

# Book reviews

**Musical Illusions and Phantom Words: How Music and Speech Unlock Mysteries of the Human Brain.** Diana Deutsch. OUP, New York, 2019. 243 pp.



At the beginning of my freshman year music theory class, the professor proclaimed that while we would be learning the harmonic framework for western music theory, we should not fall into thinking that chords “want” to happen in a certain order. Diana Deutsch, approaching music perception from a neurological perspective, clarifies that it is our brains that want chords to happen in an expected fashion. As we look for short-cuts to aid in processing the information we take in, we impose order on tones, pitches, and rhythm.

The first question in reviewing this book is how does one read a book about musical illusions? The use of audio intermixed with the text is especially effective. While previously we might have had to juggle CD players or tape decks with the book, the use of QR codes and a camera phone makes listening to the examples as easy as looking at illustrations carefully placed within text.

The first six chapters present musical illusions and oddities. The musical illusions start with looking at how being left- or right-handed influences how we localize sounds and moves onto how our brains discriminate melodies by the proximity of pitches rather than by location or instrument—the “continuity effect” which also allows us to understand speech in noise. I have a minor quibble when Deutsch discusses using “orchestral sound textures to create ambiguous images” in Chapter 3 and focuses on the orchestral tone poems of Debussy, Strauss, and Berlioz in the Romantic Period and Varese, Penderecki, and Ligeti in the twentieth century but does not reach back to Beethoven of the late Classical Period. Coming out of the melody-based polyphonic

tradition of western music, Beethoven’s use of rhythm alone as thematic material (exemplified by the main theme of the 5th Symphony) was groundbreaking.

The book continues its examination of musical effects by looking at how looping pitches can create illusions of perpetually rising or falling scales (an effect used to create a sense of unbalance in movies), and the tritone paradox. Deutsch’s analysis of the tritone paradox begins her exploration of the connection between music and language with the finding that people hear computer generated tritones rising or falling differently based on whether they were raised in the south of England or California. She follows with a chapter on absolute pitch and the relationship between those who speak tonal languages and their greater rates of absolute pitch discrimination.

Chapter 7 focuses on the internal “editor” in our “verbal processing system” by looking at how we superimpose words on the babbling of talking dolls, the “Laurel vs Yanni” craze of 2018, the spiritualist movement of the nineteenth century, how important visual cues are to speech perception, and how the Spoonerism phenomenon can help us to trick our friends into saying that the yolk is the white part of the egg. (Hint: ask them to say “poke” seven times first.)

Deutsch moves directly from this gem into a discussion of what makes a tune “catchy.” The themes of repetition and just the right amount of “wrongness” that make a melody sticky echo the previous chapters’ discussion of how our brains fill in the blanks visually, aurally, and verbally. In drawing on the works of the neuroscientist Oliver Sacks and the journalist Malcolm Gladwell, Deutsch draws upon our contemporary understanding that the human superpower is finding the most effective mental short-cuts. The less effort we have to spend figuring out what someone is trying to communicate to us, the quicker we are, and the more energy we have left to escape the predator on the open plain.

To me, the highlight of the book occurs

in Chapter 10: the illusion she creates by listening to her spoken phrase “sometimes behave so strangely” on repeat. After several repetitions, our brains move from hearing spoken language to a sung phrase. One of the most striking audiovisual modules is a classroom of elementary students listening to the spoken phrase repeatedly, then singing back the pitches exactly. It brought to mind the first time I heard Steve Reich’s 1966 piece “Come Out” where the phrase “come out to show them” is repeated and manipulated to create a 13-minute musical piece. The warning from my freshman year was reinforced: music is not defined by set rules, but by how our brain interprets an aural soundscape. The words disappear into rhythm and melody as they are superimposed and offset.

Deutsch ends with a chapter on how speech and music are processed. She concludes that they are not entirely the same, but also not completely separate. While tone, timing, and timbre are processed for both speech and music, they have different purposes. Speech functions primarily to communicate information, while music is used to communicate feelings and emotions as well such diverse purposes as religious rituals and work songs. The close connection in our brain processing is likely due to the evolution of language and music over time. This connection was noted going back to Darwin and is a hot topic in contemporary study.

This book covers a wide swath of material, and it holds together well. The specificity of the early chapters feed into the large concepts of the later chapters. Deutsch has succeeded in creating a book that is accessible to the non-expert but has enough detail that even the most accomplished audiophile and neuro-acoustician will leave satisfied and enlightened.

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**Women in Audio.  
Leslie Gaston-Bird.  
Taylor & Francis  
Routledge, New  
York, 2020. 316 pp**

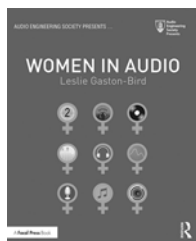
Leslie Gaston-Bird, a former Governor of the Audio Engineering Society, has authored what might possibly be the first comprehensive historical account focused on the contributions of women in the fields of Audio and Acoustics. This book catalogs the significant contributions by women, beginning with the inception of foundational mathematical formulations in 1808 and building through to the present day. I felt enriched by a new awareness of discoveries, fascinating in their own right, which had been unintentionally omitted from my education.

As a matter of historical fact, Gaston-Bird mentions instances where policies explicitly excluded women from participation in formal academic institutions, societies, and competitions. This context then gives way to examples of persistence and aptitude in time overcoming exclusionary policies, in part thanks to allyship with well-known male contributors with familiar names. It was fascinating to learn that famous male mathematicians and male physicists embodied allyship and had egalitarian values in the 1800s—for anyone in education these anecdotes are indispensable.

The book recounts the contributions and stories of 100 women. Through these accounts and interviews, Gaston-Bird offers inspiration and context for accomplished audio engineers independent of gender, and provides role models, direction, and tools for those who may still be aspiring. Tools include a global catalog of organizations, recommended reading, and a glossary of terms in the book.

Gaston-Bird generally organizes the book around various audio media and disciplines: Radio, Sound for Film, Television, Music Recording, Electronic Music, HW/SW, Acoustics, Live Sound & Theatre, Education, and Games (Augmented, Virtual, Mixed Reality, and Immersive Audio). Within each discipline, the stories of some key female contributors are highlighted.

While not the central focus of the book, issues around identity and intersectionality are unavoidable



when curating interviews of “Women in Audio.” These matters were well addressed by recounting a consistent theme among the women interviewed: They are audio engineers who happen to be women. Secondly, it was directly addressed that transgender women were welcomed within the context of the book. These inclusive values are touched on through the lens of personal profiles of audio engineers whose behaviors epitomized them: examples of women whom, upon establishing their presence in the audio industry, welcomed others who were not yet represented (e.g., produced recordings of Native Americans or organized the first interracial band).

Scant representation of female sound engineers is demonstrated via census and other various datasets. One candid story recounts an attempt to address this tactically from within the AES from 1995–2000 as being cathartic to some and controversial to others. The book itself is certainly a positive lens and approach to counter the disparity.

Some of the less savory aspects of the gender disparity in audio are briefly addressed. The book acknowledges that many women enjoy professional and fulfilling settings throughout their career. However, through a handful of anonymous first-hand accounts, some time is spent airing real retention issues such as sexism, bias, and harassment. The importance of social capital (rapport and belonging in social groups which effectively cooperate, sharing opportunity and resources) and a supportive network is

emphasized, and various mission-aligned organizations across the globe are introduced.

Having presented the history and broached some of the more sensitive topics, the majority of the book settles into chapters focusing on each audio/acoustic discipline. Within each medium, various roles are identified and ubiquitous equipment is introduced. This is followed by recent interviews of prominent female contributors. More often than not, a portrait of the professional is included, and to great effect, as it illustrates the gap between the reader’s imagination of the outward appearance of the professions and the reality. Contributors embody a diverse range of occupations: recording studio owners, electronic music performing artists, presidents of laboratories, and equipment maintenance technicians. These profiles provide sources of inspiration, path, and educational background, as well as the philosophies and accomplishments of each individual. Each chapter ends in thorough citations offering resources for more detail about the engineers and their contributions, and also addresses their professional and sociological context.

*Women in Audio* is effective: contextually illuminating to established professionals, and likely unparalleled in practical utility to aspiring audio engineers envisioning their future.

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