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JOHN A. SLOBODA, *THE MUSICAL MIND:
THE COGNITIVE PSYCHOLOGY OF MUSIC*
(Clarendon Press, 1985)

ELIZABETH WEST MARVIN

John A. Sloboda states in his preface to *The Musical Mind: The Cognitive Psychology of Music* that his purpose is to bridge the gap between psychological research and the needs of musicians. To a great extent, the author succeeds in this mission. The book is a well-written introduction to the field Sloboda prefers to call "psychomusicology"; it avoids the undefined technical terms that make reading in a field other than one's own daunting, and addresses many issues of interest to performing musicians and music theorists alike. To the author's credit, the *The Musical Mind* abounds with suggestions for further reading and contains an excellent bibliography. Sloboda, a lecturer in psychology at the University of Keele, is also a pianist, choir director, and composer; thus his knowledge and experience as both psychologist and musician serve him in good stead as he attempts to bridge the two fields.

The author's work stands apart from much of the psychological mainstream due to his focus on such musical skills as performance and composition. To use his words, "I address myself to the real-life behaviour of musicians, rather than to their behaviour in artificially constricted laboratory situations. I try to give as much prominence to output skill (e.g., performing) and higher cognitive functioning (e.g., composition) as I do to input skill (e.g., listening)" (p. 9). Thus, although one of his stated aims is to describe the main achievements in the field since circa 1982, his book differs markedly in content, organization, and tone from other overviews, such as Deutch's *Psychology of Music* or Dowling and Harwood's *Music Cognition*,¹ which devote more attention to the ways in which listeners structure musical input. Unfortunately, those sections of Sloboda's book that deal with output skills, particularly composition and improvisation, are by far the weakest. The ad hoc methodology of these chapters and the lack of clear-cut conclusions make them less useful to music theorists and pedagogues than their subject matter promises.

Each chapter of *The Musical Mind* can stand alone to some extent, since each explores a different facet of the field. If there is one unifying factor, it is the systematic examination, in diverse contexts, of the abstract mental

representation of musical structure. Chapter 1 ("Music as a Cognitive Skill") defines cognition in terms of the internal representation of music. Chapter 2 ("Music, Language, and Meaning") is a detailed comparison of the structure of music and language; further, it examines the implications of this structure for memory of verbal and musical content. Chapter 3 ("The Performance of Music") discusses ways in which abstract structures govern aspects of skilled performance. Chapter 4 ("Composition and Improvisation") explores the composer's or improviser's ability to work out small details within the context of large-scale structure. Chapter 5 ("Listening to Music") discusses the aural perception of musical structure and posits possible internal representations by which this structure is retained in memory. Chapter 6 ("Musical Learning and Development") is an examination of the learning process involved in acquiring the mental structures used to represent music. Finally, Chapter 7 ("The Musical Mind in Context: Culture and Biology") relates the cognitive principles of Western music to those underlying music of other cultures and to human physiology.

Among these diverse chapters, three relate closely to the concerns of those who teach music theory. The first of these, the chapter entitled "Music, Language, and Meaning," parallels Chomsky's deep structures with Schenker's *Ursatz*. Although he makes some apt comparisons, Sloboda's discussion of Schenker's ideas is extremely superficial and the sources he cites are not well chosen. According to the author, "a difficulty with approaching the work of Schenker is that good English translations of all his major writings are not yet available. The major English-speaking musicologists to employ Schenkerian concepts are Salzer (1952) and Forte (1962)." Why he chooses Salzer's *Structural Hearing* and Forte's *Tonal Harmony in Concept and Practice*,² over Schenker's *Harmony, Free Composition*, and *Five Graphic Analyses* or Oswald Jonas's *Introduction to the Theory of Heinrich Schenker*³—all available in English translation at the time of Sloboda's publication—is a mystery. Further, why he chooses to cite Forte (1962) rather than Forte and Gilbert's *Introduction to Schenkerian Analysis*⁴ (1982) is also unclear, unless he is simply unaware of these resources. Most curious is the author's attempt at several points in the book to link Schenker's theories with Leonard Meyer's work. Sloboda describes the dominant (in the bass arpeggiation of the *Ursatz*), for example, as the tension-inducing element that

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...operates by attempting to set up a 'rival' triad. In the final chord of the *Ursatz* we witness the 'defeat' of this rival system. Let us, then, hypothesize that one appropriate 'deep' universal for musical thought is to be summarized in the phrases 'creation and resolution of motivated tension'. This notion has a family resemblance to the 'implicative' theory of L.B. Meyer... (p. 22).

