Romantic Ears and Phonographic Objectivity: Epistemic Articulations and the Study of Music at the Age of Empire[1]

João Silva

Introduction

This article examines the transformations in the study of music between the 1860s and the 1910s, concentrating on the relationship between Romantic ideals and objectivity through early phonography. I aim to trace the connection between the emergence of academic musicology and early recordings, an intersection that is especially audible in ethnographic cylinders. As 'the presence of audiovisual media structured prevailing beliefs about race, the mythology of race structured prevailing beliefs about audiovisual media'.[2] During this time, a complex constellation of people, ideas, and technology became fundamental to acoustics, otology, psychology, sociology, anthropology, ethnology, and musicology, areas that helped to shape early twentieth-century Western thought under the sign of the Empire. Then, paradigmatic transformations and the accumulation of large amounts of new information led to the creation of numerous disciplines. This convoluted and flexible relationship between fields informed the study of music. A new perspective on objectivity, intensified by innovations like the phonograph, converged with Enlightenment and Romantic ideals in a period that saw the rise of positivism and evolutionism. By highlighting the tensions that haunted this process, I aim to retrieve fundamental aspects in the historiography of a discipline that has articulated multiple types of knowledge from its inception.

---

1 This article is a revised and expanded version of Romantic Ears and Phonographic Objectivity: Musicology, Ethnology, and Anthropology at the Age of Empire (conference paper), *Exploring Traditional Music on Wax Cylinders*, ERA and Surrey University, 12 June 2024.

2 Brian Hochman, *Savage Preservation: The Ethnographic Origins of Modern Media* (University of Minnesota Press, 2004).

Industrial growth, the need for raw materials, and the creation of new markets triggered a new stage in colonialism, encapsulated in the principle of 'effective occupation' that emanated from the Berlin Conference. The colonial world became ubiquitous in Europe as new perspectives concerning its future arose. Countries like Britain, France, Portugal, and the newcomers Belgium, Italy, and Germany competed for land, resources, and consumers. As colonialism expanded, scientists engaged comprehensively with human diversity and recorded what they perceived as traces of disappearing cultures, which triggered a profound epistemological transformation. Recorded sound catered to a market for musical commodities focused on popular entertainment that paralleled ethnological endeavours. Following the advent of the phonograph and the gramophone, machines that captured performances, numerous scholars understood these devices as catalysts for scientific objectivity. The active engagement with these apparatuses led to the spread of formal and informal archiving practices. The establishment of the Phonogrammarchiv at the Austrian Academy of Sciences in 1899 set an example for equivalent counterparts in cities such as Berlin, Paris, and Cambridge. These institutions illustrated the fundamental role of recorded sound in this scientific transformation. People collected and transcribed traditional music, and publishers printed folk songs to suit a bourgeois sociability built around the household piano. Missionaries and explorers captured non-European music, and some added piano accompaniment to it. With the uneven spread of the Industrial Revolution in Europe, railways cut through the rural landscapes of some countries, disturbing a purportedly idyllic notion of quiet permanence.[3] Urban growth pressured the countryside, while intellectuals strove to rescue a culture they perceived as endangered. The colonies followed this course with the construction of ports, railways, and telegraph lines. Preserving folk cultures at home and

[3] Raymond Williams, *The Country and the City* (Spokesman, 2011).

'exotic' cultures abroad became fundamental in the study of humankind during the late nineteenth century.

Music played a prominent role in creating 'imagined communities' as print capitalism connected people in unprecedented ways.[4] Printed music exposed audiences to diverse repertoires, while intellectuals often reinterpreted rural traditions through urban perspectives, exploring the unstable boundaries of this dichotomy. Song collectors '[set] aside particular songs by transcribing them, changing both their locus (from country to city) and their status (from songs to folk songs)'.[5] Their selection overlooked other materials, such as the popular urban songs of the new industrial centres; it frequently negated the creative ability of the 'people' and privileged ahistorical stasis to the detriment of a dynamic of popular creativity. Therefore, music collecting should be interpreted 'not as the discovery, but as the manufacture of culture'.[6] Adapting traditional music for urban audiences became widespread, with publishers producing folk song collections tailored to fit bourgeois sensibilities centred around the household piano. The piano embodied Romantic and Victorian values of self-improvement, dominating the printing business. Scholars and publishers arranged traditional pieces for wide distribution; they 'tuned' modal inflexions, irregular rhythms, and microtonality to fit triadic harmony, the tonal system, and rhythmic regularity. Monophonic music received accompaniments it never possessed as notation disciplined the perceived unruly creativity of the people. This abstraction of sound as writing highlighted the artificiality of musical notation.[7] A rift between art and entertainment developed significantly

---

[4] Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (Verso, 2011).

[5] Ross Cole, *The Folk: Music, Modernity, and the Political Imagination* (University of California Press, 2021), 51.

[6] Cole, *The Folk*, 51.

[7] Ronald Radano, *Lying up a Nation: Race and Black Music* (University of Chicago Press, 2003), 205.

towards the end of the nineteenth century. In this context, numerous transcriptions of traditional music were between worlds, as folk pieces arranged for the parlour piano became incompatible with a positivist standpoint.

Positivism and Evolutionism

The transformation of the human sciences under the signs of positivism and evolutionism permeated Western thought in a substantial part of the nineteenth century. It reflected the tensions between Enlightenment narratives of universal progress and growing nationalism, which materialised in the Herderian concept of the *Volksgeist*.[8] Despite their coexistence and mutual influence, positivism and evolutionism developed a convoluted relationship. Positivism, understood as the strict adherence to Auguste Comte's ideas, was a contested and debated space. Comte understood it as a totalising systematisation of existence through the 'unchangeable combination of sentiment, reason, and activity'.[9] Positivism's emphasis on universal laws relied upon the methods of the natural sciences, a spectre that haunted the human sciences for decades. For Dilthey, 'Comte created the basis for a genuine philosophy of the sciences' that touched the works of Stuart Mill, Littré, and Spencer.[10] Unlike many contemporary scholars, Dilthey argued for an epistemological distinction between the fundamental approaches of the natural sciences (*Naturwissenschaften*) and the human sciences (*Geisteswissenschaften*).[11] However, the dominant perspective prized the latter,

---

[8] Johann Gottfried von Herder, Philip V. Bohlman (ed.), *Song Loves the Masses: Herder on Music and Nationalism* (University of California Press, 2017).

[9] 'Le positivisme vient inaugurer en systématisant toute notre existence, personnelle et sociale, par une combinaison inaltérable entre le sentiment, la raison, et l'activité.' Auguste Comte, *Discours sur l'ensemble du positivisme – ou exposition sommaire de la doctrine philosophique et sociale propre à la grande république occidentale* (Paris: L. Mathias, 1848), 315 [translation by the author].

[10] Wilhelm Dilthey, *Wilhelm Dilthey: Selected Works, vol. 1: Introduction to the Human Sciences* (Princeton University Press, 1989), 74.

[11] Dilthey, *Introduction to the Human Sciences*, 56–66.

valuing comparative methods drawn from disciplines like anatomy. Darwin's evolutionary biology relied extensively upon this approach, while the evolutionist underpinnings of positivism resonate with similar procedures. It is not accidental that the earliest embodiment of ethnomusicology was called 'comparative musicology'.

The publication of Charles Darwin's *On the Origin of Species* in 1859 was a landmark for evolutionist theories.[12] However, the spread of nineteenth-century evolutionism was uneven and problematic, as some scholars fiercely resisted its biological incarnation.[13] The application of the evolutionist paradigm to human societies is often known as Social Darwinism, given the relevance of Darwin's thought in the late nineteenth century. However, this naming raises epistemological and historical difficulties because many of its early proponents predated Darwin and drew upon the work of other scientists. Thus, Social Evolutionism shares its basic tenets with Social Darwinism, but it encapsulates the concept more broadly and accurately. As Herbert Spencer championed evolutionist approaches in the Anglophone world before Darwin, philosophy paved the way for biology as evolution entered everyday discourse.[14] In 1855, shortly before the publication of *On the Origin of Species*, Spencer published *The Principles of Psychology*. He remarked that the climate was adverse for evolutionism as 'the Doctrine of Evolution everywhere implied in it, was at that time ridiculed in the world at large, and frowned upon even in the scientific world'.[15] In the 1860s and 1870s, evolutionism enjoyed greater acceptance, with Darwin as its leading figure. Spencer shared Comtean ideas concerning the relativity of knowledge but differed from his

---

[12] Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (London: John Murray, 1859).

[13] Bennett Zon, *Evolution and Victorian Musical Culture* (Cambridge University Press, 2017); Miriam Piilonen, *Theorizing Music Evolution: Darwin, Spencer, and the Limits of the Human* (Oxford University Press, 2024).

[14] Bernard Lightman (ed.), *Global Spencerism: The Communication and Appropriation of a British Evolutionist* (Brill, 2016).

[15] Herbert Spencer, *The Principles of Psychology*, vol. 1 (New York, NY: D. Appleton, 1871), v.

hierarchy of sciences and model for an ideal society.[16] E. B. Tylor, a renowned pioneer of social anthropology, shared evolutionist ideas and meticulously examined the distinction between the 'primitive' and the 'civilised'.[17] He asserted that 'History, so far as it reaches back, shows arts, sciences, and political institutions beginning in ruder states, and becoming in the course of ages more intelligent, more systematic, more perfectly arranged or organized, to answer their purposes'.[18]

Music held a special significance in evolutionary theories, with Spencer and Darwin disagreeing on its origin. Darwin stated in *The Expression of the Emotions in Man and Animals* that 'the habit of uttering musical sounds was first developed, as a means of courtship, in the early progenitors of man, and thus became associated with the strongest emotions of which they were capable, – namely, ardent love, rivalry and triumph'.[19] Spencer argued that music originated 'as the developed language of emotion'.[20] Richard Wallaschek, whose work echoed Darwinian thought, disagreed with Spencer.[21] He believed that music 'arises directly from the rhythmical impulse', unlike the modulations of speech Spencer cherished.[22] Psychologist Edmund Gurney also supported Darwin's perspective, developing a post-Darwinian music theory based on actual scores.[23] He defined music as 'the perpetual production in us of an emotional excitement of a very intense kind, which yet cannot be

---

[16] Herbert Spencer, *Illustrations of Universal Progress: A Series of Discussions* (New York, NY: D. Appleton, 1865), xiv-xv.

[17] E. B. Tylor, *Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Art, and Custom*, 2 vols. (London: John Murray, 1871).

[18] E. B. Tylor, *Anthropology: An Introduction to the Study of Man and Civilization* (London, Macmillan and Co., 1881), 15.

[19] Charles Darwin, *The Expression of the Emotions in Man and Animals* (London: John Murray, 1872), 87.

[20] Herbert Spencer, 'On the Origin of Music', *Mind* 15, no. 60 (October 1890), 468.

[21] Richard Wallaschek and J. M. Cattell, 'On the Origin of Music', *Mind* 16, no. 63 (July 1891), 375–388, Richard Wallaschek, *Primitive Music: An Inquiry into the Origin and Development of Music, Songs, Instruments, Dances, and Pantomimes of Savage Races* (London: Longmans, Green and Co., 1893).

[22] Wallaschek, 'On the Origin of Music', 382.

