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## Book reviews

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- Diana Deutsch (ed.), *Psychology of Music* (Second Edition). San Diego, CA: Academic Press, 1999, 807 pp. ISBN 0-12-213564-4, \$ 129.95 (cloth); ISBN 0-12-213565-2, \$ 69.95 (paper)

When *Psychology of Music* first appeared in 1982, it was quickly recognized as a landmark publication. It heralded the revival of a research area that had lain nearly dormant for several decades and had previously been associated mainly with the name of Carl Seashore. As the cognitive revolution swept through the desert of academic behaviorism, the 1970s saw new stirrings with pioneering work by Diana Deutsch, Jay Dowling, Alf Gabrielsson, Dirk-Jan Povel, Henry Shaffer, and John Sloboda, among others. Deutsch, who probably has done more than anyone to put music psychology back on the map, felt a new wind blowing and assembled a stellar cast of experts for the book that has served researchers and students as an essential reference for 17 years. It would have deserved to be called the *Handbook of Music Psychology*, but unfortunately that name was usurped by another, vastly inferior publication.

So, here is the long-awaited second edition of *Psychology of Music*. It has been in preparation for an exceptionally long time, which makes one apprehensive about the timeliness of the reviews and references. Like its predecessor, it has 18 chapters, but they fill 807 rather than 542 pages – a clear sign of the growth the field has experienced in the last two decades. Ten of the chapters have the same senior author and nine of them the same title as chapters in the first edition, though there are some changes in coauthors and in the order of the chapters. Four additional chapters have titles similar to those of previous chapters but have new authors; they supersede the chapters by Rasch and Plomp (Chapter 5), by the late Paul Fraisse, by Rosner and Meyer, and by Sloboda. Four chapters are entirely new, which means that four earlier contributions (by Sternberg *et al.*, Shepard, Konecni, and Erickson) have not been followed up. Those by Sternberg *et al.* (an original empirical study) and by Shepard were important but fairly unique contributions and could not easily have been updated or replaced. The old chapters by Konecni and by Erickson, while perhaps less significant, do leave gaps behind. The editor, in her unusually brief preface, does not explain why she retained some chapters but replaced or jettisoned others, or why publication was delayed for so long.

The new edition starts out unpromisingly with John Pierce's chapter on "The Nature of Musical Sound". It was undoubtedly a good idea to begin with an introduction to musical acoustics, as the book is meant to serve as a textbook as well as a reference work. However, the chapter is a disappointment. It is vague and rambling like a conversation in a cafeteria. Many crucial terms are left undefined, and there are no illustrations at all. The literature references are dated, the most recent ones being from 1990, and some are parochial in that "informal experiments" and unpublished theses from the author's institution are cited instead of mainstream literature. The writing is often careless. For example, the first section contains a subsection, "A. What is Musical Sound?", that neither answers the question posed in the heading nor is followed by a "B." subsection. The final section is entitled "Descriptions of Musical Sounds" but instead deals with coding and resynthesis. There are numerous errors and misprints ("music concrete" instead of *musique concrète*, "Boesendorf" instead of Bösendorfer, "10" instead of 110 in Table I, to mention only a few). Students or musicians faced with this chapter will be thoroughly confused, while researchers have little to gain from it.

Chapter 2, "Concert Halls: From Magic to Number Theory" by Manfred Schroeder, is ostensibly a sequel to Rasch and Plomp's "The Listener and the Acoustic Environment" in the first edition. However, this is only partially true. Schroeder, an eminent figure in architectural acoustics, focuses almost exclusively on problems of sound transmission and specifically on his own path-breaking contributions, most of which were made several decades ago. The presentation, while authoritative and engaging, is fairly technical and not always easy to follow. There are merely 15 references, 9 of which are to Schroeder's own work, the most recent date being 1986. Only a single study of listener evaluation is described, without a literature reference. Compare this with Rasch and Plomp's admirably lucid chapter of 1982, which listed 37 references and dealt primarily with the listener's response to sound in enclosed spaces. Important as Schroeder's work is, there is no question in my mind that the psychological/musical readership was served better by the old chapter than by the new one, which seems more appropriate for an acoustics textbook. An opportunity was missed here to review more recent work on perceptual and aesthetic aspects of architectural acoustics, a topic of great importance to musicians.