To Sloboda's credit, however, is his awareness of Schenker's ideas and their importance in relation to music cognition. All too often, it is Piston⁵ who is cited by psychologists as their primary source of information about tonal harmony, leading to an extremely vertical rather than linear understanding of harmony. This may contribute to experimental designs that seem flawed from a musicians' perspective, such as those that test relationships among triads in a key with little consideration of the way those triads function in musical contexts or of voice-leading patterns that might lead listeners to hear the same triad as a stable goal in one context and a passing harmony in another.

Following the Chomsky-Schenker discussion, Sloboda discusses other parallels between language and music. For any teacher who has compared phrase structure or cadence types to punctuation, subordinate harmonic progressions to subordinate clauses, etc. this discussion may prove to be of interest. Certainly an engaging classroom discussion could be built around the parallels Sloboda suggests. He notes, for example, that both language and music are capable of generating an unlimited number of novel sequences; that both may be seen as comprising phonology, syntax, and semantics; that children have natural ability to deduce rules of language and music simply from exposure to examples; and that, although the forms taken by natural language and music differ across cultures, some universal features may be cross-cultural. His discussion of the phonology, syntax, and semantics of music is largely a report on current experimentation in perception of absolute pitch frequency and duration (phonology), of underlying musical structure and experimentally derived grammars (syntax), and of musical meaning (semantics). The discussion is flawed, however, by omission of some important publications. In his examination of musical syntax, Sloboda discusses at length the generative grammar developed by Sundberg and Lindblom (1976)⁶ for a group of nineteenth-century Swedish nursery tunes. He describes in general terms Lerdahl and

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Jackendoff's important contributions to this field, but notes that their generative theory of tonal music⁷ was published too recently for inclusion in this book. Yet the fruits of Lerdahl and Jackendoff's collaboration have been in print since 1977, with a series of articles published since then,⁸ providing a wealth of information upon which Sloboda could have drawn. Further, considering the author's interest in cross-cultural universals, an examination of Becker and Becker's⁹ 1979 grammar for the musical genre *srepegan* might have been in order. Finally, this chapter's discussion of scale degree and key relationships neglects the work of Krumhansl and her colleagues,¹⁰ while the rhythm portion contains mostly the author's own speculations with very little support from the wealth of experimental data that exists on rhythmic perception.¹¹ Although Sloboda states at the outset that he cannot hope to provide a complete survey of all publications in the field, his choices sometimes leave key areas untouched and important ideas unsupported.

The fifth chapter, "Listening to Music," opens with a number of apt cautionary remarks about problems with current experimental research.¹² Sloboda is concerned that this flourishing area of music psychology seems to be "characterized by a relative insensitivity to the problems of relating research findings to normal music listening" (p. 153). In this regard, he notes that testing perception of small relationships may not tell us much about higher cognitive processing. Further, testing with novel musical materials tells us little about how perception changes over time with repeated exposure to a given musical passage. Sloboda concludes these remarks with a warning about the possible "halo effect" that surrounds the research of certain experimenters and the scientific paradigms that they posit:

A paradigm is signalled by the existence of a set of agreed research problems, a methodology capable of solving them and generating new, but similar, problems, and a group of scientists who interact around these problems. When, as often happens, such a group 'captures' prestigious communication channels, in journals and elsewhere, generating a continuous series of co-ordinated and logically connected research articles, it is tempting to accord the research a significance which is not necessarily justified by its long-term achievements. The history of psychology is littered with forgotten paradigms (p. 153).

