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Essay Review

Sounding the field: recent works in sound studies

David Hendy, *Noise: A Human History of Sound and Listening*. London: Profile Books, 2013. Pp. xv + 382. ISBN 978-1-781-25089-1 £16.99 (hardback).

Trevor J. Pinch and Karin Bijsterveld, *The Oxford Handbook of Sound Studies*. New York: Oxford University Press, 2011. Pp. xiii + 593. ISBN 978-0-195-38894-7. £95.00 (hardback).

Alexandra Hui, *The Psychophysical Ear: Musical Experiments, Experimental Sounds, 1840–1910*. Cambridge, MA: MIT Press, 2012. Pp. xxii + 233. ISBN 978-0-262-01838-8. £23.95 (hardback).

For sound studies, the publication of a 593-page handbook, not to mention the establishment of at least one society – the European Sound Studies Association – might seem to signify the emergence of a new academic discipline. Certainly, the books under consideration here, alongside many others, testify to an intensification of concern with the aural dimensions of culture. Some of this work comes from HPS and STS, some from musicology and cultural studies. But all of it should concern members of our disciplines, as it represents a long-overdue foregrounding of the aural in how we think about the intersections of science, technology and culture.

In developing an overview of a subject area, perhaps the place to start is with a book designed to convey the broad topic of the social history of sound to a wide audience. Accordingly, let us commence with David Hendy's *Noise: A Human History*, the book accompanying his 2013 BBC Radio 4 series, which it echoes closely, with each of the thirty chapters arranged in blocks of five thematically linked episodes, just as the six weeks of five fifteen-minute broadcasts sounded the territory on the airwaves. Sometimes the prose bears the mark of its origin and you hear Hendy's voice as you read; for example, discussing the conservationist Sigurd Olson's retreat 'Listening Point', designed to enable him to focus on the *absence* of noise, Hendy breaks in, 'But was Olson right? Is silence really the essence of the world's wild places?' (p. 21), proceeding to a discussion of the noises of nature. Perhaps it is fitting in a book on the aural for the voice of the author to sound in the reader's mental ear. Both the episodic structure and the as-spoken prose make the book eminently readable, with no topic outstaying its welcome, and tempting the reader, like the punter at an unexpectedly congenial discotheque, to stay for just one more song, then another.

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David Hendy is a radio man in two senses; he has written extensively on the history of radio, including the award-winning *Life on Air: A History of Radio Four*.[1] But he has been a practitioner of radio too, starting his career as a journalist and producer before teaching at Westminster and now Sussex. Although radio is only formally given one chapter in *Noise*, the book is the product of the intuitions of an author at home in this sonic medium. It is history of sound in the sense that it is a history of what can be heard – or of what, across time, might have been heard; it is a history of what might be included in an acoustically aware radio programme. This gives *Noise* its inclusivity and breadth, rumbling forward from the prehistoric cave dwellings of our antecedents to the peace of a Japanese tea ceremony re-enacted in today's Ashmolean Museum in Oxford. This is a broad spectrum – taking in Neolithic burial chambers, medieval church bells and the noise of interwar New York – that would gladden the heart of a Braudel. And, as an introduction to a realm that must be listened to, where we must adjust our attentiveness to an overlooked sense, it is most valuable. It is *longue durée*, but, in proper service to its trade book audience, the book is not necessarily 'big-picture' in the Pickstonian sense; we hear no echoes of Foucauldian epistemes here.[2] Rather, it is a commonsensical, largely chronological, social history. That is not to say that Hendy is unaware of relevant literature; he has read and makes available here the insights of some of the most significant authors in the field. For example, R. Murray Schafer, who in 1969 coined the term 'soundscape', is present, as is Emily Thompson, who applied it in her study of early twentieth-century America. Here it underpins a chapter on noise and noise abatement in twentieth-century New York. As is common with books aimed at more than an academic readership, there is no bibliography, but *Noise* is well footnoted and the index is detailed.

