Sharing MEI: common semantics in diverse musics?

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Abstract

In this panel, we consider the role of MEI in providing common structures and meanings for heterogeneous musical practices and notations and, to a lesser extent, uses. Drawing on direct experience of working with particular cultural or historical material, we consider the robustness of the fundamental modelling of MEI, and its challenges and strengths. From a practical standpoint, we evaluate strategies for successfully working with MEI, whether through extension of the standard or linking to it from external data structures. We will engage the community with the problems of standardising musical semantics from a non-CMN (Common Music Notation) perspective, and will start the process of developing recommendations for those who wish to engage with the standard to extend further our range of digitised and shareable musics.

Introduction

Music notation can serve a wide variety of purposes. It can act as instructions for the physical performance of a work, it can act as a visual record of performance for study or archiving, and it can act as a summary of music-theoretic and analytical elements of a piece. Each of these purposes relates to a different audience, each with their own set of priorities and their own understanding of what constitutes core musical information.

Music encoding, as a machine-readable digital proxy for music notation, inherits this complexity, on the one hand expanding the potential applications available, while on the other requiring more explicit, definitive statements of parameters where graphical forms can preserve ambiguity. Music encoding extends the facility of other music notations to provide a framework for sharing meaning between very different types of music and musical cultures, by defining a model for musical semantics which supports sharing of concepts when they overlap and defining new ones when they do not.

The rewards of sharing semantic structures like this are great: we can transcribe, reproduce, search, analyse and share a wide range of musical materials using a common tool set. There are also many challenges. For the effort to be most valuable to a wide range of users, a balance must be struck. Translating all notational forms into a shared but over-simplified form (MIDI-like time and pitch only, for instance) strongly favours some uses over others and risks serious distortion of the information being communicated. On the other hand, an over-complicated, highly specialised and segmented model risks having no shared semantics at all between different musics, since fine differences between meanings are always present.

A transcriber cannot completely avoid the role of editor, and the less direct the connection between graphic and interpretation, the greater the need to support the fine-grained recording of responsibility and justification. Since this connection is different in different notations, it is hard to generalise which concepts should be made easy to describe in this way (as elements) and which do not require it (as attributes). Ideally, where notational semantics can be divided between a core and a more-interpreted layer, being able to represent the two separately gives support for switching interpretation without substantial change to the main encoding.

Notation is historical in nature and varies by time and geography. There is much that historical notation does not capture, but which we may wish it did, such as the nature of the instruments used and the sound and techniques of performance sound. Those limitations need not persist in our own musical models.

To crystallise the concerns and challenges, and help to begin a more explicit discussion of what common semantics in music encoding can and should mean, we consider a range of case studies that stretch some of the core concepts of MEI and how we accommodate them in practice.

1 In search of common ground

1.1 Modelling with MEI – the domains in practice

One basic concept that MEI incorporates is the distinction of four different musical domains, as stated by SMDL (Standard Music Description Language) (ISO, 1995): the logical, the gestural, the visual and the analytical domain. As an underlying paradigm embracing and naming the several contexts music can be described in (Selfridge-Field, 1997 p. 7), it already gives vital clues when approaching a new notation. After collecting what can be drawn from a source, the model may serve as a categorization pattern, sorting the evidence based on a few central questions: What is the musical content? How will it be performed? How does it look? And what can be said about this? But when following the given definitions carefully and when underlying assumptions are unravelled, limitations become evident. Already the logical domain may serve as an example:

> The logical domain is the basic musical content – the essence from which all performances and editions of the work are derived, including virtual time values, nominal pitches, etc. The logical domain is describable as 'the composer's intentions with respect to pitches, rhythms, harmonies, dynamics, tempi, articulations, accents, etc.,' and it is the primary focus of SMDL. It can also be described as 'the abstract information common to both the gestural and visual domains.' […](Music Encoding Initiative, 2019)

First, relying on the composer's intention as a rule of definition focuses heavily on the circumstances of creation and the conceptual work of music, leaving aside alternative forms like oral and more performance-oriented traditions. From a semiotic perspective, reducing it to the "mental model" might be sufficient.

Second, even the question of what is "common to both the gestural and the visual domains" cannot be solved easily. It carries a silent assumption that notation already gives all the clues necessary to build that very mental model. But what if not? Taking a step back, we are able to observe music notation in very different forms, circumstances and purposes: As a medium of transmission, as *aide memoire* for performers, as a graphical piece itself, famously known as '*Augenmusik*', etc. Acknowledging this, one central question arises: What is the difference between music and its instantiations, may those be either graphical as notation or visualisation, or may they be performed or aurally perceived?

1.2 Challenges from diverse musics

When an encoding vocabulary is faced with a musical repertoire that it is not designed for, two questions come into play. Does the vocabulary provide concepts suited for the music in question? And if not, or only partially, what is missing and how can this gap be tackled? The subsequent paragraphs will exemplify several cases.

The direct mapping between notated symbols and their durational and pitch interpretation is an innovation that took centuries to develop and cannot be taken for granted. For example, **Mensural notation**, throughout its history, always required multiple steps of interpretation. When following the reading process from graphical instance to the mental model and back, it becomes apparent that many ways are used to express a similar result, e.g. using *color minor* or a dot of augmentation – and that these were commonly used alongside each other. Regarding the semantic domains, this challenges the relationship between the visual and the logical domain more explicitly than CMN (Common Music Notation) does. The model originally perceives the logical domain as leading, while the visual domain "specifies exactly how components of the logical domain is rendered visually" (Music Encoding Initiative, 2019). Mensural notation however exemplifies a structural ambiguity: Graphical features first need to be recognised and classified according to their semantic function before they can denote a certain musical structure. We must also acknowledge the impact of historical and geographical differences: Even though we understand the semantic value of graphical features in general, the underlying assumptions still vary over time and between theorists. Therefore, various presumptions do exist and may lead to diverging interpretations, depending on the notational as well as the historical context (Busse-Berger, 1993). This questions whether the visual is a mere addendum to the mental model – is it a substantial part of it or is it an integral layer on its own? And moreover, it exemplifies the need for strategies on dealing with and distinguishing different layers of interpretation without losing track of them.

By contrast to the heavily contextual and interpreted nature of mensural notation, **tablatures** are direct and explicit. Generally, they are almost exclusively concerned with the placement of fingers, indicating where they should go and, usually, when. Apparently ambiguous or missing information may be considered unnecessary: perhaps relying on prior knowledge – many guitar tablatures for popular music exclude rhythm with an expectation that the player will

already know the piece – or having different priorities – absolute pitch is of secondary importance to a player, provided they know how to achieve the note. Avoiding absolute pitch allows musicians to accommodate different performance situations with the same notation. The tuning of lute strings can generally be inferred from the date of a source, the number of courses (sets of strings) of the instrument and the key of the piece, although there are exceptions, where a diagram or tuning system name is required. The nature of the instrument is also important, with the cittern being notable for frets that do not uniformly mark semitones. Specificity of relative, but not absolute pitch, is common for the notation, if seldom a welcome consideration of music encoding.

Whilst modern guitar tablatures often either completely ignore rhythm or indicate it using staff notation and all the apparent precision that gives, lute tablatures include rhythm signs to indicate the amount of metrical time to wait before striking the next note – they give inter-onset intervals, but not durations. In practice, CMN is similar – duration signs show how much time to leave between successive notes within a voice. Lute tablature rhythm signs are also relative, in the sense that the relationship between them and their equivalents in staff notation is variable.

Transmitted mostly orally throughout centuries, **Ottoman music** has similar concerns to those of tablatures. It is hardly ever the composers themselves or professional scribes who notated the music at first hand and the different notation systems utilized do not always correspond to each other. Neumatic systems such as Hampartsum notation and Byzantine notation do not assign an absolute pitch to notes, hence it is always a matter of transposition in the performances. In contrast, Western staff notation, which became common for Ottoman music only in the late nineteenth century, acts as if in Western music, but the performers still transpose the notation accordingly. Besides, the peculiar accidentals introduced by AEU (Arel-Ezgi-Uzdilek) (Arel, 1991, p. 10) fail to address the actual values of pitches such as Segâh (slightly sharper in some makams and slightly flatter in some others). When rhythm is considered, the gap between notated music and performed music is usually enlarged. The groupings in early Hampartsum notation and late Hampartsum notation refer to different gestural meanings while Western staff notation needs the usûl (system of rhythmic patterns) information in the heading of notated music as text, as a mimesis of orally transformed information. The performance of rhythms, however, is usually independent from the notation. The three different 32-beat usûls, for instance, have diverse accents which necessitate different dynamic information, but percussionists usually prefer to perform all the usûls at issue with the same 8-beat rhythm.

Electroacoustic music is a repertoire with no common notation standard other than the established interactive visualizations in dedicated music production software (Digital Audio Workstations, DAWs). Its musical substance manifests on the level of sound and timbre design and its modulation rather than on the level of pitched notes and metrical rhythms. Neither do the MEI CMN concepts of the note or the control event suffice to encode this information exhaustively. But they are incarnations of more general concepts, sound events and modulations that affect the sound events' properties over time. Moreover, in CMN, most score encoding models are content with the mere reference name of an instrument (e.g. violin, flute, trumpet, soprano) to provide enough information about a general sonic quality of a note. In the context of electroacoustic music, the timbres that a synthesizer can produce are extremely diverse. This demands a more detailed specification of the instrument, its settings and further elements of the

audio processing patch. MEI's elements instrDef and perfMedium may represent a shared concept and potential starting point for a respective generalization and expansion.

In contrast to the cases discussed so far, **musical performance** is not a self-contained musical repertoire but rather an additional domain or layer of information on top of the logical domain that details how a given musical material is executed by musicians. From an MEI perspective, it can be seen as a series of additional control events that specify the timing, dynamics and articulations (among others) of a performance. The Music Performance Markup (MPM) format (Berndt, 2021) is an attempt to enable performance encodings in much detail. Its conception as a supplement to MEI and other symbolic music formats shows that it is not always necessary or even appropriate to expand MEI itself to make it more versatile and exponentially more complex. An autonomous format can utilize its own, more suitable data structures that do not have to integrate with those of MEI or others. It does nonetheless interact with the latter via XML IDs and timing alignment. This example shows how shared concepts can be left in their "home encoding" and extensions can be incorporated as self-contained formats or data structures in the form of linked data.

2 Reflecting on encoding standards and processes

Our aim with this panel was not only to point at relevant cases that need further consideration in future developments but also to discuss the different paths such developments might take. These do not necessarily lead to an extension of an existing standard such as MEI. We summarized our experiences from MEI integrations of other formats, MEI customizations and interlinked complementary formats such as MPM. The discussion provided valuable guidance for the planning of current and future developments.

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