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The remainder of this chapter on music listening deals with grouping mechanisms, attention, and memory, and serves for the most part as a good overview of current work in these areas. Those involved in aural-skills instruction may find some direct implications for teaching among these experimental results. For example, Sloboda speaks of "focal listening," that is, the listener's ability to attend selectively to certain aspects of musical input. He hypothesizes, with some experimental support,¹³ that listeners can only hear one line at a time in counterpoint; that they can choose to attend to one or the other, or may alternate between the two. He believes that the other voice or voices are heard as harmonization; thus, when an error is placed in some voice other than that which is being attended to, listeners can tell something is wrong in the "background harmony" but cannot identify in which voice it occurred. In his discussion of musical memory, the author weighs the advantages and disadvantages of perfect pitch, and cites some experimental evidence that perfect pitch can be taught. Generally, however, listeners do not rely on retention in memory of exact pitch information, but on memory of scale type and contour. (For this reason subjects often confuse fugue subjects with their tonal answers, since, in spite of one or more intervallic change, their contours and scale type are identical.) Sloboda discusses a number of experiments in which subjects are asked to identify alterations of musical materials given first in one key, then presented with alterations in another.¹⁴ From these, various conclusions about the representation of scale-step information in memory are drawn. For example, experimentation has shown that subjects are able to identify alterations far more easily in diatonic tonal contexts than non-diatonic or non-tonal contexts; in these latter contexts, listeners make their determinations from contour information alone, rather than from scale-step or interval information. One experiment¹⁵ asked listeners to identify contour and pitch changes upon diatonic tonal melodies of varying lengths, and discovered that listeners were most successful identifying contour changes in shorter melodies, but pitch changes in longer melodies. From this result, the author concludes that listeners retain and use contour information only until the tonal context becomes clear; as melody length increases, scale step information becomes increasingly important. Finally, Sloboda discusses a group of experiments which show that memory for melodies with internal hierarchical patterning is better than memory for those without.¹⁶ The implications of these studies for music theory pedagogy are clear. Psychological research generally supports a pedagogy based on scale-degree information rather than absolute-pitch frequency (moveable-do rather than fixed-do). These studies further show that most listeners perceive music by recognizing musical patterns and relationships among repeated or transformed patterns. Thus, it is the task of the theory pedagogy to give

students a repertoire of common patterns—arpeggiated triad, ornamentation by neighbor tone, melodic sequence, half cadence, 3-2-1 descent, etc.—from which they may draw in forming mental representations of music as it is heard.

Although Sloboda's sixth chapter, "Musical Learning and Development," promises much of interest to instructors of music theory, it focuses mainly on musical development in early childhood.¹⁷ The two portions of this chapter most applicable to collegiate teaching are his general discussion of skill acquisition and his evaluation of tests of musical ability. As most teachers intuitively know, but Sloboda explicitly states, skills development involves: 1) acquiring habits that are automatic, with little or no mental activity involved; 2) passing from factual knowledge to procedural knowledge (from knowing that, to knowing how); and 3) setting realistic goals for achievement. He also specifies three general conditions for successful skill acquisition: motivation, repetition, and feedback. The chapter concludes with a section on musical ability assessment. Sloboda notes that there are 24 tests of musical ability documented in recent literature;¹⁸ but his discussion focuses on the Wing and Seashore tests. Because some of the tasks required in the Seashore test—like discrimination between degrees of loudness and microtonal frequency—seem little related to musical success, Sloboda concludes that the Wing test is to be preferred to the Seashore, although both tests are somewhat dated and need reworking.

Finally, Sloboda's "output" discussions of musical performance, composition, and improvisation are of uneven calibre and usefulness. In Chapter 2, the performance chapter, the author describes a number of experiments on sight reading that may have important implications for teachers of applied music. He considers the mental structures and techniques that facilitate good sight reading and memorization, discusses the issue of performers who unconsciously "correct" errors in the score while sight reading, and hypothesizes a procedure by which performers make expressive decisions. On the other hand, Chapter 6, on musical learning, contains a lengthy and tedious discussion of the method by which a pianist (Sloboda himself) learns to play clarinet. This type of ad hoc "procedural" self-study appears also in Chapter 4, on composition. Here, the author, details at great length his thought process in composing a choral composition. For example, he asks himself

How am I to continue at bar 29? The next verse is going to be quieter and slower. A theme is needed for 'From all eternity'. The tentative one where composition broke down before didn't seem right. . . . I decide to progress the accompaniment so that it slows down. It occurs to me that the word 'eternity' can be represented by a circular motif. . . . Now I leave the accompaniment and return to the voices. . . . (pp. 126-127)

He continues in this vein for some thirteen pages, complete with numerous musical examples. (All examples are, incidentally, reproduced in the author's manuscript without benefit of straight-edge; thus they are unattractive and often difficult to read.) In sum, these "output" sections completely lose the sense of scholarly investigation that so consistently characterize the other chapters. Likewise, Sloboda's final chapter seems not to be an objective overview of the literature on culture and biology, but rather primarily a vehicle for the author's own philosophical musings on the relation of music notation to cognition, on possible cross-cultural musical universals, music and evolution, and the role of music in society.

To summarize, *The Musical Mind* is a good general introduction to the cognitive psychology of music. To Sloboda's credit, the book covers a broad spectrum of issues within the field and, where it cannot hope to give a complete overview, refers the interested reader to other sources for additional reading. Further, the author does not merely summarize work in the field, but provides a critical view, and repeatedly suggests avenues for future experimentation and research. Although he does not directly address the issue of music theory pedagogy, the conclusions that may be drawn from experiments reported here certainly have implications for those who teach theory. The book's primary weakness is the lack of sophistication with which it sometimes approaches music-theoretical concepts. In addition, the author's knowledge of current publications and developments in the field of music theory lags far behind his awareness of current psychological research. Sloboda, like others in his field, would profit from more direct collaboration with music theorists, and as a result both fields would be enriched.

NOTES

¹Diana Deutsch, ed., *Psychology of Music* (New York: Academic Press, 1982); W. Jay Dowling and Dane L. Harwood, *Music Cognition* (New York: Academic Press, 1986).

²Felix Salzer, *Structural Hearing* (New York: Charles Boni, 1952); Allen Forte, *Tonal Harmony in Theory and Practice* (NY: Holt Rinehart and Winson, 1962).

³Heinrich Schenker, *Harmony*, ed. by Oswald Jonas, trans. by Elisabeth Mann Borgese (Cambridge: MIT Press, 1954), paperback reprint, 1973; *Free Composition*, trans. Ernst Oster (NY: Longman Inc., 1979); *Five Graphic Music Analyses* (NY: Dover Publications, Inc., 1969); and Oswald Jonas, *Introduction to the Theory of Heinrich Schenker*, ed. and trans. John Rothgeb (NY: Longman Inc., 1982). Sloboda does indeed cite Schenker's *Free Composition* in his bibliography, but fails to mention this important source in the discussion cited here.

⁴Allen Forte and Steven E. Gilbert, *Introduction to Schenkerian Analysis* (NY: W.W. Norton and Co., 1982).

⁵Walter Piston, *Harmony*, 4th ed., rev. and enl. by Mark DeVoto (NY: W. W. Norton, 1978).

⁶J. Sundberg and B. Lindblom, "Generative Theories in Language and Music Descriptions," *Cognition* 4 (1976), pp. 99-122.

⁷Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (Cambridge: MIT Press, 1983).

⁸Fred Lerdahl and Ray Jackendoff, "Toward a Formal Theory of Tonal Music," *Journal of Music Theory* 21/1 (1977), pp. 111-171; "On the Theory of Grouping and Meter," *The Musical Quarterly* 67/4 (1981), pp. 479-506; Ray Jackendoff and Fred Lerdahl, "Discovery Procedures vs. Rules of Musical Grammar in a Generative Music Theory," *Perspectives of New Music* 18/2 (1980), pp. 503-510; "Generative Music Theory and its Relation to Psychology," *Journal of Music Theory* 25/1 (1981), pp. 45-90.