To take one example, Chapter 21, dealing with the sound of the Industrial Revolution, starts imaginatively with Henry David Thoreau on Walden Pond, reflecting on the sound of the railroad. Hendy artfully segues from here to the more general coming of the railway, taking Britain as his extended example, citing Dickens from *Dombey and Son* along the way. This expands to a broader discussion of the noise of industry, quoting Hugh Miller, Thomas Carlyle and the Glasgow physician Thomas Barr's 1880s studies of boilermakers. *In toto*, Hendy agrees with Schafer's judgement that the 'Industrial Revolution' was a turning point in the history of sound. The chapter is a fine example of how a book aimed at a broad audience can cover a wide scope without losing the fine texture of telling historical detail.

The radio-programme-derived format of the book does lead to some disproportion; this reader nursed the suspicion that, given the episodic five-per-week, equal-length chapter structure, in the selection of some of the chapters the requirement to cover particular world events leads to some shoehorning of not especially sonic material into the narrative. In these cases, however, there is soon another chapter to enjoy. The brevity of the individual chapters also reduces the scope for detailed comparison, so, for example,

1 David Hendy, *Life on Air: A History of Radio Four*, Oxford: Oxford University Press, 2007.

2 John Pickstone, *Ways of Knowing: A New History of Science, Technology and Medicine*, Chicago: The University of Chicago Press, 2001.

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the noise abatement movement in America is discussed whilst that in Britain is not. Hendy has also made choices which may derive from the week-by-week structure of the programmes. So, for example, only a third of the book – two of the six weeks' broadcasts – is concerned with modernity. This may well be a valuable corrective to the naive assumption that sound and noise are only emblematic of our industrial and post-industrial era. All the same, it constricts the space available to discuss the tumultuous range of new ways to generate sound and noise that our era has produced. These are observations, not quibbles, as in sum David Hendy can be said with *Noise* to have produced a highly valuable introduction to the new field of sound studies, but one which is much more than a popularization, a work that is distinctively his, with its own concerns that will be treasured by other scholars.

The very first footnote in Hendy's book takes us to Karin Bijsterveld, one of the key players in the emergence of sound studies as an STS discipline.[3] She, along with STS eminence – and practitioner as well as historian of electronic music synthesizers – Trevor Pinch, is co-editor of the new *Oxford Handbook of Sound Studies*. Where many such compilations comprised summaries of the different aspects of established fields, this volume has more in common with an exploratory essay collection in a new field. The individual contributions are in many cases second-stage original academic products; either early published work from recent postdocs, or that of established scholars exploring an intriguing byway of already published research. In addition to the editors, several of the major figures in this new field – Hans-Joachim Braun, Myles Jackson, Mark Katz, Hillel Schwartz, Michael Bull and Jonathan Sterne[4] – are (co-)authors of chapters here. Several of the younger scholars are the students of the more senior figures, revealing how this interdisciplinary area is thriving via the normal mechanisms of modern academe. We may note here that five of the excellent contributions come from Bijsterveld's Maastricht University department. The volume has perhaps twice the number of essays (twenty-three, with a helpful introduction) that might normally be found in a standard book from the academic publishers that specialize in the fallout from themed conferences, making it a substantial statement about the potential of this recently convened field.

The reader may wonder whether the *Handbook* is an act of discipline-building. Pinch and Bijsterveld, as sophisticated analysts and observers, are acutely aware of this and careful in their terminology. In the introduction, they coyly suggest dropping the word 'emerging' from the definition they previously advanced in the 2004 issue of *Social Studies of Science* that in a sense laid out the field: 'Sound Studies is an emerging interdisciplinary area that studies the material production and consumption of music, sound, noise, and silence, and how these have changed throughout history and within different

3 He cites Karin Bijsterveld, *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century*, Cambridge, MA: MIT Press, 2008.

