model for scientific funding, were good then and should be followed more consistently now. That is, funding for research should be awarded by peer review of proposals and administered primarily through universities and research institutes. Moreover, such funding should be stable, Teitelbaum insists, and not subject to boom-and-bust patterns.

With Teitelbaum's account of all the fuzzy thinking and unfounded claims about the scientific workforce over the years, *Falling Behind?* should add to the growing realization in policy circles that this country needs an independent institute for analysis of, and advocacy for, the scientific enterprise.

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American Association for the Advancement of Science
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Music and the Making of Modern Science

Peter Pesic
MIT Press, 2014. $40.00 (360 pp.).
ISBN 978-0-262-02727-4

Peter Pesic's *Music and the Making of Modern Science* ends with the following statement: "Science has followed music." In this magnificent book, trotting from Pythagoras to Max Planck and beyond, Pesic shows us again and again how music informed innovation, and he offers illuminating new insights into nearly three millennia of scientific developments. Pesic's rigorous analysis of source material allows him to confidently credit music for its critical role in the innovations of Johannes Kepler's astronomy, Leonhard Euler's topology, and Planck's quantized energy. It is a testament to Pesic's quiver of knowledge that he can so thoroughly examine the work of so many polymaths. That breadth can also be seen in the unique pedagogical approach of Pesic's home institution—St. John's College in Santa Fe, New Mexico—which uses mainly primary source materials in its science courses. For example, students read Hans Christian Oersted to learn about electromagnetism.

Over the course of 18 tight, graceful chapters, Pesic—a physicist, historian, and musician—builds his case. Many of the episodes will be familiar to students of the hard sciences. They include cosmological debates and the development of irrational numbers, field theory, and Schrödinger's wave equation. Indeed, a basic familiarity with physics and mathematics is necessary to take full advantage of the book—as is some basic music knowledge. Although its main appeal may be to readers interested in the connections between music and science, the book could be fruitfully employed as the main text for a college course on the history of science and music or even an introductory physics course.

Music, as Pesic presents it, is broadly defined, though limited to the Western tradition. In the examples offered, music's causal power as a conceptual force varied. For Isaac Newton, Euler, George Johnstone Stoney, and Thomas Young, music prompted insight (and sometimes confusion) through analogy. For Nicole Oresme, Kepler, Hermann von Helmholtz, and Planck, it was a personal love and practice of music that informed their science. And, as Pesic puts it, for Pythagoras, Plato, Johann Balmer, and Erwin Schrödinger (kind of), music was the "interface through which natural philosophy could connect with mathematics." That Pythagoras and Schrödinger both employed music as an interface reveals just how broadly music is defined in the text. It also underscores Pesic's claim that natural philosophy's search for cosmic harmony has followed music to the present, even if nowadays the role of music is generally unacknowledged.

It is always a bit unfair to point to what has been left out of a book, especially one that so impressively balances both breadth and depth, but there isn't a lot about music in *Music and the Making of Modern Science*. Besides the audio examples in the ebook—which I recommend over the physical copy—and a few discussions of composers sprinkled about, readers have little sense of the sound of the music heard by the principle actors in the book. I wanted to know more about what Young listened to on the church's organ. I wanted to know what operas Albert Einstein attended. I wanted to know more about the music that rang in those men's ears—music as they most commonly experienced it. Pesic does include a lot on music theory, music as an abstract interface, and musical instrument design. In his discussion of René Descartes, we witness music shifting from divine force to material phenomenon. But readers won't quite experience music as a cultural phenomenon.

That said, nothing in the fields of history of science or sound studies compares with *Music and the Making of Modern Science*. Scholarly monographs on the relationship between physics and music have focused on much narrower temporal and geographical settings—that includes my own book, *The Psychophysical Ear: Musical Experiments, Experimental Sounds, 1840–1910* (MIT Press, 2012). Two other excellent examples are Veit Erlmann's *Reason and Resonance: A History of Modern Aurality* (Zone Books, 2010) and Myles Jackson's *Harmonious Triads: Physicists, Musicians, and Instrument Makers in Nineteenth-Century Germany* (MIT Press, 2006). Edited volumes such as Trevor Pinch and Karin Bijsterveld's *Oxford Handbook of Sound Studies* (Oxford University Press, 2012) have made valiant efforts toward breadth but remain restricted to the modern era.

Pesic's brilliant, unique work fills a glaring need.

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Quantitative Plate Tectonics

Physics of the Earth—Plate Kinematics—Geodynamics

Antonio Schettino
Springer, 2015. $99.00 (403 pp.).
ISBN 978-3-319-09134-1

During the past half century, plate tectonics has developed from an initially radical, paradigm-shifting view of Earth processes to the foundational support for essentially all branches of geology. One early, great success of plate-tectonic theory was the explanation of geological observations through quantitative, physics-based models.

Plate-tectonic theory is closely linked to its underlying fundamental physics of heat transfer, continuum mechanics, elastic-wave propagation, and electromagnetic processes. But hardly any university-level texts derive and focus on those connections. That gap is the one Antonio Schettino intends to fill with his *Quantitative Plate Tectonics: Physics of the Earth—Plate Kinematics—Geodynamics*.

What sets the book apart is not the specifics of its content; virtually all the covered material can be found in other geophysics texts. Rather, the framing of everything in terms of plate-tectonic processes is what distinguishes this from a wide range of theoretical geophysics texts. *Quantitative Plate Tectonics* was clearly designed for a course taught by the author, and although its