⁹Judith Becker and Alton Becker, "A Grammar of the Musical Genre *Srepegan*," *Journal of Music Theory* 23/1 (1979), pp. 1-44.

¹⁰ Carol L. Krumhansl, "The Psychological Representation of Musical Pitch in a Tonal Context," *Cognitive Psychology* 11 (1979), pp. 346-374; C. L. Krumhansl and F. C. Keil, "Acquisition of the Hierarchy of Tonal Functions in Music," *Memory & Cognition* 10 (1982), pp. 243-251; C. L. Krumhansl and R. N. Shepard, "Quantification of the Hierarchy of Tonal Functions within a Diatonic Context," *Journal of Experimental Psychology: Human Perception & Performance* 5 (1979), pp. 579-594.

¹¹ See, for example, Eric F. Clarke, "Structure and Expression in Rhythmic Performance," in *Musical Structure and Cognition*, eds. Peter Howell, Ian Cross, and Robert West (London: Academic Press, 1985), pp. 209-236; Peter J. Essens and Dirk-Jan Povel, "Metrical and Nonmetrical Representations of Temporal Patterns," *Perception & Psychophysics* 37/1 (1985), pp. 1-7 and "Perception of Temporal Patterns," *Music Perception* 2/4 (1985), pp. 411-440; and Jeffery J. Summers, Simon R. Hawkins, and Helen Mayers, "Imitation and Production of Interval Ratios," *Perception & Psychophysics* 39/6 (1986), pp. 437-444.

¹² Other recent critiques of experimental research methods may be found in Edwin Hantz's "Studies in Musical Cognition: Comments from a Music Theorist," *Music Perception* 2/2 (1984), pp. 245-264; and Mary Louise Serafine's *Music as Cognition: The Development of Thought in Sound* (New York: Columbia University Press, 1988), particularly pp. 52 and following.

¹³ John A. Sloboda and Judy Edworthy, "Attending to Two Melodies at Once: The Effect of Key Relatedness," *Psychology of Music* 9 (1981), pp. 39-43.

¹⁴ Among these are L. L. Cuddy, A. J. Cohen, and J. Miller, "Melody Recognition: The Experimental Application of Musical Rules," *Canadian Journal of Psychology* 33 (1979), pp. 148-157; W. J. Dowling, "Scale and Contour: Two Components of a Theory of Memory for Melodies," *Psychological Review* 85 (1978), pp. 341-354; W. J. Dowling and J. C. Bartlett, "The Importance of Interval Information in Long-Term Memory for Melodies," *Psychomusicology* 1 (1981), pp. 30-49; and J. Edworthy, "Towards a Pitch-Contour Continuum Theory of Memory for Melodies, in *Acquisition of Symbolic Skills*, ed. by D. Rogers and J. A. Sloboda (NY: Plenum, 1983).

¹⁵ Edworthy (1983) cited above.

¹⁶ See Diana Deutsch, "The Processing of Structured and Unstructured Tonal Sequences," *Perception & Psychophysics* 28 (1980), pp. 381-389; D. Deutsch and J. Feroe, "The Internal Representation of Pitch Sequences in Tonal Music," *Psychological Review* 86 (1981), pp. 503-522.

¹⁷It is surprising that Sloboda neglects the work of Mary Louise Serafine in his discussion of the application of Piaget's theories to the realm of music. See, for example, her "A Measure of Meter Conservation in Music, Based on Piaget's Theory," in *Genetic Psychology Monographs* 99 (1979), pp. 185-229.

¹⁸Sloboda refers the reader to Shuter-Dyson and Gabriel's *The Psychology of Musical Ability*, 2nd ed. (London: Methuen, 1981) for a comprehensive description and discussion of these tests.