4 Hans-Joachim Braun is editor of the collection *Music and Technology in the Twentieth Century*, Baltimore: Johns Hopkins University Press, 2002. Michael Bull is author of *Sound Moves: iPod Culture and Urban Experience*, London: Routledge, 2007. Jonathan Sterne is author of two seminal texts in the field: *The Audible Past: Cultural Origins of Sound Reproduction*, Durham, NC: Duke University Press, 2003; and *MP3: The Meaning of a Format*, Durham, NC: Duke University Press, 2012.

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societies'.[5] They are not claiming a new discipline, but 'a new interdisciplinary area', and are keen to stress, as in 2004, the wide-ranging disciplinary affiliations of their contributors. In the 2004 collection, the focus was explicitly on bringing new technologies and music into the orbit of STS; in that case the same editors devoted 20 per cent of their introduction to making the case for inclusion of a paper on audiophilia by the ethnomusicologist Marc Perlman within an STS collection, 'since his paper on the face of it seems far away from the concerns of S&TS'.[6] In the *Handbook*, the disciplinary credentials of the wider range of contributors are trumpeted; sound studies

> is a flourishing interdisciplinary area with several overlapping disciplines and a range of methods that touch upon the fields of acoustic ecology, sound design, urban studies, cultural geography, media and communication studies, cultural studies, the history and anthropology of the senses, the history and sociology of music, and literary studies (p. 10).

In laying out their contributors' work, they divide the material into seven, occasionally overlapping, sections organized around the places of sound: shop floors and test sites, the field, the lab, the clinic, the design studio, the home and the digital. I will discuss a few sample contributions. Unlike Hendy's book, it is the noise of industrialization that marks the commencement of the volume. In the first chapter, Mark M. Smith, in a subtle revision of Leo Marx's 1977 *The Machine in the Garden*, rejects the binary of industry loud/pastoral quiet.[7] Taking the example of the female workers at Lowell, Massachusetts, he enquires into how these first-generation American factory hands 'incorporate[d] the new invariably loud sounds into their worldviews and soundscapes' (p. 40). One, for example, heard the sounds of the mill 'as of crickets, frogs, and jewsharps, all mingled together in strange dischord' (p. 49). Another wrote, 'I discovered, too, that I could so accustom myself to the noise that it became like a silence to me … And I defied the machinery to make me its slave' (p. 51). Furthermore, as Smith shows, the industrial noises of the antebellum North were seen as positive characteristics of its free-wage labour economy, in comparison with the slave labour of the South. To an extent, both owners and workers used aural metaphor – 'the hum of industry' – to connote what they saw as a kind of progressive northern, anti-slavery capitalism. Smith styles himself a 'historian of aurality' (p. 40), and his attention to sounds and how they were perceived in the past starts on the work of making the case for the concerns of the volume as a whole.

Joeri Bruyninckx delivers a fascinating chapter on the history of field recordings in ornithology. He shows how the long-established technique of recording birdsong using musical notation was replaced in the twentieth century, first by using nonsense syllables or phonetic vowels – on the grounds that, as Richard Hunt argued in 1923, 'bird sounds are essentially human speech-like' (p. 132). Alternatively, graphical scores said by their

5 Trevor Pinch and Karin Bijsterveld, 'Sound studies: new technologies and music', *Social Studies of Science* (2004) 34(5), pp. 635–648, 636.

6 Pinch and Bijsterveld, op. cit. (5), 641–642; Marc Perlman, 'Golden ears and meter readers: the contest for epistemic authority in audiophilia', *Social Studies of Science* (2004) 34(5), pp. 783–807.

7 Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America*, Oxford: Oxford University Press, 1964.

