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Review of Eleanor Selfridge-Field, *Beyond MIDI: The Handbook of Musical Codes* (Cambridge, Mass.: MIT Press, 1997)

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[1] Since the days of the earliest electronic computers, musicians have engaged them in a veritable love/hate relationship. We seem to have little or no indifference towards computers. Indeed, individually we seem either to embrace them with a passion or to shy away from anything concretely or representationally related to them. I do not want to imply, however, that there are not gradations—layers so to speak—of interest, particularly among the convert group (after all, that really is the intended audience for this review). Here you will find the pedagogues, the catalogers, the analysts, and the cognitive and artificial intelligence explorers to name but a few. You will also find overlapping camps of those with an aural bent and those with a visual one. Of course, across all of these boundaries there exist degrees of involvement among respective members. In other words, there are "users" (e.g., non-programmers) and their are "doers" (e.g., programmers).

[2] *Beyond MIDI: The Handbook of Musical Codes* is a compilation of reports and documents from numerous authors. The work, edited by Eleanor Selfridge-Field, Consulting Professor at the Center for Computer Assisted Research in the Humanities at Stanford University, is a book that is clearly aimed at the doers. In fact, it aims high enough to propel itself beyond many "apprentice doers"—this is not a work for the faint of heart. If you happen to be one of the real "power doers," however, it speaks clearly and with an effective voice. At its most profound level, *Beyond MIDI* is a book that discusses the nuances and intricacies of computer-based musical descriptions, the languages and vehicles by which we are able to interact with or make observations about the phenomenon known as "music." At its simplest level, it is an extremely valuable handbook for those who wish to harness computers to facilitate such interactions. In either case, the work succeeds in conveying what is important to the reader, partly because it is a book written by insiders for insiders. It takes someone well versed in the complexities of computer programming—the "power doers"—to appreciate fully the profound nature of the information being shared, and it is precisely these sorts of professionals who have been engaged to supply the information for the book. Included are such notable practitioners as Max Matthews, Stephen Dydo, Thomas Hall, Leland Smith, Donald Byrd, David Huron, and Walter Hewlett.

[3] This is not another MIDI programmer's handbook, yet it gives a surprisingly detailed and explanative summary of this language. It lacks examples of many code models, yet is an effective exposition on how to represent music in a computer environment. The book confronts us with a marvelous dichotomy: it is both incomplete, yet complete. It omits much, yet

gives more than one could hope for. It accomplishes what most well-written books should but few actually do: it presents us with enough of the right information targeted at the appropriate audience and presented in such a way that it enables the reader to continue where the book leaves off. In this case, it empowers those of us who are "doers" to propel ourselves into the status of "power doers."

OVERVIEW

[4] This work is actually an outgrowth of an initiative of the Study Group on Musical Data and Computer Applications sponsored by the International Musicological Society, and co-chaired by Walter B. Hewlett and Selfridge-Field [xvii]. According to Selfridge-Field, the purpose of *Beyond MIDI* is "to provide a general description, with encoded examples, of numerous ways of representing music in the computer" (xv). Such an overtly terse statement, while elegant in its simplicity, belies the accomplishments of the work. Her reasons for creating the compilation are stated with significantly more zeal—a tone more befitting the spirit of the book:

> Hundreds of codes for music have been developed. Most are intentionally made invisible to users. Not so happily, documentation about many musical codes is extremely scarce. This scarcety impedes applications. It deprives many potential users from investigating the relative merits of different schemes for data representation. It thwarts discussions of generalized representational systems. Worst of all, it imprisons data sets within the confines of the specific applications for which they were created. [xv]

[5] As someone trained in computer programming, it was always stressed to me that a computer program is essentially a set of data combined with a collection of means, or tools, for manipulating that data effectively. At the heart of all good programs is a well-developed, powerfully flexible data model: one capable of supporting profound exploration and revelation, yet also capable of expressing subtle nuances. Music, in whatever form it is perceived or explored, presents us with an extremely complex set of data that requires an extraordinary representational model even to begin to capture its essence. No one model can embody it all; instead, we must strive to solidify and implement those concepts necessary to meet our immediate needs. Beyond MIDI attempts to do just that by offering us a pastiche of numerous different models for accomplishing musical representations. The work does not overtly attempt to be profound in what it offers. Instead, the editor reverts to a rather apologetic tone when she states that

> the emphasis of the *Handbook* is intended to be on practical concepts. While the *Handbook* cannot serve as a complete reference for any one code, it is designed to cover the basic features of pitch, duration, articulation, dynamics, timbre, and other defining features of music. It also describes the file organization for each code, existing applications, data archives (where relevant), existing file interchange provisions, published references, and sources of further information [xvi].