[23] Piilonen, *Theorizing Music Evolution*, 118–136, Zon, *Evolution and Victorian Musical Culture*, 109–110.

defined under any known head of emotion', using this definition to grade musical manifestations according to this ability.[24]

The early days of the academic study of music stood at a crossroads between positivism and evolutionism, as Guido Adler's 1885 foundational article 'The Scope, Method, and Aim of Musicology' reflects.[25] Adler praised the emerging field of comparative musicology, which aimed to compare the 'tonal products, in particular the folk songs of various peoples, countries, and territories, with an ethnographic purpose in mind, grouping and ordering these according to the variety of [differences] in their characteristics'.[26] He acknowledged the value of the insights offered by the natural sciences but did not strictly adhere to Comte's principles.[27] 'Positivism' and 'evolutionism' emerged as broad categories that extended beyond the original ideas of their proponents. Nevertheless, they spread widely in the second half of the nineteenth century, and their influence was decisive.

Experimental Science, Psychology, and Otology

Adler segmented the musical sciences into two branches: *historische Musikwissenschaft* (historical Musicology) and *systematische Musikwissenschaft* (systematic Musicology). Historical Musicology focused on aural sensations, while systematic Musicology dealt with the 'mental conceptualisation of tones and interval relationships, and the practical counterpart thereof, namely, the theory of musical thinking'.[28] Adler emphasized that psychology and physiology served as auxiliary sciences to the systematic branch of musicology. Between the

---

[24] Edmund Gurney, *The Power of Sound* (London: Smith, Elder and Co., 1880).

[25] Erica Mugglestone and Guido Adler, 'Guido Adler's 'The Scope, Method, and Aim of Musicology' (1885): An English Translation with an Historico-Analytical Commentary', *Yearbook for Traditional Music* 13 (1981), 1–21.

[26] Mugglestone and Adler, 'Guido Adler's 'The Scope, Method, and Aim of Musicology',' 14.

[27] Kevin Karnes, *Music, Criticism, and the Challenge of History: Shaping Modern Musical Thought in Late Nineteenth-Century Vienna* (Oxford University Press, 2008), 9.

[28] Mugglestone and Adler, 'Guido Adler's 'The Scope, Method, and Aim of Musicology',' 13.

1860s and the 1910s, experimental psychology and otology witnessed significant advancements. During this period, 'the spatial properties of sound and hearing were increasingly measured, defined, and delineated; and practices of spatial hearing were codified and systematized'.[29] The merging of physiological approaches with the experimental study of aural sensations aimed to achieve the kind of objective knowledge found in the hard sciences. Despite psychology's secondary role in Adler's framework, it played a crucial part in establishing musicology as an academic discipline that borrowed legitimacy from laboratory work.

Hermann von Helmholtz was a prominent figure in acoustics and otology.[30] His influential monograph *On the Sensations of Tone as a Physiological Basis for the Theory of Music* shed new light on how people respond to sound.[31] Helmholtz stated that 'the sensation of sound is therefore a species of reaction against external stimulus, peculiar to the ear, and excitable in no other organ of the body, and is completely distinct from the sensation of any other sense'.[32] The English translation of Helmholtz's book by Alexander J. Ellis made the content accessible to English-speaking audiences. Ellis shared similar views and offered further insights into a substantial section of the book.[33] Although Helmholtz provided a detailed examination of the ear's anatomy and the process of hearing, he did not dismiss the role of the listener. This approach reflected a prevailing tension between objectivity and subjectivity in the latter half of the nineteenth century, an issue I will discuss below:

---

[29] Gascia Ouzounian, *Stereophonica: Sound and Space in Science, Technology, and the Arts* (The MIT Press, 2021), 35.

[30] David Cahan (ed.), *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science* (University of California Press, 1994).

[31] Hermann von Helmholtz, *On the Sensations of Tone as a Physiological Basis for the Theory of Music* (London: Longmans, Green and Co., 1895 [3rd edition based on the German 2nd edition]).

[32] Helmholtz, *On the Sensations of Tone*, 7.

[33] Alexander J. Ellis, 'Additions by the Translator', in Helmholtz, *On the Sensations of Tone*, 430–566.

> We must distinguish two different points – the audible sensation, as it is developed without any intellectual interference, and the conception, which we form in consequence of that sensation. We have, as it were, to distinguish between the material ear of the body and the spiritual ear of the mind.[34]

Sensations also form the foundation of Ernst Mach's influential approach. He argues that

> the world does not consist of mysterious entities, which by their interaction with another, equally mysterious entity, the ego, produce sensations, which alone are accessible. For us, colors, sounds, spaces, times . . .are provisionally the ultimate elements. [35]

This statement resonated with thinkers like Henri Bergson and Franz Boas. Echoing Schopenhauer, Mach contended that music is 'the simplest and distinctest form in which sensations of tone reveal their remarkable characteristics'.[36] In exploring the works of Darwin and H. Berg discussing music, Mach remarked that, 'although music may actually remind our organism of the courtship of distant progenitors, it must, if it was ever used for wooing, have contained at the start some positive agreeable quality, which, to be sure, may be reinforced at the present time by that memory'.[37] Moreover, Mach linked positivism with evolutionism by stating that 'a psychology in the Spencer-Darwinian sense, founded upon the theory of

---

[34] Hermann von Helmholtz, Edmund Atkinson (tr. and ed.), 'On the Physiological Causes of Harmony in Music', *Popular Lectures on Scientific Subjects* (New York: D. Appleton, 1873), 88.

[35] Ernst Mach, *The Analysis of Sensations, and the Relation of the Physical to the Psychical* (Chicago/London: Open Court Publishing Company, 1914), 29–30.

[36] Mach, *The Analysis of Sensations*, 262.

[37] Mach, *The Analysis of Sensations*, 263–264; H. Berg, *Die Lust an der Musik: nebst einem Anhang, Die Lust an den Farben, den Formen und der körperlichen Schönheit* (Berlin: B. Behr's Buchhandlung, 1879).

evolution, but supported by detailed positive investigation, would yield richer results than all previous speculation has done'.[38]

Experimental psychology gained prominence in German-speaking universities starting in the 1870s. Carl Stumpf played a leading role in understanding sensation and perception, particularly in terms of tone. Although he referenced the Darwinian approach, he described 'music as the art whose material consists essentially of fixed and transposable tonal steps'.[39] This perspective shifted the emphasis towards sounds and their organisation. For Stumpf, music operated as a permanent filter that sorted the stimuli received by the inner ear.[40] The contributions of Stumpf proved to be instrumental in laying the foundation for comparative musicology, an undertaking furthered by the collaborative efforts of Erich M. Hornbostel and Otto Abraham, who joined the research team under Stumpf's leadership. They led a paradigm shift from 'experiments designed as extensions of the natural sciences into musicology to an era of collection and analysis that was more indebted to the social sciences'.[41] Consequently, the relocation from the physiological and acoustical perspectives to psychological approaches paved the way for new epistemologies.[42] Stumpf and Hornbostel were pivotal in establishing the Berlin Phonogramm-Archiv in 1900, a centre for comparative musicology that housed empirical sonic data from many places, mostly recorded on

---

[38] Mach, *The Analysis of Sensations*, 77.

[39] Carl Stumpf, *The Origins of Music* (Oxford University Press, 2012), 66.

[40] Riccardo Martinelli, 'Melting Musics, Fusing Sounds: Stumpf, Hornbostel, and Comparative Musicology in Berlin', in Rens Bod, Jaap Maat and Thijs Weststeijn (eds), *The Making of Humanities*, vol. 3 (Amsterdam University Press, 2014), 397.

[41] Lars-Christian Koch, 'Images of sound: Erich M. von Hornbostel and the Berlin Phonogram Archive', in Philip V. Bohlman (ed.), *The Cambridge History of World Music* (Cambridge University Press, 2013), 497.

[42] Alexandra Hui, Mara Mills and Viktoria Tkaczyk, 'Testing Hearing: An Introduction', in Viktoria Tkaczyk, Mara Mills, Alexandra Hui (eds), *Testing Hearing: The Making of Modern Aurality* (Oxford University Press, 2020), 9.

phonograph cylinders.[43] They found support in Felix von Luschan (1854-1924), a renowned anthropologist who, along with Hornbostel and Abraham, showcased the phonograph at a 1903 meeting of the Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte (Berlin Society for Anthropology, Ethnology and Prehistory).[44] This tool underlined the connection between ethnology and psychology in Imperial Germany during the early days of recorded sound. The Berlin Archive provides significant insights into this relationship, revealing 'the colonialist outlook of Kaiserreich imperialism and the comparativist-evolutionist perspective of turn-of-the-century German anthropology'.[45]

In the second half of the nineteenth century, otology emerged as a clinical specialty focused on the physiological study of the ear, leading to various, and sometimes conflicting, theories of hearing. These studies transcended disciplinary boundaries, influencing psychologists and comparative musicologists alike.[46] As experimental psychology advanced, it forged a strong connection with otology. Influential figures such as Helmholtz, Stumpf, Hornbostel, and Abraham conducted hearing experiments during this time. Furthermore,

---

[43] Carl Stumpf, 'Das Berliner Phonogrammarchiv', *Internationale Wochenschrift für Wissenschaft, Kunst und Technik* 2 (February 1908), 225–246; Susanne Ziegler, *Die Wachszylinder des Berliner Phonogramm-Archivs*. (Staatliche Museen zu Berlin – Preußischer Kulturbesitz, 2006); Elliot Scott Cairns, The Berliner Phonogramm-Archiv and the Emergence of Comparative Musicology (Ph. D dissertation, Columbia University, 2020); Britta Lange, 'Archival Silences as Historical Sources Reconsidering: Sound Recordings of Prisoners of War (1915-1918) from the Berlin Lautarchiv', *SoundEffects* 7, no. 3 (2017), 46–60.

[44] Cairns, The Berliner Phonogramm-Archiv and the Emergence of Comparative Musicology, 97; Felix von Luschan, 'Einige türkische Volkslieder aus Nordsyrien und die Bedeutung phonographischer Aufnahmen für die Völkerkunde', *Zeitschrift für Ethnologie* 36, no. 2 (1904), 177–202; Otto Abraham and Erich Moritz von Hornbostel, 'Phonographierte türkische Melodien', *Zeitschrift für Ethnologie* 36, no. 2 (1904), 203–21; Otto Abraham and Erich Moritz von Hornbostel, ' Über die Bedeutung des Phonographen für vergleichende Musikwissenschaft', *Zeitschrift für Ethnologie* 36, no. 2 (1904), 222–36.

[45] Alejandro L. Madrid, 'Listening through the Colonial Noise: Things, Sound Objects, and Legacy at the Berliner Phonogramm-Archiv's Konrad T. Preuss Collection', *Journal of the American Musicological Society* 78, no. 1 (2025), 213; Eric Ames, 'The Sound of Evolution', *Modernism/modernity*, 10, no.2 (2003), 297–325; Vanessa Agnew, 'The Colonialist Beginnings of Comparative Musicology' in Eric Ames, Marcia Klotz, and Lora Wildenthal (eds), *Germany's Colonial Pasts: An Anthology in Memory of Susanne Zantop* (University of Nebraska Press, 2005), 41–60.

[46] Dennis G. Pappas, 'Otology Through the Ages', *Otolaryngology–Head and Neck Surgery* 114, no. 2 (February 1996), 173–196.