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proponents to be more accurate than the conventional stave were used, followed by various kinds of audio recording and electronic–visual representation of sound waves. Bruyninckx's STS sensibility, especially where the theory is embedded in his account, effectively helps tease apart the issues at stake in the sixty-odd-year scope of his concerns here. On both sides of the Atlantic, existing sound-recording techniques were pressed into service from the late 1920s; sound on film in the USA and disc-cutting phonographs in Britain. In both cases, when they had trundled their enormous sound trucks out into the wild, and endured the frustration of birds surrounded with multiple microphones flying away, they discovered a new obstruction. Resonant with the anti-noise movements described elsewhere in this volume, 'not only did mechanical artifacts and "machinery" generate more noise, but mechanical measuring devices or recording technology also made noise increasingly audible' (p. 135). One solution was the development of parabolic sound-focusing microphones, which allowed the recordist to focus their recording on the bird's song, reducing background noise. Interestingly, as Bruyninckx shows, this was not automatically preferred by some British ornithologists, who required the registration of the bird's environment. In his final section, he shows, citing Latour, how visualization techniques using audiospectrographic analysis continued the erasure of noise from the recording.

The historian of science Myles Jackson, perhaps best known for his 2006 monograph on physicists, musicians and instrument-makers in nineteenth-century Germany,[8] expands the territory of that book by showing how instruments used in the nineteenth century for the standardization of musical pitch and metre were pressed into service in the twentieth century by avant-garde composers. At issue here are the well-established STS theme of standardization and, on the musical side concerning the authorial control of composers, the role of virtuosity in the character of genres of music, and the search for novel timbres and structures in music since the era of high modernism.

Hillel Schwartz supplies an enjoyable essay that links noise abatement to hospital design and the use, or otherwise, of earplugs. He considers Florence Nightingale's views on the avoidance of noise, as she wrote of the distressing 'fidget of silk and of crinoline, the rattling of keys, the creaking of stays and of shoes' (p. 275). He describes the New York campaigns of Julia Barnett Rice against noise outside the city's hospitals, then demonstrates how high-technology hospitals themselves became increasingly noisy. Turning to debates around the use of earplugs at work and in times of war, he sketches the debates for and against, ending in a brief coda with a sigh, gesturing to the subsequent development of noise-cancelling earphones. As in his magnum opus, *Making Noise*,[9] the prose is highly literary and at times slightly playful, which makes for an entertaining read: 'anti-noisites invariably enlisted infants and invalids in their briefs against dutiful daughters pounding out piano scales in upstairs apartments, maids beating carpets on balconies, organ-grinders at the curb' (p. 279). Like a stateside Will Self, his out-of-the-way vocabulary may occasionally provoke the reader to reach

8 Myles W. Jackson, *Harmonious Triads: Physicists, Musicians, and Instrument Makers in Nineteenth-Century Germany*, Cambridge, MA: MIT Press, 2006.

9 Hillel Schwartz, *Making Noise: From Babel to the Big Bang & Beyond*, New York: Zone Books, 2011.

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for the dictionary, and there is the occasional larky pun: 'inserting earplugs was eargo a risky business' (p. 288). These stylistic qualities are suggestive of what is involved in conceiving of sound studies as a novel 'interdisciplinary area'. Gone, as the editors embrace this 'independent scholar, poet, translator, and public arts consultant',[10] is the effort at inclusion required in the *Social Studies of Science* special issue. If sound studies is to thrive, this inclusion implies, it is going to be a broad church.

The musicologist Timothy D. Taylor contributes a chapter on three American composers of the 1960s and 1970s – Raymond Scott, Eric Siday and Suzanne Ciani – who introduced electronic sounds into advertising. Here, despite a passing reference to Oudshoorn and Pinch on users, and another to Silverstone and Hirsch on domestication, the emphasis of the piece is more supply-side.[11] Taylor quotes extensively from the excellent small book that accompanies the year 2000 CD of Scott's electronica, for Siday he uses some archive material, and for Ciani an interview as well as some contemporary advertising literature. This is very much a first dip into this fascinating territory, whereby electronic sounds, previously associated with science fiction (notably in Bernard Herrmann's score for the 1951 *The Day the Earth Stood Still*) became normal parts of the American domestic soundscape. Scott's 'sound logos' and Siday's 'identitones' were aimed to make particular commercials stand out by making associations between novel sounds and particular products. It is here that, if it were possible, attention to the historical radio listeners' and television viewers' experience would be valuable. There is also room here for international comparisons – the BBC Radiophonic Workshop and the British composer Daphne Oram were in directly analogous territory to their 1960s American equivalents in using electronic music to create programme idents and advertising – but this is a task for work to come that will build on this essay. The reader looks forward to further exploration of the territory that is tentatively suggested by phrases such as 'it is likely that', 'seems to be', 'doubtless partially as a result'.