The reader must dig three chapters deep to strike gold at last. Norman Weinberger's review of "Music and the Auditory System" is everything it is supposed to be: clear, accessible, informative, well illustrated, and documented with extensive references to the literature. Weinberger's own interesting research is given due attention but is presented in the context of a rich background that is discussed impartially and insightfully. The author is especially to be commended for taking the title of his chapter seriously and selecting from the large literature on auditory physiology those studies that are most relevant to music perception. As he points out, the neurophysiology of music is not yet a well developed field, but the

methodology has advanced to a point where research of increasing musical relevance may be conducted. Readers who have not kept up with that literature will be astonished by the mounting evidence for effects of attention, learning, and context in the auditory system, which turns out to be much more than the passive conduit it was believed to be not long ago. If there is one drawback, it is that Weinberger's review was completed in 1992 or 1993, as he points out twice in the chapter. (Some references appear to have been updated later, as they reach up to 1996.) This is a very active research area, and important things may have happened in the last 6 years. If so, then this excellent review has been victimized by the long gestation period of this volume.

The fourth chapter, "The Perception of Musical Tones" by Rudolf Rasch and Reinier Plomp, is almost identical with its predecessor in the first edition. A few sentences have been changed here and there, and some formulas and a figure have been deleted. It remains an admirably clear introduction to some basic findings in psychoacoustics and their applicability to music. However, it is sad that it has not been brought up to date. Certainly, there has been much relevant research since. However, the references end in 1979, except for two added items dating from 1984 and 1988, respectively. There is even a reference to "Chapters 8, 9, and 11, this volume" (p. 94), which still refers to the first edition! Clearly, Rasch and Plomp have not gone out of their way to bring their chapter into the 21st century.

Jean-Claude Risset and David Wessel have done a much better job in that regard. Chapter 5, "Exploration of Timbre by Analysis and Synthesis", is a significantly expanded version of its predecessor that fully takes into account recent developments in the very active field of computer sound synthesis. It includes new sections on global synthesis and sampling, as well as updated information on additive synthesis, physical modeling, analysis-synthesis, granular synthesis, wavelets, and the importance of doing justice to "musical prosody". The list of references, previously 4 pages long, has grown to almost 11 pages and covers the literature up to 1996. The writing is clear and authoritative. Although the chapter is mainly about technology, it does touch on timbre perception, music performance, and composition. Since music psychologists should certainly be informed about the state of the art in sound analysis and synthesis, this is a useful chapter that well deserves its place in this collection.

Johan Sundberg's contribution, "The Perception of Singing", has likewise been updated from the first edition, though it has not increased much in length. The references reach up to 1997. The title of the chapter is somewhat misleading; "The Acoustics and Perception of Operatic Singing" would have been more accurate, as much of the research concerns acoustic analysis, and there is no discussion of popular and non-Western styles of singing. Sundberg's writing is clear and informative and only occasionally marred by a slightly unidiomatic use of English, mainly in the newly added paragraphs. On page 174, there is a misprint: The highest pitch in the soprano range is given as "1400 Hz (C<sub>6</sub>)", which should

be “1046 Hz ( $C_6$ )”. The findings reported often seem somewhat preliminary and in need of replication; for example, at one point (as already in 1982) Sundberg is attempting to draw conclusions from a comparison between his own data from 1977 and Stumpf’s results obtained half a century earlier. Several issues described as not yet investigated in 1982 are still so described. Sundberg remains the only researcher who has been really productive in this area, but clearly he cannot do everything by himself. At the same time, he is much less self-centered than Schroeder in Chapter 2 and gives a good overview of work by others.