> by referring to the 'physical-acoustical' domain, the comparative musicologists drew attention to the different status that the sound wave attained thanks to the phonograph: the new technology etched the vibration directly into the wax cylinder, and in this way inscribed the musical performance directly into the material with which the researchers could work.[47]

Otto Abraham relied on the phonograph for his tests and questionnaires. He 'transferred the practices of hearing tests from the natural sciences to the applied human and social sciences', a process greatly influenced by his contribution.[48] Charles S. Myers used the phonograph in his ethnological and psychological research. As a trained physician, he participated in the 1898 Cambridge Anthropological Expedition to the Torres Straits and Sarawak, where he became a pioneer in field recording in the British Empire.[49] During the expedition, Myers conducted an otological study to examine auditory acuity, the upper limits of hearing, the slightest perceptible tone difference, and the order of sounds among Murray Islanders.[50] He then compared them with a sample from Aberdeenshire; in some parameters both groups responded similarly while significant differences surfaced in others. Myers extrapolated the general results to music, emphasising their relevance to comparative studies:

---

[47] Alexander Rehding, *Hugo Riemann and the Birth of Modern Musical Thought* (Cambridge University Press, 2003), 178.

[48] Viktoria Tkaczyk, 'The Testing of a Hundred Listeners: Otto Abraham's Studies on 'Absolute Tone Consciousness'," Hui, Mills, Tkaczyk, *Testing Hearing*, 61; Otto Abraham, 'Das absolute Tonbewußtsein: Psychologisch-musikalische Studie', *Sammelbände der internationalen Musikgesellschaft 3*, no. 1 (1901): 1–86; Otto Abraham, 'Das absolute Tonbewußtsein und die Musik', *Sammelbände der Internationalen Musikgesellschaft* 8 (1907), 486–491.

[49] Bennett Zon, *Representing Non-Western Music in Nineteenth-Century Britain* (University of Rochester Press, 2007), 159–248.

[50] Charles S. Myers, 'Hearing', in *Reports of the Cambridge Anthropological Expedition to Torres Straits: Physiology and Psychology* (Cambrige: Cambridge University Press, 1901), 142–168, Charles S. Myers, 'A Study of Papuan Hearing', *Archives of Otology* 31 (1902), 283–288.

> For if it be supposed that smaller intervals are employed by primitive than by civilized communities — if, for instance, third- and quarter-tone music be at all widely spread among savage peoples — we should expect them to show evidence of extremely high sensibility to minute differences of pitch. That this is not the case, so far as the Murray Islanders are concerned, is shown by the experiments described in this section. Nor could it be expected, since the intonation of native songs by the older men was often so variable and so inaccurate, that the intended intervals were only evident when several islanders sang them together.[51]

Myers later built a distinguished career as an experimental psychologist. Influenced by Mach, he believed 'there is a constant rivalry between the play of reproduction effects and the ceaseless inflow of sensory impressions'.[52] Myers held evolutionist beliefs but differentiated 'progress' from 'improvement', which liberated him from strict biological determinism.[53] In a 1932 article, he revisited the information gathered in the Torres Straits, stating 'every step in evolution, *i.e.*, every change making for increased differentiation of function, increased co-ordination of parts and increased integration of previously independent units, may be accepted as progress'.[54] Myers contradicted this with 'improvement', which is subjected to subjective and ethical standards since 'it is bereft of any scientific, objective criterion'.[55] To counter an ethnocentric view of progress, he introduced a relativist standpoint, 'as modern civilization is now attempting to bring all races under the same social environment'.[56]

---

[51] Myers, 'Hearing', 168.
[52] Charles S. Myers, *A Text-Book of Experimental Psychology* (London: Longmans, Green and Co., 1909).
[53] Zon, *Evolution and Victorian Musical Culture*, 113.
[54] Charles S. Myers, 'Human Improvability', *Bristol Medico-Chirurgical Journal* 49, no. 183 (Spring 1932), 31.
[55] Charles S. Myers, 'Human Improvability', 32.
[56] Charles S. Myers, 'Human Improvability', 40.

The anatomical study of the ear has contributed to the development of modern technologies modelled after the eardrum. These innovations 'did not simply represent prosthetic extensions of the human sensorium, but rather they promised to replace the sensory organs with a technological apparatus that would make hearing itself obsolete'.[57] The eardrum acts as a transducer, converting pressure variations into sounds. Early sound recording technologies mimicked this function, with diaphragms capturing vibrations that the needle engraved in cylinders or discs. Sterne claims that these early technologies relied upon a tympanic function.[58] Furthermore, these were 'functionally related, as sharing a set of common operational and philosophical principles, and, most important, as embodiments and intensifications of tendencies that were already existent in the culture'.[59] Due to its historical instability, the tympanic function evolved beyond the physiological imitation of the human ear, gaining an autonomous life as sound transmission and recording technologies.[60] These new devices articulated different worlds and were fundamental for early musicologists.

The Phonograph and the Gramophone

Thomas Edison filed for a patent for his 'Phonograph or Speaking Machines' in December 1877.[61] This device captured sound by carving vertical grooves on metallic foil cylinders. Edison's intended uses were an office dictating machine, a scientific instrument, a toy, a coin-operated amusement machine, and a memory extension.[62] Despite these aspirations, the early

---

[57] Anthony Enns, 'The Human Telephone: Physiology, Neurology, and Sound. Technologies', in Daniel Morat (ed.), *Sounds of Modern History: Auditory Cultures in 19th- and 20th-Century Europe* (Berghahn, 2014), 65.

[58] Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction* (Duke University Press, 2003), 34.

[59] Sterne, *The Audible Past*, 34.

[60] Sterne, *The Audible Past*, 84.

[61] Thomas A. Edison, 'Improvement in Phonograph or Speaking Machines', US Patent 200,521, 19 February 1878, Roland Gelatt, *The Fabulous Phonograph 1877–1977* (Cassell, 1977).

[62] Pekka Gronow, 'The Record Industry: Growth of a Mass Medium', *Popular Music* 3 (1983), 54.

phonograph was ill-suited for its intended purposes and became more of a curiosity than a practical device.[63] Its later success relied on a redefinition of the phonograph in visual, cultural, and acoustic terms, a transformation driven by manufacturers, advertisers, and consumers.[64] This discontinuous development delayed its broader dissemination. Significant changes to create a market for machines and recordings began in the 1880s when Edison upgraded his phonograph, releasing the Improved and the Perfected phonographs, and establishing the Edison Phonograph Company.[65] Other inventors contributed to the development of the phonograph during its early years. In 1886, Charles Sumner Tainter, working for Alexander Graham Bell, patented the Graphophone, which recorded sound in a cylinder covered with a wax-like substance, thereby improving fidelity.[66] The introduction of moulding and the use of celluloid in the last years of the nineteenth century enabled the mass reproduction of cylinders in the following decades.[67]

In 1887, Emil Berliner patented the gramophone, a machine that distinguished itself from Edison's phonograph by solely reproducing pre-recorded music.[68] Berliner and his technicians produced early masters on laterally cut 7-inch flat discs to avoid infringing Edison's patents. While the phonograph allowed homemade recordings, the gramophone relied on disc-pressing plants, the first of which opened in Hannover in 1898. The expiration of the Bell-Tainter patent in 1900 marked a significant transformation in the gramophone

---

63 Leonard DeGraaf, 'Confronting the Mass Market: Thomas Edison and the Entertainment Phonograph', *Business and Economic History* 24, no. 1 (1995), 88.

64 Emily Thompson, 'Machines, Music, and the Quest for Fidelity: Marketing the Edison Phonograph in America, 1877–1925', *Musical Quarterly* 79, no. 1 (1995), 140.

65 Thomas A. Edison, 'Phonograph', US Patent 386,974, 31 July 1888, Thomas A. Edison, 'The Perfected Phonograph', *The North American Review* 146, no. 379 (1888), 641–650, Walter L. Welch and Leah Brodbeck Stensel Burt, *From Tinfoil to Stereo: The Acoustic Years of the Recording Industry, 1877–1929* (University Press of Florida, 1995), 25–26.

66 Sumner Tainter, 'Apparatus for Recording and Reproducing Sounds', US Patent 341, 288, 4 May 1886.

67 Thomas Bennett Lambert, 'Improvements in the Process of and Apparatus for Reproducing Phonographic Records', UK Patent Office, GB190013344A, 24 November 1900.

68 Emile Berliner, 'Gramophone', US Patent Office, 372,786, 8 November 1887.

industry. Early twentieth-century companies began recording the masters in wax, a more pliable material. The growth of the gramophone business required varied repertoires, and double-sided records, introduced by Odeon at a Leipzig fair in 1904, became the industry standard. Many phonographic companies emerged, varying from multinational enterprises to local ventures, all catering to the demand for pre-recorded sound. In France, Pathé issued both cylinders and discs. Adhering to Edison's patents for vertically cut recordings, they recorded their masters in cylinders and transferred them onto discs using pantographs.

The emphasis on pre-recorded music facilitated the expansion of the phonographic market. This process intertwined technological innovation with commercial strategies, showcasing the phonograph's role as a purveyor of entertainment while maintaining its utility in other areas, thus exemplifying the machine's embodiment of domestic modernity. Between 1896, when Edison's device became available to the general public, and 1900, the phonograph proliferated across many countries.[69] Manufacturers, customers, and publicists debated the potential for phonographic recording to store and archive sound. However, this perspective contrasted sharply with its practices, as early recordings were ephemeral. The responsibility of storing master discs and metallic negative cylinders fell to phonographic companies and archives.

Victorian domesticity prized the informal archiving of family portraits, photographs, and home recordings.[70] The parlour represented family identity through handmade items and family-specific artefacts, including needlework, lace, and photo albums. Eventually, this space also incorporated mass-produced products, like phonographs and gramophones.[71] The

---

[69] Thompson, 'Machines, Music, and the Quest for Fidelity', 138.

[70] Sterne, *The Audible Past*, 204; Holly Kruse, 'Early Audio Technology and Domestic Space', *Stanford Humanities Review* 3 (1993), 6.

[71] Sterne, *The Audible Past*, 204.

phonograph entered households, encouraging users to engage actively with the technology by producing amateur recordings rather than purchasing pre-recorded music.[72] This possibility is fundamental to understanding its use as a scientific instrument within the emerging paradigms of the social sciences. While gramophones primarily served the purpose of reproducing recorded sound, both phonographs and gramophones functioned as scientific tools, especially as new technologies enabled faster production of field discs. Documenting and comparing sound became crucial during the early phonographic period, opening up new avenues for scientific research, particularly as these fields expanded through interactions with the internal and the colonial Other. The portability of sound recording technology significantly recast the study of music and language when European nations occupied large parts of the world. Positivism anticipated these advancements, enabling scholars, recently affected by their encounters with colonial societies, to develop new transcription methods. Writing in an 1892 anthropology handbook, Carl Engel remarked:

> In writing down the popular tunes of foreign countries or hearing them sung or played by the natives, no attempt should be made to rectify anything which may appear incorrect to the European ear. The more faithfully the apparent defects are preserved, the more valuable is the notation.[73]

Studying People, Studying Music

The rise of social sciences in the late nineteenth century generated new perspectives on the 'people'. Colonialism's intensification and transformation played a cardinal role in the

---

[72] John M. Picker, *Victorian Soundscapes* (Oxford University Press, 2003), 112.

