Peter Pesic’s *Polyphonic Minds: Music of the Hemispheres* provides an in-depth examination of the nature and larger significance of polyphony in music, science, and the arts. The text is divided into four complete parts, broken down into more detailed chapters. The work spans 330 pages, including both a prelude and postlude, fifteen thorough chapters, notes, references, credits, acknowledgements, and an index. Pesic defines polyphony as the interweaving of simultaneous sounds and explores the history and significance of “polyphonicity,” or “many-voicedness,” in relation to human experience and how we understand the mind. He traces this musical aspect from ninth-century church music through the experimental twentieth-century compositions of Glenn Gould and John Cage, presenting the perspective each offers on the polyphonic brain.

Pesic explores the polyphonic “music of the hemispheres” that shakes brain states from sleep to awakening. He explores how the interconnected activity of cerebral subcenters in the brain embody polyphony from two angles: the multiplicity of simultaneous voices, and the changing dissonances by which they mutually interact. As discussed in *Mind as Machine* by Margaret A. Boden, neuroscientists are constantly...
evaluating what types of consciousness occur when the brain is affected in various ways. Pesic’s research intersects with recent work in the field of consciousness, as explored by Boden, and in the field of music and neuroscience, as he searches for answers to the question of how the brain processes polyphony, a burgeoning topic in the field today. For example, Marc Leman, another researcher in the field of music cognition, also examines the impact that musical sound can have on human beings in his book Embodied Music Cognition and Mediation Technology. He explains that “involvement assumes a relationship between a person and music. This relationship may be either direct or indirect.” Research such as Leman’s and Pesic’s connects directly to music cognition through the study of various types and textures of sound and how they engage the mind in thinking, reasoning, interpretation, and evaluation.

Pesic provides comprehensive and accurate research to support his argument that “polyphonic music raised fundamental issues for theology, philosophy, literature, sociology, psychology, and neuroscience,” all of which search for a unity of consciousness among various simultaneous experiences (1). This consciousness, to quote Damasio, “is an entirely private, first-person phenomenon which occurs as part of the private, first-person process we call mind. Consciousness and mind, however, are closely tied to external behaviors that can be observed by third persons.” Through the use of written musical excerpts, charts, figures, photographs, listenings, studies, and more, Pesic provides evidence for the effect of polyphony on music, consciousness, and the human experience as a whole.

Parts I, II, and III focus on the idea of polyphony in music throughout history. Pesic provides ample evidence and examples to support his arguments in these three sections. When he mentions an excerpt, the reader is provided with a visual reference. For example, Pesic traces elements of heterophony and complex polyphony from Gregorian chants, complex polyrhythms from Africa, and other aspects of polyphony from around the world. He provides examples of these through figures, illustrations, and musical examples, so the reader can visualize and understand the aspects of these different musical traditions. However, while he usually defines terms in an in-depth manner before discussing them further, he lacks this quality in portions of the book, particularly in these beginning sections, where he introduces a great deal of musical jargon with little explanation, making it difficult for a non-musical reader to follow and understand.

Pesic compares and contrasts the teachings of Plato and those of Plato’s student Aristotle, both of whom instigated thought provoking questions: “If each individual human mind is essentially one, how can it deal with the multiplicity of what it perceives? If each mind is not a single thing, how can we seem to understand or grasp

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anything as one? How could we even form the concept of unity, much less experience it
in the welter of multiple voices, whether inner or outer?” (2). Pesic’s work shows how
theological and philosophical questions such as these arose through the examination of
polyphony, engaging later thinkers.

As he moves through the development of polyphony in Parts I-III, Pesic explores
the importance of a simpler form, monophony, in Christian worship and chants, noting
the informal part singing in monastic villages and more complex forms of polyphony
seen in the twelfth and thirteenth centuries, such as canons and motets. Anna Maria
Busse Berger discusses these forms in Medieval Music and the Art of Memory where she
presents her findings on memorisation tactics used during the twelfth and thirteenth
centuries, or rather, how people were beginning to organise their thoughts amidst the
growing popularity and difficulty of polyphony.¹

Pesic provides visual examples of these polyphonic works throughout his
introductory sections. He then describes the controversies that surrounded polyphony
in the fourteenth century, and considers the defenders of polyphony, such as Nicole
Oresme, a mathematician and natural philosopher who attempted “to describe many-
dimensional qualities in nature, including sound” (67). In On Repeat, Elizabeth Margulis
expands on the idea of the dimensions of sound to include repetition, prediction, and
participation. She presents a study where “listeners heard short excerpts from
commercially available recordings of classical music by composers ranging from
Rameau to Strauss. . . the participants’ task was simple: they pressed a button as soon as
they detected something repeating within the excerpt.” ⁵ The data from this study
suggests that repeated exposures trigger a shift in the brain from more local to more
global levels of musical organization. Pesic expands upon this idea of musical
organization as he discusses new aspects of polyphony in the fifteenth century and
through the sixteenth and seventeenth centuries.