“Intervals, Scales, and Tuning” by Edward Burns succeeds a first-edition chapter coauthored by Dixon Ward, who passed away in 1997. The new version is dedicated to Ward’s memory. It has been substantially expanded and rewritten, though parts of the earlier version survive. The most substantial additions are in the section on musical interval perception, where Burns discusses discrimination paradigms and categorical perception in considerable detail. The other major section, on natural intervals and scales, also contains much new information. The most recent reference is from 1995. Burns’ literature review shows a keen eye for methodology and includes appropriate critical comments on some studies. There is even an occasional touch of humor. I noted a few minor flaws: The word “continua” is consistently (10 times) misspelled as “continuaa”. The penultimate entry in the last column of Table I (copied from the first edition) should be 1100, not 1180. Table II appears 8 pages after it is first mentioned. Figure 1 contains four large panels, where a single panel would have sufficed. The second mention of “roving discrimination” in the middle of page 231 should read “identification”. However, this is an excellent and informative chapter.

The same can be said about Dixon Ward’s “Absolute Pitch”, which had previously been coauthored by Burns. Although large sections of the previous version survive, additional studies up to 1995 are covered. Several new sections have been added: on white versus black notes, neurological correlates, “absolute tonality”, and auralization. In addition to recent work by Miyazaki, Levitin, and others, Ward relates some informal experiments he conducted on himself and his daughters. Only the final paragraph remains puzzling. In the first edition, it had seemed like a joke to me. Now the last two sentences, containing the punch line, have been deleted (by the author or the editor?), so that the intention is even less clear. Certainly, the results cited ( $N = 3$ ) do not warrant the sweeping conclusion that “mentally retarded teenagers apparently have AP” (p. 293). On page 270, line 15 from bottom, “pitch tone” should read “pitch alone”. On page 278, line 9, some text has been inadvertently omitted; it should read “so one category *was lost, as it were*, in the process...” (restored text, in italics, from the first edition).

The next two chapters are both by the editor, Diana Deutsch. Chapter 9, “Grouping Mechanisms in Music”, although succeeding a previous chapter with the same title, has been greatly expanded and extensively rewritten. It provides an excellent review of grouping phenomena, written with great lucidity and illustrated with many figures. Not surprisingly, Deutsch’s own well-known work on auditory

illusions occupies a prominent place. Although Bregman's research and book are referenced, the now commonly used term *auditory scene analysis* is nowhere mentioned. The heading "III. Larger Scale Groupings" is followed by only two paragraphs of text, though it was presumably intended to be a superordinate heading for the second half of the chapter. In the music example of Figure 15, two accidentals (e-sharp and f-natural on the second staff) are missing. Figure 23 is hard to understand. However, these are minor failings of a superb chapter overall.

Chapter 10, "The Processing of Pitch Combinations", is almost in the same class. Again, it represents an expanded and largely reworded version of its predecessor in the first edition. It relies heavily on Deutsch's own research, perhaps too heavily in places, although the work has been pathbreaking in many ways. I find the detailed treatment of the hierarchical encoding formalisms of Deutsch and Feroe tedious, and the discussion of the "tritone paradox" (pp. 387-390) controversial. Since Deutsch herself has not published any serious follow-up research on this topic since 1994, her claims about "linguistic" or "geographic" correlates of the tritone paradox still await replication and further clarification. Another minor flaw in the chapter is that the graphs in Figures 12 and 13 are not properly aligned with the music examples. Apparently taking advantage of her position as editor, Deutsch has included some very recent references (up to 1998) but conveniently has overlooked some articles that are critical of her interpretation of the tritone paradox.

Chapter 11, "Neural Nets, Temporal Composites, and Tonality", by Jamshed Bharucha, is one of the new chapters in the second edition. It is quite concise and written in tutorial style with the exceptional clarity one has come to expect from its author. Technical details are avoided, so that this chapter would make an excellent basic introduction for students. Topics treated include frequency tuning of neurons, feature detectors, activation, vector spaces, composite patterns, temporal patterns, self-organization, auto-association, and sequence learning. The most recent references date from 1993, in stark contrast to Deutsch's chapters.

Another new contribution is Eugene Narmour's Chapter 12, "Hierarchical Expectation and Musical Style". Although the topic seems related to Rosner and Meyer's chapter in the first edition, its content is very different. Rosner and Meyer discussed melodic archetypes and presented an empirical study of melody classification. Narmour's approach is decidedly nonempirical and based on his implication-realization model of melodic structure. Although he briefly refers to psychological research inspired by his model, he does not review it. Instead, he presents a detailed hierarchical analysis of variants of a simple melody, which is instructive and well illustrated with graphs but remains an exercise in music theory. Narmour accurately characterizes his goal as "schematiz[ing] what an overall cognitive system for the stylistic processing of a set of melodies might look like" (p. 457). However, it is the cognitive system of an ideal listener; questions of real-time processing, learning, attention, and memory in real listeners are not considered. Narmour also assumes his cognitive system to be infinitely flexible, rather than tending towards an asymptotic state as a result of cumulative experience.

(The relevant statements occur in a section entitled “Archetypes” that never mentions archetypes.) A speculative section on a “neuronal representation” of the system seems to me more a suggestion for how it might be implemented in a computer. While Narmour’s model falls short of being a psychological theory, it is a good example of psychologically relevant music theory. However, its inclusion in this book could have been motivated more convincingly by embedding it in a more general discussion of the relationship between music theory and music psychology, and by reviewing relevant empirical studies.

Chapter 13, “Rhythm and Timing in Music” by Eric F. Clarke, starts out with a gracious acknowledgment of Paul Fraise’s contributions, which Fraise himself had summarized so well in his first edition chapter. Clarke goes on to discuss more recent work on form perception, rhythm perception, and the perception and performance of timing. References end in 1996. This is one of the shorter chapters in the book and the literature review is selective, but Clarke’s characteristic lucidity and insight make him a worthy successor to Fraise.

At 102 pages, 23 of which are taken up by references, Alf Gabrielsson’s Chapter 14, “The Performance of Music”, is the longest in the book. It provides a wide-ranging review of the psychological literature on music performance and thus goes far beyond the relatively short chapter by John Sloboda in the first edition. Major topics considered are performance planning, sight-reading, improvisation, feedback, motor processes, performance measurement (the largest section by far, and one of Gabrielsson’s own specialties), modelling of expression, physical factors, psychological and social factors, and performance evaluation. In an early footnote, Gabrielsson pointedly notes that his chapter was completed in 1995; a few more recent references are mentioned in additional footnotes. The writing style is a bit dry at times, and details can be overwhelming. Only specialists in performance research and intrepid novices will want to read this chapter from beginning to end. However, it provides a valuable resource of references to sometimes obscure literature. One somewhat frustrating aspect is that the research reviewed often does not yield consistent results, as Gabrielsson notes again and again. The only simple message to take home from this long chapter is that music performance is exceedingly complex. Perhaps appropriately, the chapter ends abruptly without any general conclusions.

Jay Dowling’s Chapter 15, “The Development of Music Perception and Cognition”, is far less comprehensive than Gabrielsson’s review but wonderfully clear and accessible. It is substantially different from the 1982 version, with a greater emphasis on development. The three major sections deal with infancy, childhood, and adulthood, respectively, though the last one is very brief. References reach up to 1998. Students will love this chapter; researchers will admire Dowling’s ability to be simple and to the point.

In Chapter 16, Rosamund Shuter-Dyson presents an updated and expanded version of her earlier chapter on “Musical Ability”. Unfortunately, her writing is less engaging than Dowling’s and that of most other authors in this volume. The content is mostly a rather dry concatenation of findings of the sort “X found...,

Y reported..., Z concluded...". Many paragraphs start out with references, index card fashion. While there is useful information in this chapter, it does not make exciting reading.