[73] Carl Engel 'Music', in John George Garson, Charles Hercules Read (eds), *Notes and Queries on Anthropology* (London: The Anthropological Institute, 1892), 165.

segmentation of scientific knowledge into distinct fields. This period witnessed the emergence of new disciplines within universities, journals, museums, and archives. Influenced by positivism and evolutionism, these approaches led to a fresh understanding of humanity. Etymologically, anthropology and ethnology are distinct; they differ in their methods and perspectives.

Anthropology (etymologically, the science of man) was primarily associated with physical anthropology. The discipline focused on studying 'universal' traits of the human species, particularly relevant at the end of the nineteenth century when Europeans and Americans interacted with various groups through colonialism. The universalist trend of anthropology developed theories based on natural history and anthropometric data, giving rise to new paradigms of 'racial science'.[74] The establishment of the Société d'anthropologie de Paris by Paul Broca in 1859 inspired the creation of European counterparts, such as the Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte, led by Rudolf Virchow and Adolf Bastian. Comparing measurements became the standard scientific approach for studying different peoples. Establishing fundamental methods for collecting and measuring skeletons became essential for notable scientists such as Broca, Paul Topinard, Cesare Lombroso, and the anti-evolutionist Virchow.[75] These scholars devised methodologies for studying materials collected by travellers, naturalists, military officers, missionaries,

---

[74] Nancy Stepan, *The Idea of Race in Science: Great Britain 1800-1960* (MacMillan and Co., 1982); Alice L. Conklin, *In the Museum of Man: Race, Anthropology, and Empire in France, 1850–1950* (University Press, 2013); David Ciarlo, *Advertising Empire: Race and Visual Culture in Imperial Germany* (Harvard University Press, 2011).

[75] Paul Broca, *Instructions générales pour les recherches anthropologiques (anatomie et physiologie)* (Paris: Victor Masson et fils, 1865); Paul Topinard, *L'anthropologie* (Paris: C. Reinwald et cie, 1876); Paul Topinard, *Éléments d'anthropologie générale* (Paris: A. Delahaye et É. Lecrosnier,1885); Cesare Lombroso, *L'uomo bianco e l'uomo di colore: Letture su l'origine e la varietà delle razze umane* (Padova: Padova, Tip. F. Sacchetto, 1871); Rudolf Virchow, 'Ueber Einige Merkmale Niederer Menschenrassen Am Schädel Und Über Die Anwendung Der Statistischen Methode in Der Ethnischen Craniologie', *Zeitschrift Für Ethnologie*,12 (1880), 1–26; Rudolf Virchow, *Beiträge zur physischen Anthropologie der Deutschen, mit besonderer Berücksichtigung der Friesen* (Berlin: Akademie der Wissenschaften zu Berlin, 1876).

merchants, and settlers. Printers published handbooks that taught people to catalogue and measure human beings. This novel 'racial science' is closely related, though not synonymous, with the 'scientific racism' of the Age of Empire, which contributed to eugenicist thought.[76] Scholars established the notion of 'biological race', which became a fundamental idea during the height of colonialism. Many scientists segmented humans based on physical traits and ranked them hierarchically on an evolutionary scale. For the British evolutionist John Lubbock:

> The study of the lower races of men, apart from the direct importance which it possesses in an empire like ours, is of great interest from three points of view. In the first place, the condition and habits of existing savages resemble in many ways, though not in all, those of our own ancestors in a period now long gone by: in the second, they illustrate much of what is passing among ourselves, many customs which have evidently no relation to present circumstances; and even some ideas which are rooted in our minds, as fossils are imbedded in the soil: while, thirdly, we can even, by means of them, penetrate some of that mist which separates the present from the future.[77]

This approach sanctioned colonialism abroad and various forms of social control at home. Furthermore, the determination of group psychology through anthropological data reflected the prevailing views of many Westerners, some of whom held strong allegiances to colonial

---

[76] Conklin, *In the Museum of Man*; George Stocking, Jr., 'The Critique of Racial Formalism', in George Stocking, Jr., *Race, Culture, and Evolution: Essays in the History of Anthropology* (University of Chicago Press, 1982), 161–194.

[77] John Lubbock, *The Origin of Civilisation and the Primitive Condition of Man: Mental and Social Condition of Savages* (London: Longmans, Green and Co., 1870), 1.

practices. The production of differences between European Selves and Colonial Others objectified people, a pattern that became profoundly ingrained in anthropology for decades.

Ethnology (etymologically, the science of peoples) studied human groups linked by cultural bonds and was a precursor to social and cultural anthropology.[78] Early Romantic ideas influenced ethnology, a field predominantly focused on Europe in the early nineteenth century. This perspective resonated with the Herderian idea of *Volksgeist* during a time of Western nation-building, contrasting with the universalist aims of anthropology. Towards the end of the nineteenth century, a greater emphasis on diversity led to the study and comparison of popular traditions. The variety of subjects addressed by ethnology made it challenging to adopt positivist methods. The study of myths, customs, techniques, poems, tales, songs, constructions, and tools required different approaches. Anthropological and ethnological perspectives are not mutually exclusive; instead, they informed scientific thought in the Age of Empire. The idea of legitimising a nation-state through its antiquity and racial identity was prevalent in the late nineteenth century. Many thinkers used archaeological remains and human skeletons to trace the origins of a nation and its people, often blending these ideas with ethnological data, and merging chronological and synchronic approaches. As a result, it is challenging to create a clear distinction between anthropological methods and ethnological inquiry. Moreover, the dialectical relationship between nation-building and empire-building anthropologies, as explored by George Stocking Jr., is crucial to understanding the scientific frameworks at the *fin-de-siècle*.[79] Evaluating the complex relationship between anthropology and colonialism, Asad emphasises the limited impact anthropologists had in 'maintaining

---

[78] George Stocking, Jr., *Race, Culture, and Evolution*; George Stocking, Jr., *Victorian Anthropology* (Free Press, 1987); George Stocking, Jr., *The Ethnographer's Magic and Other Essays* (University of Wisconsin Press, 1994); Johannes Fabian, *Time and the Other: How Anthropology Makes Its Object* (Columbia University Press, 1983).

[79] George Stocking Jr., 'Afterword: A View from the Center', *Ethnos* 47, no. 1-2 (1982), 172–186.

structures of imperial domination' compared with other agents; however, 'European power, as discourse and practice, was always part of the reality anthropologists sought to understand, and of the way they sought to understand it'.[80]

Music occupies a special place in this context, with scholars such as Deniker affirming that 'vocal and instrumental music are the common property of mankind as a whole'.[81] The international circuit of opera houses and concert halls focused on Western art music. Prominent orchestras and soloists travelled widely, while avant-garde Modernism began to emerge. Popular music spread globally through new commodities such as sound recordings and music rolls. Trained musicologists aimed to capture the subtleties of repertoires that fell outside the boundaries of traditional notation. Some collectors minimised their interventions by transcribing what they heard without adding elements like a piano part. The coexistence of 'prescriptive' and 'descriptive' music-writing (to borrow Charles Seeger's terminology from 1958) became a hallmark of this period.[82] According to Seeger, prescriptive notation is performance-oriented; it 'does not tell us as much about how music sounds as how to make it sound'.[83] He argued that descriptive music writing was in its early stages and that musicology should develop an approach to ensure it is 'written and read with maximum objectivity'.[84] Cross-cultural interactions transformed music notation in the late nineteenth century, supporting numerous attempts to capture musical detail. Alexander J. Ellis' work in

---

[80] Talal Asad, 'Afterword: From the History of Colonial Anthropology to the Anthropology of Western Hegemony', in George Stocking Jr. (ed.), *Colonial Situations: Essays on the Contextualization of Ethnographic Knowledge* (University of Wisconsin Press, 1991), 314.

[81] Joseph Deniker, *The Races of Man: An Outline of Anthropology and Ethnography* (London: Walter Scott, 1900), 209.

[82] Charles Seeger, 'Prescriptive and Descriptive Music-Writing', *The Musical Quarterly* 44, no. 2 (1958), 184–195.

[83] Seeger, 'Prescriptive and Descriptive Music-Writing', 186.

[84] Seeger, 'Prescriptive and Descriptive Music-Writing', 194.

the 1880s, which provided a detailed depiction of the sonic worlds of several communities, exemplified this trend.[85]

Scholars such as Benjamin Ives Gilman, who transcribed the pioneering 1890 field recordings by Jesse Walter Fewkes, along with Hornbostel, Abraham, Myers, and Fox Strangways (1859-1948), relied on the phonograph in their work. As a result, notation became an unstable symbolic mediator between sound waves and listeners.[86] The phonographic cylinder occupied a unique space between sound waves and paper, given the dominance of the written word in scientific communication. Suisman claims that 'the phonograph inscribed and conveyed sound-in-time – that is, sound as the ephemeral vibrations in the air produced by a specific instance of musical labour (or other sound-making activity)'.[87] This quality of the phonograph contrasts with printed media containing 'sound-in-knowledge', an operative code of signification to decipher music. The phonograph facilitated the act of collecting and transcribing, allowing for repetition rather than instantaneous performances. As stated, 'among the objects of cultural modernity, phono-objects have the ability to reorder the space-time coordinates of acoustic events'.[88] Moreover, the phonograph encouraged non-specialists to gather materials for transcription and study by European and American musicologists, allowing for the disarticulation between the sonic event and its scholarly study. For Hornbostel,

---

[85] Alexander J. Ellis, 'On the musical scales of various nations', *The Journal of the Society of Arts* 33, no. 1688 (1885): 485–527.

[86] Erika Brady, *A Spiral Way: How the Phonograph Changed Ethnography* (University Press of Mississippi, 1999); Benjamin Ives Gilman, 'Zuñi Melodies', *A Journal of American Ethnology and Archaeology* 1, no. II (1892), 63–91; Otto Abraham and Erich M. Hornbostel, *Phonographierte indische Melodien* (Leipzig: Breitkopf & Härtel, 1904); Charles S. Myers, 'Music' in *Reports of the Cambridge Anthropological Expedition to Torres Straits: Arts and Crafts* (Cambridge: Cambridge University Press, 1912), 238–269; Arthur Henry Fox Strangways, *The Music of Hindostan* (Oxford: Clarendon Press, 1914).

[87] David Suisman, 'Sound, Knowledge, and the 'Immanence of Human Failure:' Rethinking Musical Mechanization through the Phonograph, the Player-Piano, and the Piano',' *Social Text* 28, no. 1 (2010), 23.

[88] Stefan Gauß, 'Listening to the Horn: On the Cultural History of the Phonograph and the Gramophone', in Morat (ed.), *Sounds of Modern History*, 75.

> with the invention of the phonograph, musicology was presented with a device that can record the musical utterances of all the world's peoples in an irrefutably accurate manner, thereby allowing for a rigidly scientific approach.[89]

However, musical transcriptions remained uneven and heterogeneous, despite Hornbostel's 1903 warning: 'for all mere description without critical assessment would be as unprofitable as heedless, unrestrained hypotheses'.[90] Myers concurred with Hornbostel, arguing that the phonograph made better transcriptions easier than its field counterparts, validating what is now derogatorily termed 'armchair' scholarship.[91] Prioritising contained and quantifiable settings, such as laboratories, was the scientific norm as social sciences emulated the natural sciences. 'Armchair' scholarship profoundly impacted epistemology during the Age of Empire.

The limitations of conventional Western notation have long distressed musicologists. Some transcriptions echoed nineteenth-century Romantic conventions, with piano harmonisations of collected pieces, while others emphasised differences.[92] The transcriptions of Fox Strangways, who recorded and collected Hindustani music, illustrated the latter approach.[93] He noted 'a European has great difficulty in giving himself account of these queer modes, because of the enormous difference between having the tonality condensed into a few contrasted chords and having it spread over a melody in successive notes which are

---

[89] Erich M. Hornbostel, 'The Problems of Comparative Musicology', in Klaus Wachsmann, Dieter Christensen and Hans-Peter Reinecke (eds), *Hornbostel Opera Omnia*, vol. 1 (Martinus Nijhoff, 1975 [1905]), 252.

[90] Erich M. Hornbostel, 'Studies on the Tonsystem and Music of the Japanese', *Hornbostel Opera Omnia*, vol. 1, 8.

[91] Charles S. Myers, 'The Study of Primitive Music', *The Musical Antiquary* 4 (April 1912), 122.

[92] Jann Pasler, 'Sonic Anthropology in 1900: The Challenge of Transcribing Non-Western Music and Language', *Twentieth-Century Music* 11, no. 1 (2014), 7-36.

[93] Zon, *Representing Non-Western Music*, 289.

epitomized as a scale'.[94] Fox Strangways also acknowledged the challenges of field recordings:

> A phonograph cannot be carried on the person or unlimbered and brought into action in half a minute, like a camera; there are also conditions, such as distance of the sound, or movement of the producer (e.g. in dancing) with attendant dust, which preclude its employment altogether. Secondly, as it is impossible for the European reader to reproduce the local colour which is imparted by curiosities of grace-note or of intonation, it is unnecessary to trouble him with them at this stage.[95]

Phonographic transcriptions present challenges, one of which is researcher bias, contradicting the purported objectivity of the recording apparatus. As Myers noted:

> Just as with our ear to the telephone we 'read' what is really a false meaning into its sounds (inasmuch as this instrument transmits an exceedingly distorted and defective rendering of what is being spoken at the other end), and realize what ought to be there, thus unconsciously supplying the omissions and neglecting the errors of distortion; so in listening to primitive music, we are only too apt to hear an air as we think from past experience it ought to sound. Even with the assistance of a phonograph, it has repeatedly happened to me that my attention has been called to errors of transcription (due to the inevitable dangers of habituation to European music just mentioned) only after I have heard the air a considerable number of times.[96]

---

[94] Fox Strangways, *The Music of Hindostan*, 317.
[95] Fox Strangways, *The Music of Hindostan*, 17.
[96] Charles S. Myers, 'The Study of Primitive Music', 122.

In the appendix to their 1904 article 'On the Significance of the Phonograph for Comparative Musicology', Hornbostel and Abraham provided guidelines for conducting field recordings.[97] They focused on the equipment, the recording process, logging procedures, and optional features, creating an ideal model for collectors.

Western scholars frequently depicted phonographic cylinders as objective and transparent representations of sound events. However, these recordings were instead opaque media entangled in complex power relations, often permeated by colonialism.[98] Ethnographic recordings became 'contact zones', where 'peoples geographically and historically separated come into contact with each other and establish ongoing relations, usually involving conditions of coercion, radical inequality, and intractable conflict'.[99] Thus, these so-called 'objective' technologically mediated relationships encapsulated uneven experiences between Western scholars and colonial Others. The recordings became remnants of asymmetrical interactions that relied on 'epistemologies that structure and constitute our forms of knowledge acquisition' through imperial lenses.[100] For Brady, using the phonograph

> Implied a set of choices made by the collector based on training, disposition, and intellectual assumptions; the cooperation of the performer implied choices based on personal and cultural criteria no less complex and serious. Although the cylinder phonograph was hailed as a scientific, objective tool, its use reflects a full measure of

---

[97] Otto Abraham, Erich M. Hornbostel, 'On the Significance of the Phonograph for Comparative Musicology', *Hornbostel Opera Omnia*, vol. 1, 200–202.

[98] Will Prentice, Looking at a Lens Through a Lens: Understanding What we Hear When we Listen to Ethnographic Cylinder Recordings (conference paper), *Exploring Traditional Music on Wax Cylinders*, ERA and Surrey University, 12 June 2024.

[99] Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (Routledge, 2008), 8.

[100] Ronald Radano, 'Introduction', in Ronald Radano, Tejumola Olaniyan (eds), *Audible Empire: Music, Global Politics, Critique* (Duke University Press, 2016), 13.

characteristics resulting from subjective motivations, conscious and unconscious, of collector and performer.[101]

The transformation of ephemeral sound into tangible objects depended on the technological and contextual contexts in which the researchers 'prescribed the availability and interpretability of the empirical data'.[102] Thus, early phonography is profoundly intertwined with 'imperialist modes of listening, looking, and gathering'.[103] Robinson argues that 'listening is guided by positionality as an intersection of perceptual habit, ability, and bias'.[104] Consequently, scholars, 'working from an unmarked positionality', replicated 'settler forms of everyday, normative sensory perception'.[105] This 'colonial ear', which constructs the acoustic identity of the colonised and subaltern, played a significant role in shaping knowledge about their cultures.[106] As a result, many collectors carved and perpetuated the 'sonic colour line', the 'process of racialising sound' or sonifying race, in numerous ethnographic recordings.[107] In conclusion, the act of listening became a way for Western scholars to observe and appropriate otherness during the colonial era.

Contacting the music and dance of people worldwide had significant repercussions for musicology. Explorers, missionaries, military officers, and merchants wrote extensively about sound-producing events. Western ears recreated the colonial Other in widely disseminated

---

[101] Brady, *A Spiral Way*, 7.

[102] Irene Hilden, *Absent Presences in the Colonial Archive: Dealing with the Berlin Sound Archive's Acoustic Legacies* (Leuven University Press, 2022), 216.

[103] Madrid, 'Listening through the Colonial Noise', 219.

[104] Dylan Robinson, *Hungry Listening: Resonant Theory for Indigenous Sound Studies* (University of Minnesota Press, 2020), 37.

[105] Robinson, *Hungry Listening*, 68.

[106] Mèhèza Kalibani, 'Prolegomena to the Study of Historical Sound Recordings from Colonial Contexts', *The World of Music (New Series)* 13, no. 2 (2024), 12.

[107] Jennifer Lynn Stoever, *The Sonic Color Line: Race and the Cultural Politics of Listening* (New York University Press, 2016), 7.

written accounts, often emphasising the strangeness of what they observed and heard. Later, they were encouraged to make phonographic recordings. Evolutionist ideas regarding race permeated many contemporary accounts. The notion that 'primitive' music relied on rhythm while Western art music used harmony and counterpoint resonated with turn-of-the-century 'racial science'. Returning to Wallaschek,

> It is a well-known fact, established by the observations of travellers and investigators, that the one essential feature in primitive music is rhythm, melody being a matter of accident. We do not meet with a single instance among savages of a fixed melody – fixed at least according to musical principles; melodic cadences, where they occur, serve only as signals, or as a convenient accompaniment to certain activities, such as rowing, towing, or fighting.[108]

The new ethnological and anthropological museums and archives reflected a growing interest in material culture, fostering the collection of musical instruments from various places.[109] Objects became fundamental for employing the comparative method, which Hornbostel claimed in 1905 had a late start in musicology.[110] Furthermore,

---

[108] Wallaschek, Cattell, 'On the Origin of Music', 375.

[109] George W. Stocking, Jr. (ed.), *Objects and Others: Essays on Museums and Material Culture* (University of Wisconsin Press, 1985); Nélia Dias, *Le musée d'ethnographie du Trocadéro (1878-1908): Anthropologie et muséologie en France* (Éditions du CNRS, 1991); Nélia Dias, 'The Visibility of Difference: Nineteenth-Century French Anthropological Collections', in Sharon Macdonald (ed.), *The Politics of Display: Museums, Science, Culture* (London: Routledge, 1998), 36–52; Adam Kuper, *The Museum of Other People: From Colonial Acquisitions to Cosmopolitan Exhibitions* (Profile Books, 2023); Philip Burnett, Erin Johnson-Williams, Yvonne Liao, 'Music, Empire, Colonialism: Sounding the Archives', *Postcolonial Studies* 26, no. 37 (2023), 345–359.

[110] Erich M. Hornbostel, 'The Problems of Comparative Musicology', 251.

> Until a short time ago, the musicologist who looked for assistance from the ethnologist was badly off; musical instruments by themselves, in museums, could offer him little; travelers' reports were mostly content with some remarks on the 'discordant music of the natives', 'the hellish din during dances and feasts', or 'the melancholic mood of a strange tune'. Some travelers and missionaries attempted to write down melodies by ear. However, the difficulties of this method increase infinitely, even for the experienced musician, when the music employs unaccustomed intervals and rhythms. And difficulties here are equal to sources of error. In this regard, we have a hardly surmountable tendency to adjust everything that is unusual to fit our concepts and to hear exotic music with European ears.[111]

Comparing similar cultural manifestations across different geographies depended on an epistemology that favoured uniformity, often at the expense of recognising difference and specificity. Franz Boas expressed concerns about the practical application of the comparative method because it relied on extrapolation.[112] Gilman argued that understanding music required different approaches: 'Our exacter knowledge of primitive music has hitherto been obtained in part through an examination of primitive musical instruments, and in part through the comparatively rare opportunities which trained musicians have enjoyed to hear it in actual performance'.[113] Since music is also immaterial, integrating its transient essence into museums presents a significant challenge.

---

[111] Erich M. Hornbostel, 'The Problems of Comparative Musicology', 251.

[112] Franz Boas, 'The Limitations of the Comparative Method of Anthropology', *Science* 4, no. 103 (1896), 901–908.

[113] Benjamin Ives Gilman, 'Zuñi Melodies', *A Journal of American Ethnology and Archaeology* 1 (1891), 67–68.

The portability of phonographs made them essential tools for the new approaches to studying multiple forms of musical expression. However, it is crucial to consider the role played by commercial flat discs. In the early days of the recording industry, technicians travelled and recorded music from various locations. These recordings catered to local markets but also captured repertoires perceived as 'exotic' for Western ears, as exoticism is always relative. Many early recordings stood in a hybrid position between ethnographic curiosity and the popular music market. The novel ability to reproduce recorded sound fostered an active engagement with musical diversity and highlighted the idea of phonography as an 'objective' transcription of sound events.

Phonographic Objectivity

In 1801, the French philosopher Charles de Villers published *Philosophie de Kant, ou Principes fondamentaux de la philosophie transcendentale*.[114] This work is remarkable for being the earliest epistemological reference in French to 'the necessary distinction between subjectivity and objectivity'. The second issue of *The Edinburgh Review*, published in January 1803, contained a review of Viller's book.[115] According to the Oxford English Dictionary, it marked the earliest recorded use of 'subjectivity' and 'objectivity' in English. Enlightenment scholars began to question their epistemological status and developed this dichotomy as modern science developed.

By the mid-nineteenth century, 'objectivity' became established as a set of norms and procedures, an adoption that paralleled the rise of positivism and evolutionism. Modern objectivity is a complex idea that 'mixes rather than integrates disparate components, which

---

[114] Charles Villers, *Philosophie de Kant, ou Principes fondamentaux de la philosophie transcendentale* (Metz: Collignon, 1801).
[115] Thomas Brown, 'Villers, Philosophie de Kant', *Edinburgh Review* 1 (January 1803), 253.

are historically and conceptually distinct'.[116] Mechanical objectivity rapidly replaced an approach of 'truth-to-nature' that Enlightenment thinkers prized, thanks to technologies like photography and phonography.[117] With an increasing suspicion of certain types of subjectivity and a push for Victorian self-restraint, mechanical objectivity 'combatted the subjectivity of scientific and aesthetic judgment, dogmatic system building, and anthropomorphism'.[118] This ideal was less about eliminating the observer than about moderating their influence through technology:

> Aperspectival objectivity attributed to late nineteenth-century science opposed the subjectivity of individual idiosyncracies, which substituted for the individual interests and 'situations' analyzed by the eighteenth-century moral perspectivists.[119]

Reducing human intervention was seen as a way to allow information to speak for itself. As a result, mechanical objectivity became a fundamental principle of positivist science, rapidly spreading throughout the Western world. This idea resonates with Kant's notion of disinterested contemplation, which he developed in *Critique of Judgement*.[120] In the following century, the detachment between observer and observed became essential to mechanical objectivity. Additionally, aesthetics expanded its subject:

---

[116] Lorraine Daston and Peter Galison, 'The Image of Objectivity', *Representations* 0, no. 40 (1992), 82.

[117] Lorraine Daston and Peter Galison, *Objectivity* (Zone Books, 2007), 115–190.

[118] Daston and Galison, 'The Image of Objectivity', 82.

[119] Lorraine Daston, 'Objectivity and the Escape from Perspective', *Social Studies of Science* 22, no. 4 (1992), 607.

[120] Immanuel Kant, *Kritik der Urteilskraft* (Berlin: n.p., 1790).

> While aesthetics as a practice of critical judgement of phenomena in Baumgarten's and Kant's sense had vindicated the cognitive faculty of sense perception, aesthetics after the 1880s, in the scientific discourses of Hermann von Helmholtz and Ernst Mach as well as in the philosophical considerations of Henri Bergson or John Dewey, was conceived of as an aesthetic critique of experience.[121]

Thus, while the social sciences began to emulate methods and perspectives from the natural sciences, the latter drew from Kant's aesthetics. This process illustrates the lengthy journey the sciences undertook from the Enlightenment to Positivism through Romanticism. The proliferation of technologies like the photograph and the phonograph in the late nineteenth century reinforced this perspective, enabling people to delegate human intervention to mechanical devices that objectively captured Nature.

Daston and Galison focus their analysis on images, discussing how photographs and x-rays convey a mechanically objective vision of Nature.[122] These technologies coexisted with engravings, which depended more on the artist's subjectivity.[123] The relationship between sketch artists and explorers during the late nineteenth century overlapped significantly, as they mutually informed one another. Sketch artists depicted scenes from expeditions for wide circulation in periodicals, novels, and travel literature. Many publications featured engravings based on these expeditions, with some relying on photographs. Photography became an essential tool for ethnologists and anthropologists, although its use was complicated, particularly in fieldwork. The fragile materials and

---

[121] Ute Holl, 'Franz Boas and Anthropology in the Age of Technical Media', *Amerikastudien* 63, no. 4 (2018), 527.

[122] Daston and Peter Galison, *Objectivity*.

[123] Michael Gaudio, *Engraving the Savage: The New World and Techniques of Civilization* (University of Minneapolis Press, 2008).

chemicals used in photography were hard to manage in tropical climates. Despite these difficulties, images captured human diversity during the Age of Empire.

Phonography was often perceived as the aural equivalent of photography. Just as sound waves could be inscribed onto a wax cylinder, light could be transferred to glass plates using gelatine silver. Prior to sound recording, music was collected and transcribed, which is akin to drawing but for sound. The ideal researcher, from a positivist standpoint, was expected to act as a 'vanishing mediator' between the sounds and their transcription. The technology strove to ensure objectivity and fidelity in capturing music, ideally overcoming the limitations of musical notation and the biases introduced by the collector's musical background. However, photography reached a broader audience through magazines, books, and illustrated postcards, creating *fin-de-siècle* imagery. The incorporation of photography into mass-produced items designed for large spectatorships contrasted sharply with the phonograph, which had a much smaller reach. Early scepticism about phonographs fuelled discussions about their limitations. Boas relied on field transcriptions before the phonograph was improved, while Cecil Sharp noted in 1907 the challenges 'to record with scientific accuracy delicate shades of pitch variation'.[124] In defending recording technologies, Percy Grainger argued that 'the gramophone and phonograph record admirably what our ears and systems of notation are too inaccurate and clumsy to take advantage of'.[125]

Phonographic cylinders found their way into sound archives and private collections. During the early days of commercial phonography, manufacturers and sellers associated talking machines with prestige and marketed them to affluent buyers. The use of the

---

[124] Ira Jacknis, 'Franz Boas and Photography', *Studies in Visual Communication* 10, no. 1 (February 1984), 45; Cecil J. Sharp, *English Folk Song: Some Conclusions* (London: Simpkin & Co., 1907), 72

[125] Percy Grainger, 'Collecting with the phonograph', *Journal of the Folk-Song Society* 3, no. 12 (May 1908), 152.

phonograph as a scientific tool was limited compared to the mass-pressed flat discs containing pre-recorded pieces that circulated globally. Most cylinders that aimed to capture traditional music served other purposes, attempting to inscribe the sonic *analogon* to reality; 'because analog recording is an indexical trace of a phenomenon, the analog storage medium will contain whatever information is allowed by the physics of the situation'.[126] This perspective emphasises the phonograph's 'objective' capture of sound; however, it represents an idealised view given the device's early limitations, where 'the best available or the preferable became a stand-in for the true'.[127] Listeners developed different skills and audile techniques to differentiate between sounds *of* and sounds *by* the apparatus.[128] With phonography, a 'new kind of real in which the purity of hearing alone was distilled' emerged.[129] Phonography helped late nineteenth-century culture to create and engage with information as this 'modern technology of the Real' stored information, an innovative trend that separated recording apparatuses from earlier tools and machines. The phonograph

> took over functions of the central nervous system, and no longer, as in times past, merely those of muscles. And with this differentiation – and not with steam engines and railroads – a clear division occurs between matter and information, the real and the symbolic.[130]

---

[126] Eric W. Rothenbuhler and John Durham Peters, 'Defining Phonography: An Experiment in Theory', *Musical Quarterly* 81, no. 2 (1997), 253.

[127] Sterne, *The Audible Past*, 275.

[128] Sterne, *The Audible Past*, 283.

[129] Amanda Weidman, 'Guru and Gramophone: Fantasies of Fidelity and Modern Technologies of the Real', *Public Culture* 15, no. 3 (2003), 464.

[130] Friedrich A. Kittler, *Gramophone, Film, Typewriter* (Stanford University Press, 1999), 16.

Ultimately, cylinders serve as extensions of human memory, carrying the sonic past into the present.

Resounding Memory

Memory was a debated topic and a contested area among late nineteenth-century scholars. The emerging fields of experimental psychology, psychoanalysis, psychiatry, and neurology sought to understand the workings of the human mind. Prominent authors created analogies and metaphors to describe the processes of the human psyche. In the 1871 edition of *Principles of Psychology*, Spencer explained the workings of the cerebrum and cerebellum by comparing them to mechanical instruments.[131] For him, stimulating the brain cells resembled a sophisticated contraption:

> In the musical box, the chords and sequences admit of being produced only by these pre-adjusted appliances. But there exists a species of mechanical piano capable of being played upon ordinarily, and also of having drawn from it an unlimited number of pieces of music after a method akin to that last described.[132]

Spencer mentioned musical boxes and mechanical pianos at the dawn of a new generation of automatic instruments. Other scholars diverged from his views, comparing human memory with apparatuses that print traces on a surface. The French philosopher Jean-Marie Guyau published 'La mémoire et le phonographe' in 1880, likening the phonograph to human

---

[131] Herbert Spencer, *Principles of Psychology*, vol. 1 (New York: D. Appleton, 1871), 566–567.
[132] Spencer, *Principles of Psychology*, 566.

memory shortly after the patenting of Edison's first phonograph.[133] For Guyau, the brain worked as a 'conscious phonograph' that inscribed invisible grooves onto the brain cells. Recollections recreated sensations and thoughts, similar to a needle running through the indentations of a phonograph cylinder.[134] Their chief distinction is that the phonograph was unable to move from movement to consciousness, unlike the brain.[135] The disagreement between Spencer and Guyau anticipated the work by David Suisman, who claimed that mechanical instruments (especially the player piano) and phonography represent distinct strands of modernity.[136] The first embodied rationalisation, automation, and quantification, while the latter reconfigured the modern experience of space and time.[137]

Drawing from evolutionary theory, the French scholar Théodule Ribot published *Les maladies de la mémoire* in 1881.[138] For him, memory was solely a function of the nervous system. In response, the influential French philosopher Henri Bergson presented *Matière et mémorie* (published in 1896), positioning memory as a mediating process between matter and spirit. For Bergson,

> subject and object would unite in an extended perception the subjective side of perception being the contraction effected by memory, and the objective reality of matter fusing with the multitudinous and successive vibrations into which this perception can be internally broken up.[139]

---

[133] Jean-Marie Guyau, 'La mémoire et le phonographe', *Revue philosophique de la France et de l'étranger* IX (January-July 1880), 319-322.

[134] Guyau, 'La mémoire et le phonographe', 320, 322.

[135] Guyau, 'La mémoire et le phonographe', 322.

[136] Suisman, 'Sound, Knowledge, and the 'Immanence of Human Failure',' 24.

[137] Suisman, 'Sound, Knowledge, and the 'Immanence of Human Failure',' 24.

[138] Théodule Ribot, *Les maladies de la mémoire* (Paris: L'Harmattan, 1881).

[139] Henri Bergson, *Matter and Memory* (London/NY: George Allen and Unwin Ltd./Humanities Press, 1911), 77.

A fundamental aspect of early sound recording is preservation, as one of Edison's goals was to capture and perpetuate the voices of the dead. This functionality was especially evident during family gatherings, where homemade phonograph cylinders served as sites of sonic remembrance. Many linguists and musicologists viewed the phonograph as a tool for preserving disappearing cultures. This perspective relied on the idea that 'modernity' and 'civilisation' were replacing 'tradition', erasing its traces. Folklorists used field recordings to salvage the remnants of rural traditions threatened by the overwhelming onslaught of mass-produced, commodified entertainment. Others sought to preserve the cultural manifestations of populations transformed by their colonial condition. Formal archiving, with its implications of asymmetrical power distribution, aimed to create sonic *lieux de mémoire* of bygone peoples and languages. For Stumpf:

> Treating present-day indigenous tribes as sources for accessing the evolutionary past was common enough during the later nineteenth century, but the phonograph served to highlight their status as the final living trace of tantalizingly impermanent developmental stages.[140]

Conclusions

The phonograph merged technological innovation with a growing desire for objectivity. Beyond simply transcribing music in real time, scholars used it to capture the sound waves of live performances. This process, which some viewed as de-skilling, enabled a diverse

[140] Carl Stumpf, *The Origins of Music*, 27.

network of individuals to collect sound as an initial step in studying music, dance, and languages. However, this innovation was far from straightforward. Imperial attitudes permeated the ways through which people engaged with sound. In many instances, early recordings played a crucial role in creating a sense of sonic otherness through Western ears, as the distinction between gathering and appropriating information was often unclear during the Age of Empire. I have traced a constellation of ideas from the Enlightenment to the early twentieth century to understand how a nuanced approach to phonographic cylinders became essential for scholars. In their pursuit of a perspectival objectivity through mechanical devices, phonographic cylinders contributed to the acceptance of musicology, especially comparative musicology, as an academic discipline. This approach resonated with a profound reconfiguration of the social sciences, influenced by positivism and evolutionism, two multidimensional and heterogeneous trends. Romantic ideals of progress and a new paradigm of objectivity interacted as musicology carved human diversity into wax cylinders. People worked across disciplines during a time when the boundaries between them were recent and often unstable. Examining sounds through their various interpretations played a significant role in shaping concepts of sameness and otherness within an imperial background. Early phonographic cultures represented a contested space that articulated technology, philosophy, otology, psychology, anthropology, ethnology, and musicology. Recorded cylinders emerged as ambiguous and frequently contradictory mediators between disparate worlds, carrying the traces of their makers. These recordings embody and contribute to the intricate relationships between humans and machines, centre and periphery, sameness and otherness, science and business, Eurocentric Enlightenment and colonial violence, and *Völkerkunde* and *Naturkunde*. Whether regarded as primary sources, scientific resources, or sites of memory,

disembodied sounds became fundamental to the new discipline of musicology during an era shaped and haunted by nationalism and colonialism.

Bibliography

Abraham, Otto and Erich M. Hornbostel, *Phonographierte indische Melodien*. Leipzig: Breitkopf & Härtel, 1904.

Abraham, Otto and Erich Moritz von Hornbostel, 'Über die Bedeutung des Phonographen für vergleichende Musikwissenschaft', *Zeitschrift für Ethnologie* 36, no. 2, 1904, 222–36.

Abraham, Otto and Erich Moritz von Hornbostel, 'Phonographierte türkische Melodien', *Zeitschrift für Ethnologie* 36, no. 2, 1904, 203–2.

Abraham, Otto, 'Das absolute Tonbewußtsein und die Musik', *Sammelbände der Internationalen Musikgesellschaft* 8, 1907, 486–491.

Abraham, Otto, 'Das absolute Tonbewußtsein: Psychologisch-musikalische Studie', *Sammelbände der internationalen Musikgesellschaft 3*, no. 1, 1901: 1–86.

Abraham, Otto, Erich M. Hornbostel, 'On the Significance of the Phonograph for Comparative Musicology', *Hornbostel Opera Omnia*, vol. 1, 183–202.

Agnew, Vanessa, 'The Colonialist Beginnings of Comparative Musicology' in Eric Ames, Marcia Klotz, and Lora Wildenthal (eds), *Germany's Colonial Pasts: An Anthology in Memory of Susanne Zantop*. University of Nebraska Press, 2005, 41–60.

Ames, Eric, 'The Sound of Evolution', *Modernism/modernity*, 10, no.2, 2003, 297–325.

Anderson, Benedict, *Imagined Communities: Reflections on the Origin and Spread of Nationalism*, Verso, 2011.

Asad, Talal, 'Afterword: From the History of Colonial Anthropology to the Anthropology of Western Hegemony', in George Stocking Jr. (ed.), *Colonial Situations: Essays on the Contextualization of Ethnographic Knowledge*. University of Wisconsin Press, 1991, 314–24.

Berg, H., *Die Lust an der Musik: nebst einem Anhang, Die Lust an den Farben, den Formen und der körperlichen Schönheit*. Berlin: B. Behr's Buchhandlung, 1879.

Bergson, Henri, *Matter and Memory*. London/NY: George Allen and Unwin Ltd./Humanities Press, 1911.

Berliner, Emile, 'Gramophone', US Patent Office, 372,786, 8 November 1887.

Boas, Franz, 'The Limitations of the Comparative Method of Anthropology', *Science* 4, no. 103, 1896, 901–08.

Brady, Erika, *A Spiral Way: How the Phonograph Changed Ethnography.* University Press of Mississippi, 1999.

Broca, Paul, *Instructions générales pour les recherches anthropologiques (anatomie et physiologie)*. Paris: Victor Masson et fils, 1865.

Brown, Thomas, 'Villers, Philosophie de Kant', *Edinburgh Review* 1, January 1803, 253.

Burnett, Philip, Erin Johnson-Williams, Yvonne Liao, 'Music, Empire, Colonialism: Sounding the Archives', *Postcolonial Studies* 26, no. 37, 2023, 345–359.

Cahan, David (ed.), *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*. University of California Press, 1994.

Cairns, Elliot Scott, The Berliner Phonogramm-Archiv and the Emergence of Comparative Musicology, Ph.D dissertation: Columbia University, 2020.

Ciarlo, David, *Advertising Empire: Race and Visual Culture in Imperial Germany*. Harvard University Press, 2011.

Cole, Ross, *The Folk: Music, Modernity, and the Political Imagination*. University of California Press, 2021.

Comte, Auguste, *Discours sur l'ensemble du positivisme – ou exposition sommaire de la doctrine philosophique et sociale propre à la grande république occidentale*. Paris: L.

Mathias, 1848.

Conklin, Alice L., *In the Museum of Man: Race, Anthropology, and Empire in France, 1850–1950*. University Press, 2013.

Darwin, Charles, *On the Origin of Species by Means of Natural Selection, or the Preservation Of Favoured Races in the Struggle for Life*. London: John Murray, 1859.

Darwin, Charles, *The Expression of the Emotions in Man and Animals*. London: John Murray, 1872.

Daston, Lorraine and Peter Galison, 'The Image of Objectivity', *Representations* 0, no. 40, 1992, 81–128.

Daston, Lorraine and Peter Galison, *Objectivity*. Zone Books, 2007.

Daston, Lorraine, 'Objectivity and the Escape from Perspective', *Social Studies of Science* 22, no. 4, 1992, 597–618.

DeGraaf, Leonard, 'Confronting the Mass Market: Thomas Edison and the Entertainment Phonograph', *Business and Economic History* 24, no. 1, 1995, 88–96.

Deniker, Joseph, *The Races of Man: An Outline of Anthropology and Ethnography*. London: Walter Scott, 1900.

Dias, Nélia, 'The Visibility of Difference: Nineteenth-Century French Anthropological Collections', in Sharon Macdonald (ed.), *The Politics of Display: Museums, Science, Culture*. London: Routledge, 1998, 36–52.

Dias, Nélia, *Le musée d'ethnographie du Trocadéro (1878-1908): Anthropologie et muséologie en France*. Éditions du CNRS, 1991.

Dilthey, Wilhelm, *Wilhelm Dilthey: Selected Works, vol. 1: Introduction to the Human Sciences.* Princeton University Press, 1989.

Edison, Thomas A., 'Improvement in Phonograph or Speaking Machines', US Patent 200,

521, 19 February 1878.

Edison, Thomas A., 'Phonograph', US Patent 386, 974, 31 July 1888.

Edison, Thomas A., 'The Perfected Phonograph', *The North American Review* 146, no. 379, 1888, 641–50.

Ellis, Alexander J., 'Additions by the Translator', in Helmholtz, *On the Sensations of Tone as a Physiological Basis for the Theory of Music*. London: Longmans, Green and Co., 1895 [3rd edition based on the German 2nd edition], 430–566.

Ellis, Alexander J., 'On the musical scales of various nations', *The Journal of the Society of Arts* 33, no. 1688, 1885: 485–527.

Engel, Carl, 'Music', in John George Garson, Charles Hercules Read (eds), *Notes and Queries on Anthropology*. London: The Anthropological Institute, 1892, 164–69.

Enns, Anthony, 'The Human Telephone: Physiology, Neurology, and Sound. Technologies', in Daniel Morat (ed.), *Sounds of Modern History: Auditory Cultures in 19th- and 20th-Century Europe*. Berghahn, 2014, 46–68.

Fabian, Johannes, *Time and the Other: How Anthropology Makes Its Object*. Columbia University Press, 1983.

Fox Strangways, Arthur Henry, *The Music of Hindostan*. Oxford: Clarendon Press, 1914.

Gaudio, Michael, *Engraving the Savage: The New World and Techniques of Civilization*. University of Minneapolis Press, 2008.

Gauß, Stefan, 'Listening to the Horn: On the Cultural History of the Phonograph and the Gramophone', in Morat (ed.), *Sounds of Modern History: Auditory Cultures in 19th- and 20th-Century Europe.* Berghahn, 2014, 71–100.

Gelatt, Roland, *The Fabulous Phonograph 1877–1977*. Cassell, 1977.

Gilman, Benjamin Ives, 'Zuñi Melodies', *A Journal of American Ethnology and Archaeology*

1, no. II. 1892, 63–91.

Grainger, Percy, 'Collecting with the phonograph', *Journal of the Folk-Song Society* 3, no. 12, May 1908, 147–62.

Gronow, Pekka, 'The Record Industry: Growth of a Mass Medium', *Popular Music* 3, 1983, 53–75.

Gurney, Edmund, *The Power of Sound*. London: Smith, Elder and Co., 1880.

Guyau, Jean-Marie, 'La mémoire et le phonographe', *Revue philosophique de la France et de l'étranger* IX, January-July 1880, 319–22.

Helmholtz, Hermann von, Edmund Atkinson (tr. and ed.), 'On the Physiological Causes of Harmony in Music', *Popular Lectures on Scientific Subjects*. New York: D. Appleton, 1873, 61–106.

Helmholtz, Hermann von, *On the Sensations of Tone as a Physiological Basis for the Theory of Music*. London: Longmans, Green and Co., 1895 [3rd edition based on the German 2nd edition].

Herder, Johann Gottfried von, Philip V. Bohlman (ed.), *Song Loves the Masses: Herder on Music and Nationalism*. University of California Press, 2017.

Hilden, Irene, *Absent Presences in the Colonial Archive: Dealing with the Berlin Sound Archive's Acoustic Legacies*. Leuven University Press, 2022.

Hochman, Brian, *Savage Preservation: The Ethnographic Origins of Modern Media*. University of Minnesota Press, 2014.

Holl, Ute, 'Franz Boas and Anthropology in the Age of Technical Media', *Amerikastudien* 63, no. 4, 2018, 517–40.

Hornbostel, Erich M., 'Studies on the Tonsystem and Music of the Japanese', *Hornbostel Opera Omnia*, vol. 1. Martinus Nijhoff, 1975 [1903], 1–84.

Hornbostel, Erich M., 'The Problems of Comparative Musicology', in Klaus Wachsmann, Dieter Christensen and Hans-Peter Reinecke (eds), *Hornbostel Opera Omnia*, vol. 1. Martinus Nijhoff, 1975 [1905], 247–70.

Hui, Alexandra, Mara Mills and Viktoria Tkaczyk, 'Testing Hearing: An Introduction', in Viktoria Tkaczyk, Mara Mills, Alexandra Hui (eds), *Testing Hearing: The Making of Modern Aurality*. Oxford University Press, 2020, 1–19.

Jacknis, Ira, 'Franz Boas and Photography', *Studies in Visual Communication* 10, no. 1, February 1984, 2–60.

Kalibani, Mèhèza, 'Prolegomena to the Study of Historical Sound Recordings from Colonial Contexts', *The World of Music (New Series)* 13, no. 2, 2024, 1–17.

Kant, Immanuel, *Kritik der Urteilskraft*. Berlin: n.p., 1790.

Karnes, Kevin, *Music, Criticism, and the Challenge of History: Shaping Modern Musical Thought in Late Nineteenth-Century Vienna.* Oxford University Press, 2008.

Kittler, Friedrich A., *Gramophone, Film, Typewriter*. Stanford University Press, 1999.

Koch, Lars-Christian, 'Images of sound: Erich M. von Hornbostel and the Berlin Phonogram Archive', in Philip V. Bohlman (ed.), *The Cambridge History of World Music*. Cambridge University Press, 2013, 475–97.

Kruse, Holly, 'Early Audio Technology and Domestic Space', *Stanford Humanities Review* 3, 1993, 1–14.

Kuper, Adam, *The Museum of Other People: From Colonial Acquisitions to Cosmopolitan Exhibitions*. Profile Books, 2023.

Lambert, Thomas Bennett, 'Improvements in the Process of and Apparatus for Reproducing Phonographic Records', UK Patent Office, GB190013344A, 24 November 1900.

Lange, Britta, 'Archival Silences as Historical Sources Reconsidering: Sound Recordings of

Prisoners of War (1915-1918) from the Berlin Lautarchiv', *SoundEffects* 7, no. 3, 2017, 46–60.

Lightman, Bernard (ed.), *Global Spencerism: The Communication and Appropriation of a British Evolutionist*. Brill, 2016.

Lombroso, Cesare, *L'uomo bianco e l'uomo di colore: Letture su l'origine e la varietà delle razze umane.* Padova: Padova, Tip. F. Sacchetto, 1871.

Lubbock, John, *The Origin of Civilisation and the Primitive Condition of Man: Mental and Social Condition of Savages*. London: Longmans, Green and Co., 1870.

Luschan, Felix von, 'Einige türkische Volkslieder aus Nordsyrien und die Bedeutung phonographischer Aufnahmen für die Völkerkunde', *Zeitschrift für Ethnologie* 36, no. 2, 1904, 177–202.

Mach, Ernst, *The Analysis of Sensations, and the Relation of the Physical to the Psychical*. Chicago/London: Open Court Publishing Company, 1914.

Madrid, Alejandro L., 'Listening through the Colonial Noise: Things, Sound Objects, and Legacy at the Berliner Phonogramm-Archiv's Konrad T. Preuss Collection', *Journal of the American Musicological Society* 78, no. 1, 2025, 195–240.

Martinelli, Riccardo, 'Melting Musics, Fusing Sounds: Stumpf, Hornbostel, and Comparative Musicology in Berlin', in Rens Bod, Jaap Maat and Thijs Weststeijn (eds), *The Making of Humanities*, vol. 3. Amsterdam University Press, 2014, 391–401.

Mugglestone, Erica and Guido Adler, 'Guido Adler's 'The Scope, Method, and Aim of Musicology' (1885): An English Translation with an Historico-Analytical Commentary', *Yearbook for Traditional Music* 13, 1981, 1–21.

Myers, Charles S., 'A Study of Papuan Hearing', *Archives of Otology* 31, 1902, 283–88.

Myers, Charles S., 'Hearing', in *Reports of the Cambridge Anthropological Expedition to Torres Straits: Physiology and Psychology*. Cambridge: Cambridge University Press, 1901, 142–68.

Myers, Charles S., 'Human Improvability', *Bristol Medico-Chirurgical Journal* 49, no. 183, Spring 1932, 31–46.

Myers, Charles S., 'Music' in *Reports of the Cambridge Anthropological Expedition to Torres Straits: Arts and Crafts*. Cambridge: Cambridge University Press, 1912, 238–69.

Myers, Charles S., 'The Study of Primitive Music', *The Musical Antiquary* 4, April 1912, 121–41.

Myers, Charles S., *A Text-Book of Experimental Psychology*. London: Longmans, Green and Co., 1909.

Ouzounian, Gascia, *Stereophonica: Sound and Space in Science, Technology, and the Arts.* The MIT Press, 2021.

Pappas, Dennis G., 'Otology Through the Ages', *Otolaryngology–Head and Neck Surgery* 114, no. 2, February 1996, 173–96.

Pasler, Jann, 'Sonic Anthropology in 1900: The Challenge of Transcribing Non-Western Music and Language', *Twentieth-Century Music* 11, no. 1, 2014, 7–36.

Picker, John M., *Victorian Soundscapes*. Oxford University Press, 2003.

Piilonen, Miriam, *Theorizing Music Evolution: Darwin, Spencer, and the Limits of the Human.* Oxford University Press, 2024.

Pratt, Mary Louise, *Imperial Eyes: Travel Writing and Transculturation.* Routledge, 2008..

Prentice, Will, 'Looking at a Lens Through a Lens: Understanding What we Hear When we Listen toEthnographic Cylinder Recordings (conference paper)', *Exploring Traditional Music on Wax Cylinders*, ERA and Surrey University, 12 June 2024.

Radano, Ronald, 'Introduction', in Ronald Radano, Tejumola Olaniyan (eds), *Audible Empire: Music, Global Politics, Critique*. Duke University Press, 2016, 1–22.

Radano, Ronald, *Lying up a Nation: Race and Black Music*. University of Chicago Press, 2003.

Rehding, Alexander, *Hugo Riemann and the Birth of Modern Musical Thought*. Cambridge University Press, 2003.

Ribot, Théodule, *Les maladies de la mémoire*. Paris: L'Harmattan, 1881.

Robinson, Dylan, *Hungry Listening: Resonant Theory for Indigenous Sound Studies*. University of Minnesota Press, 2020.

Rothenbuhler, Eric W. and John Durham Peters, 'Defining Phonography: An Experiment in Theory', *Musical Quarterly* 81, no. 2, 1997, 242–64.

Seeger, Charles, 'Prescriptive and Descriptive Music-Writing', *The Musical Quarterly* 44, no. 2, 1958, 184–95.

Sharp, Cecil J., *English Folk Song: Some Conclusions*. London: Simpkin & Co., 1907.

Spencer, Herbert, 'On the Origin of Music', *Mind* 15, no. 60, October 1890, 535–537.

Spencer, Herbert, *Illustrations of Universal Progress: A Series of Discussions*. New York, NY: D. Appleton, 1865.

Spencer, Herbert, *The Principles of Psychology*, vol. 1. New York, NY: D. Appleton, 1871.

Stepan, Nancy, *The Idea of Race in Science: Great Britain 1800-1960*. MacMillan and Co., 1982.

Sterne, Jonathan, *The Audible Past: Cultural Origins of Sound Reproduction*. Duke University Press, 2003.

Stocking Jr., George, 'Afterword: A View from the Center', *Ethnos* 47, no. 1-2, 1982, 172–86.

Stocking, Jr., George, *The Ethnographer's Magic and Other Essays*. University of Wisconsin

Press, 1994.

Stocking, Jr., George W. (ed.), *Objects and Others: Essays on Museums and Material Culture.* University of Wisconsin Press, 1985.

Stocking, Jr., George, 'The Critique of Racial Formalism', in George Stocking, Jr., *Race, Culture, and Evolution: Essays in the History of Anthropology.* University of Chicago Press, 1982, 161–94.

Stocking, Jr., George, *Victorian Anthropology*. Free Press, 1987.

Stoever, Jennifer Lynn, *The Sonic Color Line: Race and the Cultural Politics of Listening*. New York University Press, 2016.

Stumpf, Carl, 'Das Berliner Phonogrammarchiv', *Internationale Wochenschrift für Wissenschaft, Kunst und Technik* 2, February 1908, 225–246.

Stumpf, Carl, *The Origins of Music.* Oxford University Press, 2012.

Suisman, David, 'Sound, Knowledge, and the 'Immanence of Human Failure:' Rethinking Musical Mechanization through the Phonograph, the Player-Piano, and the Piano", *Social Text* 28, no. 1, 2010, 13–34.

Tainter, Sumner, 'Apparatus for Recording and Reproducing Sounds', US Patent 341, 288, 4 May 1886.

Thompson, Emily, 'Machines, Music, and the Quest for Fidelity: Marketing the Edison Phonograph in America, 1877–1925', *Musical Quarterly* 79, no. 1, 1995, 131–71.

Tkaczyk, Viktoria, 'The Testing of a Hundred Listeners: Otto Abraham's Studies on 'Absolute Tone Consciousness", Hui, Mills, Tkaczyk, *Testing Hearing: The Making of Modern Aurality*. Oxford University Press, 2020, 49–76.

Topinard, Paul, *Éléments d'anthropologie générale*. Paris: A. Delahaye et É. Lecrosnier,1885.

Topinard, Paul, *L'anthropologie.* Paris: C. Reinwald et cie, 1876.

Tylor, E. B., *Anthropology: An Introduction to the Study of Man and Civilization*. London, Macmillan and Co., 1881,

Tylor, E. B., *Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Art, and Custom*, 2 vols. London: John Murray, 1871.

Villers, Charles, *Philosophie de Kant, ou Principes fondamentaux de la philosophie transcendentale* Metz: Collignon, 1801.

Virchow, Rudolf, 'Ueber Einige Merkmale Niederer Menschenrassen Am Schädel Und Über Die Anwendung Der Statistischen Methode in Der Ethnischen Craniologie', *Zeitschrift Für Ethnologie* 12, 1880, 1–26.

Virchow, Rudolf, *Beiträge zur physischen Anthropologie der Deutschen, mit besonderer Berücksichtigung der Friesen*. Berlin: Akademie der Wissenschaften zu Berlin, 1876.

Wallaschek, Richard and J. M. Cattell, 'On the Origin of Music', *Mind* 16, no. 63, July 1891, 375–388.

Wallaschek, Richard, *Primitive Music: An Inquiry into the Origin and Development of Music, Songs, Instruments, Dances, and Pantomimes of Savage Races*. London: Longmans, Green and Co., 1893.

Weidman, Amanda, 'Guru and Gramophone: Fantasies of Fidelity and Modern Technologies of the Real', *Public Culture* 15, no. 3, 2003, 453–76.

Welch, Walter L. and Leah Brodbeck Stensel Burt, *From Tinfoil to Stereo: The Acoustic Years of the Recording Industry, 1877–1929*. University Press of Florida, 1995.

Williams, Raymond, *The Country and the City.* Spokesman, 2011.

Ziegler, Susanne, *Die Wachszylinder des Berliner Phonogramm-Archivs*. Staatliche Museen zu Berlin – Preußischer Kulturbesitz, 2006.

Zon, Bennett, *Evolution and Victorian Musical Culture*. Cambridge University Press, 2017.

Zon, Bennett, *Representing Non-Western Music in Nineteenth-Century Britain*. University of Rochester Press, 2007.