Mark Katz, musicologist and author of monographs on hip hop and on the interaction of music and technology, contributes a chapter on the amateur in the age of mechanical music.[12] He shows that despite a strong presumption that recording and other music technologies would have a deleterious effect on amateur music-making, the opposite has turned out to be the case. He shows how player pianos created new forms of amateur performance, and a strong undercurrent in phonograph usage that entailed active participation, by using the machines as quasi-musical instruments, by making performances of amateur music, and by performing alongside recordings. So, for example, in 1906 we find members of a Chicago women's club recording their pet dogs 'and then, in a Dadaesque performance, played six machines simultaneously to create a kind of

10 Schwartz, op. cit. (9), dust jacket biographical note.

11 Nelly Oudshoorn and Trevor Pinch, *How Users Matter: The Co-construction of Users and Technologies*, Cambridge, MA: MIT Press, 2003; Roger Silverstone and E. Hirsch, *Consuming Technologies: Media and Information in Domestic Spaces*, London: Routledge, 1992.

12 Mark Katz, *Capturing Sound: How Technology Has Changed Music*, Oakland: University of California Press, 2010; Katz, *Groove Music: The Art and Culture of the Hip-Hop DJ*, New York: Oxford University Press, 2012.

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canine symphony' (p. 465). Those musical activities that required recording declined when gramophones – generally not capable of recording, unlike the Edison phonograph cylinders – became dominant, although many varieties of learning from and playing along with records persisted. In his carefully considered examples, he shows how recording technologies and amateur music were co-constructed. His more recent examples reinforce the point. In the case of hip hop, he shows the stages by which this new musical form was developed by DJs breaking the rule that records were to be played from start to finish; first by putting the needle back to the start of a rhythmic 'break' section, then by extending the sequence using a second copy of the same record. This interaction with the recording was further extended by manipulating the recording by 'scratching' – manually moving the disc under the stylus. He summarizes, 'the birth and flourishing of hip-hop offers a case study of the rise of a new class of musicians, one directly tied to a technology [the gramophone disc] long held to discourage, not promote, the musical amateur' (p. 471). The computer game Guitar Hero and various mobile phone apps – including an iPhone ocarina – reinforce his case that the more mechanical music devices have proliferated, from the player piano onwards, the more niches amateurs have found, so that in our present 'we must realize that, golden or not, the turn of the twenty-first century must be reckoned as the age of the amateur' (p. 477).

OUP have provided the book with an online site where the reader may hear some of the sounds referred to in the text. It must be said that this somewhat falls short in the execution, first because only ten of the chapters feature clips, and then because the contents do not necessarily align with the printed text, so, for example, several clips announced in Timothy D. Taylor's chapter are not on the site. In a contrary example, Bruyninckx's and Schwartz's selections are more in the nature of 'further reading', or in this case listening and viewing. At the time of writing, the links ascribed to Chapter 19 actually belong to 18. This failure of a 'nice to have' does not badly affect the success of the book, merely pointing to the strange stage we have reached in the relationship of printed and online media.