Were this work nothing more than a set of simple documentations it might not merit the attention being given to it. And, documentation is essentially what it is. Yet, the nature of what it is being documented and the audience to whom it is being addressed empowers it with a profound sense of purpose: it is the appropriate information presented at the appropriate level of detail to address the needs of a specific set of needy users. Nor does the book offer the reader a complete set of documentation, instead it presents the user with a selective subset of information targeted at the already knowledgeable user. A word processor manual, for example, may utilize many of pages of documentation to explain just the basics of text selection to a novice user. Yet, one page of appropriate information might unleash powerful nuances of macro creation to someone already well versed in the topic. In other words, this book is both selective, yet capable of generating powerful insights. One could easily argue that the value of the work lies, not in the content found within, but solely in the mind of the reader, a notion with which I would not totally disagree. The strength of this text, instead, lies in its ability to enable the reader to infer, to speculate, to resolve, to reconcile all of those loose associations and half-understood concepts that can plague us incessantly without any easy recourse for resolution.

CONTENT

[6] As part of a rather selective approach to the amount of detailed information about each code set discussed in the text, the

editor strives to emphasize those codes that are as comprehensive as possible in their attempts to represent the broadest spectrum of musical information. The lure of "total" representation has now been pursued for roughly three decades. This volume gives considerable recognition to those systems which aim to provide the greatest degrees of completeness. Yet no one involved with the most competent of systems claims that any piece of music can be represented at the 100% level in all of its conceivable aspects. Every system makes sacrifices somewhere to optimize clarity of its preferred features [5].

[7] Nonetheless, the work includes a considerably large body of code examples spanning a broad array of formulaic approaches to solving problems in the representation of musical data. Selfridge-Field begins by grouping most data models into four general usage categories: those based on "sound or phonological context, the notation or graphical context of notation, the rational context of analytical parameters, and the semantic context of musical perception and understanding" (7). She goes on to state that the book explicitly concentrates on the first three of these. More specifically, she points out that the choice of materials presented in the book are aimed first at introducing the reader to "the general subject of music representation, showing how intended applications influence the kinds of information that are encoded" (20). Her second aim is "to present a broad range of representation schemes, illustrating a wide variety of approaches to music representation" (20). All of these data models were then grouped rather arbitrarily into ten different categories, each containing at least two sample schemes, while acknowledging that in some categories dozens of models were available to chose from. In nearly every case, the individual models are documented by individuals closely associated with those representational schemes. One exceptional feature of the book is the mandated inclusion of several relevant musical excerpts that are then coded as a working examples for each correlative chapter.

[8] Rather than discussing each model here, I present a listing of what is included. The very complex nature of each model effectively precludes encapsulating in a few words what has taken others years to conceive and implement. The best solution I believe is the one presented in the book's table of contents, and I choose here simply to recreate it as Figure 1 (contributing authors are referenced in "[ ]").

Figure 1: Organization of Data Models

1. Introduction
    - describing musical information [Eleanor Selfridge-Field]
2. Sound-Related Codes (1): MIDI
    - MIDI [Walter Hewlett & Eleanor Selfridge-Field]
    - MIDI Extensions
        - NoTAMIDI (Meta Events) [Kiell Nordli]
        - Expressive MIDI (Extension for Notation) [David Cooper, et. al.]
        - MIDIPlus (Extension for Notation) [Walter B. Hewlett]
        - Augmented MIDI (Sound Control) [Max Matthews]
3. Sound-Related Codes (2): Other Codes
    - Csound [David Bainbridge]
    - Music Macro Language [Toshiaki Matsushima]
    - NeXT ScoreFile [David Jaffe]
    - Conductor Score File (Radio Baton)[Max Matthews]
4. Musical Notation Codes (1): DARMS
    - Its Dialects, and Its Uses [Eleanor Selfridge-Field]
    - Note Processor Dialect [Stephen Dydo]
    - A-R Dialect [Thomas Hall]
    - Lute Tablature Extensions [Frans Wiering]
    - Mensural Notation Extensions [Lynn Trowbridge]
5. Musical Notation Codes (2): ASCII Representations
    - Common Music Notation [Bill Schottstaedt]
    - MuTEX, MusicTEX, and MusiXTEX [Werner Icking]
    - Philip's Music Scribe [Philip Hazel]

