

BOOK REVIEWS

■ General

Martin Harwit. *In Search of the True Universe: The Tools, Shaping, and Cost of Cosmological Thought.* xvii + 393 pp., illus., tables, apps., index. Cambridge: Cambridge University Press, 2013. \$50 (cloth).

Martin Harwit's book is an unusual mélange of popular science, history, sociological theorizing, and science policy analysis. The topics and perspectives are wide ranging, and some treatments are more successful than others. Typically, the ideas of a social theorist, systems analyst, anthropologist, or philosopher are introduced, followed by an examination of how these ideas would apply to the astrophysics research community.

The historical parts of *In Search of the True Universe* are very informative and tend to go over ground well trodden by historians and popular writers. Less familiar to the readers of *Isis* will be the excursions into sociology and social analysis, involving discussions of the network theory of such thinkers as Mark Newman and Duncan Watts and its applicability to case studies in cosmology and astrophysics. If nothing else, it is interesting to learn about the diversity of approaches that have been devised—or, more often, borrowed—to investigate the social dynamics of the scientific community.

Harwit introduces the concept of a “social construct,” which refers to a scientific theory that is supported by the authority of a group of researchers but that eventually is recognized to be a bad theory. He believes that all too often astrophysical research may “lead to a construct, potentially accounting for all available observations but nonetheless a mere caricature of the Cosmos—rather than a true portrait” (p. 290). The viability of such a construct derives from the shared commitment of a group of researchers. A social construct should be contrasted with a good scientific theory that accords with the “true Universe.” Such a theory is accepted not primarily as a result of social consensus but because of its robust internal character and the fact that it fits so well with objective reality.

An example of a social construct is the steady-state theory of the universe developed by the English astrophysicist Fred Hoyle and others in the 1950s. This theory was invented to describe an expanding universe in which the age paradox was avoided. Because of the high nu-

merical value found for Hubble's constant, it appeared as though the universe was younger than the objects contained within it. Although the steady-state theory was not really widely accepted, it had a committed group of core scientific supporters. In the early 1960s evidence developed that the universe was evolutionary, and the discovery of the microwave background in 1965 pointed to the origins of the universe in a state of high energy and density. Distances within the universe were recalibrated to become larger, Hubble's constant was scaled down in value, and the universe was recognized to be older. The frequency of light elements in the universe was too high to be accounted for solely by stellar nucleosynthesis. The steady-state theory became little more than a discarded social construct.

Modern cosmology is largely the product of pure observation. That new mathematical theories of gravity emerged at the same time as Vesto Slipher's discoveries at Flagstaff was a remarkable historical coincidence. Cosmology advances through a myriad of technological tools—radio and optical telescopes, satellite probes and orbiting observatories, computer modeling and simulation, adaptive optics, LED devices, and so on. As Edwin Hubble accurately observed, “the conquest of the Realm of the Nebulae is an achievement of great telescopes” (*Realm of the Nebulae* [Yale, 1936], p. vii). If the essence of modern science is the skilled deployment of advanced technology, then the redshift law was the ultimate scientific achievement.

Although technological innovation is ubiquitous in astrophysical and cosmological research, Harwit believes that the tools of these sciences are facing new challenges. Since the 1930s these tools have largely been adapted from military and industrial contexts. The formative historical event was of course World War II, which led to the development of a range of instruments that became fundamental to astrophysical research in the postwar period and beyond. Today national priorities have shifted, and astronomers must be more resourceful and selective in fashioning their tools of investigation. A particular challenge is the problem of the social construct. Because of the social and policy dynamics of the research community, poor theories may continue to hold sway. The current mysteries of cosmology (dark matter, acceleration) and the esoteric and strangely inconsequential character of this science make the danger of the social

construct especially pressing. It is through creative technological innovation that the specter of the social construct will be dispelled and the nature of the true Universe revealed. In the epilogue Harwit writes: “I use the word ‘true’ to convey that the Cosmos may have a structure that could elude us unless we search for it with highly specific tools hard to imagine or come by. Lacking these tools the Cosmos we unveil could then be largely deceptive” (p. 367).

