniques may be employed, for example to examine changes in the body or brain while listening to or performing music. Qualitative studies and naturalistic observation also play an important part in studying the psychology of music. The nature of some aspects of musicality is best captured in rich observational studies of spontaneous activities in natural settings, such as observations of crowd behavior at live concerts or of parents singing to infants in their homes. Sometimes we can usefully sum up the musical experiences of a great many people in a sweeping generalization. In other cases, we need to pay close attention to music as it is perceived, appreciated, performed or composed by an individual, if we are to reach a sufficiently detailed understanding of what is happening.

Since the days of the pioneering volumes in this field, including Carl Seashore's *The Psychology of Musical Talent* and *Psychology of Music* (1919, 1938), Paul Farnsworth's *The Social Psychology of Music* (1958), Geza Révész's *Introduction to the Psychology of Music* (1954), and even the methodologically progressive Robert Francès' *The Perception of Music* (1958/1988), a wide variety of methods have been applied to the study of psychology of music. It is a great mistake in building up a science to insist on the primacy of any one of the many methods of research that can be found across the universe of the sciences. Indeed, the psychology of music is fascinating in part because it draws on so many diverse bodies of knowledge and multiple modes of investigation! Only by adopting such breadth can we hope to understand how this remarkable human practice is possible.

Coda

This introductory chapter has mapped the rich interdisciplinary terrain of the present book. The project was undertaken by three authors who represented three generations of academics when their paths first crossed almost 20 years ago as a distinguished professor, a graduate student, and an undergraduate major. Brought together many years later by a shared passion for this field, we collaborated on this volume in consultation with our many enthusiastic students who attended our psychology of music classes over the last several years. Clearly, the scope of inquiry of this field is vast, and no book can cover all that psychology of music encompasses. Our aim is simply to introduce readers to a broad range of classic and current research, and to ignite curiosity in the many intriguing questions and topics in this exciting and expanding field.

Considering what music meant to him after 50 years of studying the science of music, Carl Seashore, one of the important pioneers in this field, wrote in the preface to his 1938 volume of *Psychology of Music*:

Then I was a stargazer; now I am an astronomer. Then the youth felt the power of music and gave expression to this feeling in the way he loved

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and wondered at the stars before he had studied astronomy. Now the old man feels the same 'power of music,' but thinks of it in the manner that the astronomer thinks of the starry heavens. (p. xi)

Like Seashore, we hope this volume will serve to bridge the gap between the 'mere love and practice of music to an intelligent conception of it' (p. xi). At the same time, while learning the various principles and practices of astronomy, we hope our readers continue to be stargazers – moved by music and constantly fascinated by its many enduring mysteries.