In Part IV, Pesic discusses examples from psychology, literature, and sociology
that involve multiple simultaneous processes that were classified as polyphony. Pesic
moves through the eighteenth and nineteenth centuries as he presents the research and
findings of others, such as Descartes’ controversial suggestion of “common sense,” the
argument of déjà vu, Paul Broca’s discovery that led to the doubled brain, and more.
Pesic examines the two independent hemispheres of the brain and the functions of each.
As Daniel J. Levitin explains “musical activity involves nearly every region of the brain
that we know about, and nearly every subsystem.” ⁶ Levitin expands on this idea
through the description of his own research that explores the activation of certain parts
of the brain when it perceives of different composers, sounds, or types of music. For

¹ Anna Maria Busse Berger, Medieval Music and the Art of Memory (Berkeley: University of

² Elizabeth Hellmuth Margulis, On Repeat: How Music Plays the Mind (New York: Oxford
University Press, 2014), 7-10.

³ Daniel J. Levitin, This is Your Brain on Music: The Science of a Human Obsession (New York:
instance, the difference in brain activation when hearing a car horn as opposed to Rachmaninoff.

Levitin’s activation of the brain can be related to Pesic’s discussion of the hemispheres. Just as each hemisphere is activated by different sounds, each hemisphere controls separate functions, often on opposite sides of the body. This phenomenon led to the aforementioned idea of the doubled brain. Piano playing has become a favorite example of this, because of the brain’s ability to focus on each hand playing separate lines at the same time. Therefore, it has been determined that the brain is a very complex instrument. In Stefan Koelsch’s book *Brain and Music*, he discusses a study done on pianists where “activation was observed during both perception and production of melodies in [various portions of the brain]. Activation within [two specific portions] during both perception and production of melodies were clearly left lateralized,” or rather, caused activation in the left hemisphere of the brain, thus exploring the concept of the functions of the hemispheres. Pesic expands his discussion on the two hemispheres using research from Freud’s psychological standpoint, Weber’s sociological view, and Dostoyevsky’s literary position when considering polyphony across a vast array of subjects.

In the final chapter of the book, Pesic examines Gyorgy Buzsaki’s neurological hypothesis “that in brain networks, especially those serving cognitive functions, the packaging and segmentation of neural information is supported by the numerous self-organized rhythms the brain generates” (259). Pesic references Buzsaki’s research and findings, which are expanded upon in his book *Rhythms of the Brain*. Here, Buzsaki provides support for the idea that spontaneous neuron activity is the source of our cognitive abilities. He discusses topics such as the physics of oscillations in the brain and the complex cognitive processing and memory storage capabilities of the brain. Pesic draws upon Buzsaki’s research, including tests performed on rats that aid in the discussion of the rhythms and dysrhythmias of the brain. Pesic usually agrees with Buzsaki’s findings but does add his own input where he feels it appropriate, occasionally pointing out flaws in Buzsaki’s argument. However, Pesic concludes by stating that Buzsaki’s field of study is ongoing and incomplete and will continue even though the polyphonic “music of the hemispheres” is very complex.

Pesic effectively contributes to scholarly literature by looking at music and the brain, or music cognition, in a different way than usual. By focusing on polyphony and its effect on the brain, as well as the body, he is able to introduce and support an argument that is not popularly discussed. While it is daring to focus solely on polyphony and the brain instead of the usual aspects of music cognition, Pesic researches and presents this specialized angle with admirable detail. He draws from interesting sources and research from his fellow scholars, piecing them together to form his own study specifically geared toward polyphony and its contribution to human experiences.

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Pesic usually presents his sources and ideas with the same general approach. He introduces the argument or states the purpose and findings of a given work, gives examples and relates them to other arguments which have been previously discussed, and finally states his own analysis of the subject matter where he feels it appropriate or where he does not fully agree. Pesic uses many other pieces of literature on the same subject or similar subjects to expand his own ideas. While he mostly agrees with the sources he discusses, he tends to combine multiple types of data and examples from throughout history to prove and solidify his points. Therefore, the strength of this book lies in Pesic’s ability to draw upon multiple sub-disciplines and integrate them into his own arguments.

Overall, this book provides an interesting viewpoint on the field. Pesic’s work is unique, because it begins by exploring the history of polyphony in its many forms, to include how it started, developed, and expanded over time in different countries and throughout the world. Through this unique approach, Pesic admirably exposes the influence of polyphony on theology, philosophy, literature, sociology, psychology, and neuroscience. By joining his own research with that of others in numerous fields, Pesic forms a compelling argument, showing the valuable contribution of polyphony to music cognition and everyday life.

For further reading:


