Book Review

The Improvising Mind: Cognition and Creativity in the Musical Moment

Aaron L. Berkowitz
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Reviewed by Howard Spring

Over the last 20 years or so there has been an explosion of research on improvisation. The Improvisation, Community, and Social Practice (ICASP) website (<http://www.improvcommunity.ca/>) is a good indicator of this development as are the many publications on the subject, such as two volumes of essays on improvisation edited by Bruno Nettl and the substantial work on jazz improvisation by Paul Berliner, to name just a few. Almost at the same time, research on the brain and its relationship to music has grown at a startling rate. The former occurred because of the growth of ethnomusicology and research in jazz and popular music that began in the 1960s. Many, if not most of the musics studied by researchers in these disciplines contain a substantial amount of improvisation. To understand these musical practices, scholars had to grapple with what improvisation is, how it works, and what it means. The near simultaneous growth of research on music and the brain accelerated due to the development of fMRI (functional magnetic resonance imaging) during the 1990s. This technology allowed neuroscientists to see which parts of the brain were being used during various activities by tracing the blood flow in the brain, assuming that blood flow followed neural activity.

Professor Aaron Berkowitz, the author of *The Improvising Mind*, is in a uniquely advantageous position to bring together research in both areas. His academic career started with both a B.A. in music and a B.S. in biology. He went on to get his M.D. from Johns Hopkins and Ph.D. in musicology from Harvard. Published in professional academic journals in both fields, Berkowitz is also a composer and pianist, a fact that looms large in his approach to the study of improvisation, for better or worse, as will be discussed below.

The book is divided into two main parts. After an introductory chapter, the first part of the book (chapters two to five) is devoted to pedagogy and learning, the second (chapters six to nine) to the neuro-cognition of improvised performance in music. Berkowitz spends as much time on the learning and teaching of improvising as he does on the practice itself.

He starts by developing a definition of improvisation and introducing what we think we know about the cognition of improvisation in terms of learning and memory. He then goes on to compare music and language. In chapters two and three he discusses European pedagogical treatises from the 18th and 19th centuries that deal with improvisation. Berkowitz assesses them as to their claims about prerequisites for learning to improvise and their pedagogical strategies. He also begins to discuss some of the relevant cognitive processes that relate to these strategies. The description of improvisation based on interviews with two concert pianists, Robert Levin and Malcolm Bilson, is the focus of chapter four. Scattered throughout chapters two, three and four, are references to the ethnomusicological literature, which, according to Berkowitz, contains cross-cultural descriptions of improvisation that share similarities with those of Levin and Bilson. In chapter five, he examines similarities and differences between music and speech in terms of what is learned and how this knowledge is acquired.

Starting with chapter six Berkowitz addresses the question of how the knowledge base and procedural skills required for improvisation are used in performance, drawing mostly on the Bilson and Levin interviews. In chapter seven he discusses the results of the fMRI research he and others have done that provide insight into the neurological basis of improvisational experiences described by musicians. He returns in the last chapter to the complex relationship between choice and constraint, which he introduced at the beginning of the book. He defines improvisation as “spontaneous creativity within constraint”—constraints of musical style and physical and psychological limitations on performance (1). As with language, musical improvisation can create an unlimited number of iterations within the confines of a limited vocabulary and set of rules. Berkowitz argues that, indeed, without these constraints, improvisation would be impossible.

Professor Berkowitz aims to answer three questions:

1. What knowledge is required? (What are the elements? What are the processes?)

2. How is this knowledge acquired and internalized? (How does one learn to improvise?)

3. How is it used in improvised performance?

In order to answer these questions he uses a relatively broad range of sources that draw from a number of different disciplines. This interdisciplinary approach, although not completely evenhanded, is one of the strengths of the book. His methods and sources include those from historical musicology, the theoretical analysis of Western art music's improvisatory practices, and jazz and ethnomusicological studies of improvisational practices including those of India, Indonesia, Africa and the Arab world. Even though Berkowitz refers to the literature on the pedagogy and practice of improvisation in various areas of the world, most of his discussion depends on Western art music sources. As noted earlier, he refers to historical treatises on the teaching of musical improvisation from the 18th and 19th centuries (including those by C.P.E. Bach and Czerny among others); he relies on interviews with classical pianists Robert Levin and Malcolm Bilson; and he devotes an entire chapter to analyzing cadenzas, a mainstay of improvisation in Western concert music. This emphasis on Western concert music is not surprising given his background as a "classical" pianist and composer.

In discussing the neuroscientific research he aptly points out that much of the literature on music and the brain has focused on the perception of music and less on the production of music. Here Berkowitz breaks new ground by advancing our understanding of the role of the brain in the production of music by focusing on connections between how musicians from various cultures describe improvisation and the workings of the brain as shown in fMRI studies.

The problematic and well-trodden comparison between music and language is also studied in some detail. In particular he compares improvisation to speech. In so doing he goes over the two major theories about speech acquisition. One the one hand is Chomsky's nativist approach, which posits an innate genetically determined language faculty. On the other hand is the empiricist approach to language acquisition in which language is learned through general learning processes to form sensory-motor schemas based on exemplars and patterns rather than on abstract rules. Berkowitz comes down on the side of the latter cognitive-functional usage-based theory when it comes to learning to improvise.

As Leo Treitler and others have pointed out in the past, and as Berkowitz re-emphasizes here, the essential element common to all improvisation is the need for rapid, real-time thought and action. How is the improviser's knowledge base and procedural skill organized in such a way as to be immediately available in performance? Berkowitz's answer is at the heart of the book. He describes how improvisers internalize and automatize basic musical formulae appropriate to a style, the procedures for their transformation including abstraction of their underlying principles through analogy and inference, and their stylistically acceptable recombinations and pathways. The improviser must also have an internalized knowledge of the underlying structure of what is being performed.

In addition to explicit formal learning through teachers and written instructions of various kinds, learning and remembering elements of the knowledge base and procedures of improvisation are often accomplished unconsciously through implicit "statistical" learning facilitated by listening and practicing in a particular style. The necessity of both implicit, unconscious knowledge, memory and learning, and explicit, conscious knowledge, memory and learning is central to Berkowitz's discussion of improvisation. He is quick to point out that implicit learning and knowledge is not completely distinct from explicit learning and knowledge when it comes to improvisation. Rather, they are in a dialogue. Implicit psychological processing, including automatization, frees up other parts of the brain for broader level decisions in the heat of performance. If every detail had to be a conscious decision, improvisation could not occur. In addition, the relationship between implicit and explicit knowledge and memory, that is, the dialogue between the "knowledge of" (procedural knowledge) and the "knowledge that" (declarative knowledge) account for the paradox of being both creator of, and witness to the act of improvisation described by many of the musicians and studies quoted by Berkowitz. We instigate musical action consciously but at some level the implicit procedural, often body-based knowledge, takes over, resulting in the feeling that the music is playing us as much as we are playing the music. We respond to this music consciously and initiate something new, which gets taken up by implicit knowledge, and so on. Berkowitz explains this feeling of being both creator of, and witness to improvisation on the neuropsychological level. As an improviser I have often experienced this seemingly paradoxical dialectic but I'm not sure that it occurs in sequence as Berkowitz suggests. Nevertheless, this book contains valuable insights into this common and central improvisatory experience, but which is mostly ignored in the academic literature.

As strong as this book is in addressing this rarely addressed phenomenon, in pulling together a broad range of research and presenting it in clear language, and for including many different kinds of sources and methods, it fails to address one important aspect of improvisation. Much, if not most, improvised music is done in groups. The research that looks at this dimension of improvisation suggests that it is an important part of the picture. But as important as it seems to be, there has been, surprisingly, very little written about it. There are exceptions including some early work

by Charles Keil, and Ingrid Monson has devoted a book to interaction in jazz performance. Unfortunately Berkowitz has not added anything to help remedy the situation. In a book on cognition and creativity, on the "Improvising Mind," one expects some sort of discussion of this dimension of improvisatory practice, but there is none to be found. Given his background as pianist in the Western art music tradition with its premium on individual expression and his reliance on two concert pianists as his interview subjects, it's not that surprising that he ignores the social aspect of improvisatory practice. He is not alone in this regard. Placing a high value on individual expression is a broad cultural phenomenon. Perhaps this helps explain the relative lack of research so far on the part of musicologists on group dynamics when it comes to musical improvisation.

Other issues remain. As Berkowitz points out, there are problems with the methodology of the fRMI research in terms of balancing ecological validity and scientific interpretability. His solution does not seem very balanced to me and errs on the side of scientific interpretability. This is not uncommon in psychological research on music. Investigating improvisatory practice in such an atypical setting, as Berkowitz does here, detracts from the force of his argument about the neurological basis for improvisation.

Even though the book contains music notation this shouldn't discourage readers who do not have a technical knowledge of music. There are plenty of thought-provoking ideas to keep the general reader as well as musicians and musicologists engaged. This is an important book for all those interested in the details of improvisational practice and learning.