Chapter 17, "Neurological Aspects of Music Perception and Performance", by Oscar Marin and David Perry, is in a different class altogether. It presents a superbly informed and articulate review of the burgeoning neuropsychological research, with extensive references reaching up to 1998. (I continue to wonder why some authors were given, or decided to take, the opportunity to bring their chapters up to date, whereas others did not.) The rapid progress of this field can be gauged by the fact that Marin's 1982 chapter had 20 pages of text and 4 pages of references, whereas the new chapter has 60 pages of text and 12 pages of references. The major topics reviewed are amusia and its relation to aphasia, auditory agnosias and verbal deafness, problems of classification, hemispheric asymmetry as revealed by unilateral brain damage, PET studies, hemisphere anesthetization, and dichotic or monaural listening. The last three sections provide critical and integrative perspectives on progress in the field and on music perception as a skill. The writing is consistently lucid, authoritative, and insightful. This chapter is surely one of the finest achievements in this volume and can be highly recommended as both an entry point to the field and as a resource.

Alas, there is a precipitous fall from these lofty heights in the last chapter, "Comparative Music Perception and Cognition" by Edward Carterette and Roger Kendall. This rather long review, new to the present volume, deals with a very important topic in a less than adequate way. The organization is poor and the writing style rambling, to say the least. These problems are pervasive. They begin with the inappropriate title of the chapter, which should have been "Comparative *Studies of Music Perception and Cognition*". Even though the authors make some good points and cite much arcane literature, the information is presented with an almost total disregard for the reader, and diverse topics sometimes follow each other in an order that amounts to free association. For example, a short section entitled "Perception of tonality by the monkey" mentions monkeys, rats, humans, parakeets, raccoons, elephants, and mice in rapid succession, quite apart from the fact that tonality is not even at issue here, but rather the perception of tonal patterns. Technical terms are often introduced without definition, as if to impress the unsuspecting reader, and while too much detail is provided in some places, too little is provided in others. For example, Figure 1 (comparing Western and Balinese scales) contains more information than is needed at that point in the text; but a few pages later, when South Asian scales are discussed, it is not even referred to. Figure 6 (probe tone rating profiles for 10 Indian *rags*) is presented without any explanation. In several places, the topics overlap with those of other chapters, but there are no cross-references (something the editor should have seen to). Occasionally critical remarks about others appear without clear justification, and several times the authors indulge in citing obscure pronouncements from their own earlier articles. Statements are sometimes inaccurate, as on page 754, where Japanese

is called a tone language. This is a frustrating chapter to read, even though it contains much valuable information.

In summary, there are two basic criteria that should be met by chapters in an edited book, and they are quality and relevance. In terms of quality, two chapters (Pierce; Carterette and Kendall) fall short of the high standards established by most other chapters and by the previous edition of Deutsch's book, and a third one (Shuter-Dyson) is at the borderline. In terms of relevance, two chapters (Schröder; Narmour), though of excellent quality, are not really about the psychology of music and should have made more explicit connections with psychological issues (as the similarly peripheral chapters by Risset and Wessel and Bharucha do with considerable success). A third chapter (Rasch and Plomp) seems anachronistic because it has hardly changed from the first edition. The remaining 12 chapters are the real meat of the book. Among them are some that are more of a tutorial nature and thus seem particularly well suited for students or teaching purposes (both Deutsch chapters; Bharucha; Dowling), whereas others present sophisticated reviews and discussions that will be especially useful to active researchers (Weinberger; Burns; Risset and Wessel; Gabrielsson; Marin and Perry), and the remaining ones (Sundberg; Ward; Clarke) fall somewhere in between.

The chapters cover a wide range of topics, but there are some neglected areas. For example, little is said about the psychological issues raised by 20th century Western art music and popular music, about the social psychology of music, about music therapy, about music and emotion, or about motor control in playing instruments. Some important authors whose work could have been given more attention include Irène Deliège (structural processing), Carol Krumhansl (pitch and tonality), and Sandra Trehub (infant perception).

The book has been carefully produced, and there are relatively few misprints or other mistakes, some of which I noted above. However, the absence of an author index is regrettable. Cross-references among chapters are extremely rare, and there is little evidence of a strong editorial hand. I have already pointed out the long gestation period of this volume and the somewhat uneven updating opportunities given (or taken) by various authors. Nevertheless, this is an extremely important collection of review articles that will serve as an essential reference and textbook for years to come<sup>1</sup>.

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