- SCORE [Leland Smith]

6. Musical Notation Codes (3): Graphical-object Descriptions
    - LIME [David Cottle and Lippold Haken]
    - Nightingale Notelist [Donald Byrd]
7. Musical Notation Codes (4): Braille
    - Overview [Roger Firman]
    - Common signs [Bettye Krolick and Sile O'Modhrain]
8. Codes for Data Management and Analysis (1): Monophonic Representations
    - Essen Associative Code [Helmut Schaffrath]
    - Plaine and Easie Code [John Howard]
9. Codes for Data Management and Analysis (2): Polyphonic Representations
    - Humdrum (Kern) [David Huron]
    - MuseData [Walter B. Hewlett]
10. Representations of Musical Patterns and Processes:
    - Encoding of Compositional Units [Ulf Berggren]
    - Score-Segmentation Approach to Analysis [Andranick Tanguiane]
11. Interchange Codes:
    - HyTime and Standard Music Description Language [Donald Sloan and Steven Newcomb]
    - Notation Interchange File Format [Cindy Grande]
    - Standard Music eXpression [Toshiaki Matsushima]
12. Reflections:
    - Beyond Codes: Issues of Musical Representations [Eleanor Selfridge-Field]
    - Afterward: Guidelines for New Codes [David Halperin]

CONCLUSIONS

[10] This work is amazingly free of any significant problems. The text seems extremely accurate—at least as far as one can tell with so much complicated data incorporated both in tables and within the text. With the exception of the last chapter, the text also seems to be very well organized. I feel that the section entitled "Beyond Codes: Issues in Musical Representation" really belongs with the opening introductory chapters of the book. Selfridge-Field offers us a brief, yet engaging, discussion about the nature of codes: What attributes are essential?; How general vs. how specific should a code be?; etc. While one might see these as logical extensions of the exploration of the preceding 500+ pages of code documentation, it is probably unrealistic to think that most readers will actually sit down and read their way through the entire book. After all, this work is more a powerful reference tool containing a compelling collection of data than a "compelling" story line. Yet, this final chapter does represent a fitting conclusion to the opening discussions and certainly should be included as an integral part of the opening stages of the work.

[11] Perhaps more problematic is the lack of a summary of the abbreviations used throughout the code-definition portions of the book. This omission is a problem that will be more acutely felt by the "users" than by the "doers." For example, most programmers are familiar with reading and interpreting hexadecimal codes and variable symbols; yet most non-programmers, while perhaps somewhat familiar with hexadecimal numbers, would not automatically be able to infer the appropriate meaning in an unfamiliar context. Their appearance in code definitions absent of any explanation as to why they are being used and how they should be interpreted within that context can generate significant confusion or even leave an example completely undecipherable to such a non-practitioner. For example, the section on MIDI defines a pitch event as:

```
PITCH [kkkkkkk: note# <n>]
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Unfortunately, no attempt is made to define the meaning of the various elements present in the definition. For example, kkkkkkk stands for the first seven bits of an eight-bit byte used to store the integer representing a particular pitch. None of this information is explicitly offered as an explanation by the author—what I present here is just my informed interpretation. A few pages later, the definition for a duration is given as:

> DURATION [00:00:00 or 00:00:00:00]

This example is even more problematic, as the 00s are not a direct computer representation as the k's were in the previous example. Here, each group of zeros stands respectively for bars, beats, and fractions of a beat, or hours, minutes, seconds, and frames. The actual definition for how to represent that information in the computer does not appear until 15 pages later. Fortunately, most of the code in the book is reasonably easy to decode for someone with a fair amount of programming experience. And, in many respects, eliminating much of the explanation enables the authors to present the pertinent information more succinctly. What makes this text work so well for the "power doer," however, is precisely what keeps it from working for the novice user.

[12] No single work can serve the multiple needs of every practitioner, and this book is no exception. If you are anywhere close to considering yourself a "doer," and if you have even the slightest inclination to explore the world of music with a computer, however, then having this text within easy reach is an absolute must. There is no other source that comes close to matching the breadth, quantity, and quality of information amassed in this one work. Much of the information simply is not available anywhere within easy reach. I must commend the editor and contributing authors for a splendid job of creating an invaluable reference work.

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