CRAIG FRASER

James Kennaway. *Bad Vibrations: The History of the Idea of Music as a Cause of Disease.* xii + 213 pp., illus., bibl., index. Farnham, Surrey: Ashgate, 2012. \$114.95 (cloth).

With the ready availability of literature devoted to the wholesome field of music therapy, the siren song of James Kennaway’s *Bad Vibrations* is hard to resist, a title that promises an enticing exposé of the dark undercurrents associated with the Orphic art, whether real or imagined. A highly informative survey of the evolving relationship between music or music criticism and historical developments in physiology, psychoneurology, and concepts of “health” more generally—not to mention the political, sexual, and racial discourses that sometimes framed and were often served by this relationship—*Bad Vibrations* delivers on its promise: Kennaway demonstrates how music has provided a medium in which the medical and the moral are frequently intermixed—and at the service of an astonishing variety of ambitions. Although published as a contribution to the history of medicine, the book contributes no less productively to the fields of historical musicology and aesthetics.

In keeping with its subtitle—albeit with “disease” treated rather broadly—Kennaway’s history finds its greatest traction in the nineteenth and twentieth centuries; nonetheless, it carefully frames this period with succinct attention to classical sources, as well as to the transition from an eighteenth-century culture of the passions and of sensibility to the physiology and associated psychology of nerves. Kennaway’s research is notably steeped in British and German sources, while offering due attention to French and Italian material as well; global conflict extends its sphere of critical interest further, encompassing the Soviet Union, Korea, and the modern Middle East, while its American coverage spans the gamut from the birth of jazz and matters of race through to Waco and Guan-tanamo Bay.

Kennaway situates the emergence of a discourse of musical pathology in the context of larger socioeconomic and medical concerns. Unease over the powers of music—especially as amplified by the rapid expansion of nineteenth- and twentieth-century urban life, with its ever-multiplying platforms for the consumption of music and increasing penetration of all corners of social life—offers an intriguing perspective on the ascendance of a bourgeois culture that began in the eighteenth century, highlighting anxieties of class, gender, and morality that resonate no less powerfully in the twenty-first century. Kennaway’s genealogy of “music as disease” traces the cross-fertilization of the aesthetic with the pathological, exploring music’s engagement with familiar diagnostic categories of nervous debility such as hysteria, epilepsy, monomania, neurasthenia, and perversion. Kennaway shows how popular notions about the supposedly heightened vulnerability of the nervous systems of women led to frequent association of the pathological with the “feminine” in musical aesthetics, concerns that were subsequently extended to include men held to be vulnerable to the novel pathology of “homosexuality,” with Wagnerites making up the most at-risk community. Though the subject matter sometimes lends itself to the tragicomic—whether death by Handel oratorio or Rossini aria, or by playing the glass harmonica or the triangle—Kennaway does not make light of the sometimes nefarious purposes that both music criticism and music itself have served, including use in armed confrontation and torture or by contributing to political discourses of cultural and racial degeneration that led to state-directed violence on an unprecedented scale.

There are some signs of editorial haste, despite the evident depth of scholarship that has informed the book’s preparation. One encounters the occasional bibliographic oddity: given Kennaway’s professed (and justified) indebtedness to the critical legacy of Michel Foucault (p. 17), the critical apparatus might decide just how many volumes make up the *History of Sexuality* and when they were actually published. Although one hesitates to critique the book’s judicious coverage of an already substantial array of topics and sources, with respect to Nietzsche—a figure of particular historical importance for Kennaway’s account of the relationship between the arts and nineteenth-century concerns over degeneration—some attention to his seminal work on the relationship between music and society, *The Birth of Tragedy from the Spirit of Music* (1872), would serve both the contextual and critical interests of Kennaway’s survey, from Wagnermania through to Beatlemania and