It makes sense, having considered a recent introduction to sound studies and a significant compendium of new work, to finish by considering a monograph from the new generation of scholars in the field. Alexandra Hui's book *The Psychophysical Ear* addresses a deeply interesting topic, the relationship between musical aesthetics and the sciences of music across the period from 1840 to 1910. Like Myles Jackson's 2006 volume *Harmonious Triads*, she deals with a specifically German context. In five overlapping chapters she considers key figures in relevant debates, showing how, for a period, subjective experience of music and sound became crucial to both music and the science of sound. The term 'psychophysics', taken from Gustav Fechner's 1860/1889 treatise *Elemente der Psychophysik*, she 'loosely defines' as 'the study between physical stimulation and psychical sensation'. It was a 'subdiscipline' or an 'orientation' of physics, physiology and psychology (p. xv). Fechner – along with Heinrich Weber – is one of the two subjects of her first chapter, where she exemplifies her approach; we see the work of these individuals as a product of the culture of a particular place, in this case Leipzig. Fechner moved in circles that included Felix Mendelssohn and Clara and Robert Schumann, who stood for a specifically German musical canon, which included

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Beethoven, Mozart and a rediscovered J.S. Bach. As Hui shows, it was in Leipzig that Ernst Chladni had in 1787 published his *Entdeckungen über die Theorie des Klanges*, which publicized his technique – using a bowed sand-sprinkled metal plate – for the visualization of sound. Hui shows how Fechner built on Weber's work on the subjective perception of touch to advance what became known as the Weber–Fechner law, which relates subjective sensation logarithmically to stimulus intensity. Fechner used this as the basis of his experimental aesthetics, which enabled him to connect the 'inner psychophysics' of higher mental activities with the 'outer psychophysics' of connections to external phenomena via lower mental activities such as sensation and drive. An experimental programme of psychophysical study of external phenomena – of sound intensity and pitch discrimination, for example – could therefore for Fechner inform understanding of the musical aesthetics of melody and harmony.

Hui's second chapter turns to consider how the early musicologists A.B. Marx in Berlin, Eduard Hanslick in Vienna and Hugo Riemann in Leipzig also constructed theories of 'better' and 'worse' music, basing their ideas on notions of subjective perception not unlike that of Fechner. Marx elevated the status of form in music, promoting a type of listening practice for the educated upper middle classes that saw the comprehension of the formal elements of music as the correct route to musical aesthetics. This was aligned with new forms of 'autonomous' symphonic and chamber music that had abandoned any necessary textual content. Riemann insisted on a theory of 'harmonic dualism', which required the existence of harmonic undertones, mirroring the overtones of the harmonic series, but descending below the fundamental as the overtones ascend above it. Riemann's proof for the existence of these undertones was the acuity of his own listening, a claim which was, for a time, accepted by natural philosophers. And, as Hui shows, close and informed listening had been advanced by Marx and Hanslick as the correct route to a true musical aesthetics, one that eschewed both emotionalism and virtuosity for both performer and listener.

The core chapter of the book properly takes Hermann Helmholtz and his 1863 masterwork *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* as its subject. Here, as in other sections, Hui investigates contemporary arguments for the supremacy of European, specifically German, music – often in the Bach–Beethoven–Mozart tradition. At the core of many debates were arguments against equal-temperament tuning, which favoured instrumentalists as it permitted ready shifting between keys, as against the older and 'truer' system of just intonation (Helmholtz favoured the latter). Increasingly across the century, ideas of 'true' and 'correct' tuning were disturbed not just by developments in Western music, but also by exposure to the alternative tuning systems of non-Western music. Hui's treatment of Helmholtz is an exemplary piece of modern STS, showing the conceptual leakage between music and physics and his use of musical instruments as scientific instruments, especially given his own extensive experience as a player of music. She argues that 'when Helmholtz listened to sound, he listened as a musician. He had an instrumentalist's ear' (p. 61). His understanding of instrument construction and close contact with musical-instrument-makers – including commissioning a harmonium tuned to just intonation – also enabled his research. Hui also explores his classicism, both aesthetic and scientific,

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which enabled him to reconcile universal physiological laws of tone sensation with a historically and culturally contingent aesthetics of music.

The remaining chapters continue the exploration of the common ground of psychophysics and music. Hui discusses Ernst Mach's work on accommodation in hearing – the capacity, for example, to pick out the sound of a cello in the midst of an ensemble performance, or to hear a chord differently depending on which note the listener concentrated upon. She describes the parallel story of his friend the music critic Eduard Kulke; his 'aesthetic heresy' was to enjoy Richard Wagner's *Tannhäuser*, whose harmonies violated the 'rules' of Western harmony, bringing into question whether there could be 'correct' musical taste. This comparison works for Hui's overall argument because, as she argues,

> Mach worked to locate and explain accommodation in hearing, the locus of an individual's experience of sound. Correspondingly, Kulke sought to develop an aesthetic of music that would explain the individual's subjective appreciation of music … Both were developing a new understanding of listening that was psychophysical and evolutionary and therefore individual and historicist and bound to musical aesthetics (pp. 90–91).

The final chapter focuses on the acrimonious 1890s dispute between Carl Stumpf and Wilhelm Wundt, centring on whether the use of musically trained experimental subjects (Stumpf) or a spectrum of untrained to trained individuals (Wundt) was better suited to making scientific judgements over auditory discrimination between tones. The argument, which was to an extent a disciplinary dispute between the nascent field of psychology and its young parent physiology, reached no particular conclusion. Stumpf moved on to become a significant early figure in what was later termed ethnomusicology, whilst Wundt's Leipzig laboratory became highly influential in the field of experimental psychology.

Hui's acknowledgements thank her copy-editor; she would also have benefited from an old-fashioned book editor to help the transition from doctoral thesis to book. *The Psychophyisical Ear* in places betrays the marks of the postgraduate student having difficulty conceptualizing her material. A good editor would have helped her and the reader to clearer and bolder assertions. The arguments laid out in music notation on pp. 110–111 are also as incomprehensible to this (adequate) music-reading reviewer as the strings of despised mathematical equations that writers in the history of science are generally encouraged to omit from their accounts. These are small quibbles; it is because the book is so very interesting that one wishes it were a little closer to perfect in its execution.

All three works discussed here make a strong case for the study of sound as an element of cultural history and cultural studies where, indeed, many authors have been active since Murray Schafer's first work. As implied, these are only some of the very many works rolling off the presses; indeed since this review was commissioned, Hui and Jackson, along with Julia Kursell, have issued a volume of *Osiris* specifically on the topic.[13] The range of disciplinary approaches is wide, as is evident in the catholic range exhibited in the *Handbook*'s authors. Yet the potential for further interdisciplinary cross-fertilization is greater still; it is notable, for example, that none of the authors surveyed here seem aware of the comparable shift towards the sonic that began a

13 Alexandra Hui, Julia Kursell and Myles Jackson (eds.), *Music, Sound, and the Laboratory from 1750 to 1980*, *Osiris* (2013) 28.

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generation ago within film studies.[14] This strand considering the nature, affect, techniques and conventions of the sound specifically within cinema has much to teach those within our own disciplines who have recently opened their ears to the sonic dimension. Or, to put it another way, this interdisciplinary territory turns out to be even richer than Hendy, Bijsterveld, Pinch and Hui and their fellow travellers are already arguing. The case for this no longer 'emerging' new interdisciplinary area is made; the *Handbook* demonstrates the diversity of possible study. Hui's book shows the possibility of deep study of core problematics – in this case the interrelations of science and music. And Hendy provides an exemplary and accessible introduction. We should listen out with keen expectation for new studies from this field.

Tim Boon
The Science Museum, London

14 See, for example, Rick Altman (ed.), *Cinema/Sound*, *Yale French Studies* (1980) 60; Rick Altman (ed.), *Sound Theory Sound Practice*, AFI Film Readers, London: Routledge, 1992; Elisabeth Weis and John Belton (eds.), *Film Sound: Theory and Practice*, New York: Columbia University Press, 1985. For a more recent example see Lilya Kaganovsky and Masha Salazkina (eds.), *Sound, Speech, Music in Soviet and Post-Soviet Cinema*, Bloomington and Indianapolis: Indiana University Press, 2014.

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