Chapter VI
Challenges of Designing a Markup Language for Music

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ABSTRACT

XML-based languages for music have constraints not applicable to typical XML applications, such as for standard text documents or data sets. Music contains numerous simultaneous events across several dimensions, including time. The document model for a piece of music would thus look very different from serialised text documents. Most existing XML-based music markup languages mark music typography, following the print traditions of music scores. A general music markup language should include much more than mere print. Some of the challenges designing an XML-based markup language for music are considered. An SVG-based music symbol design grid is proposed to meet the challenge of music typography. An XML-based music symbol language is used to design symbols on this grid. Resulting symbols are positioned in 3-D Music Space, which is introduced to address the challenge of topography.

INTRODUCTION

Since the release of the XML specification (Bray, Paoli, Sperberg-McQueen, & Maler, 1998), several applications have been developed focusing on various aspects of music, but mostly on music notation, particularly the typography of common western music notation (CWMN). As XML is a metalanguage that makes it possible to mark any object in the universe that can be expressed with human language, the implication is that every conceivable aspect of music can be marked. The challenge is to develop a marking system that is sensible and economical. The decision as to what should be marked is philosophical. In recent years, the ancient Greek philosophical concept of ontology has been introduced in the markup arena. This was done, as it was realized that the first challenge in developing a markup language is to decide exactly what should be marked: the physics of sound, or a notational system, or a descriptive system, or whatever. And when no-
tational systems are to be marked, which ones? Which of the different cultural systems need to be accounted for?

Music has several unique features that differ from the one-dimensional linear text of ordinary human language, which is not problematic for typical SGML or XML applications. SGML, and thus XML, is a content model, specifically, a text content model, and not an application model. SGML does not specify how nontextual media should be handled. This has implications for a music markup language as music is primarily an audible entity, and its writing systems use many graphic symbols that are nontextual.

The most obvious difference between music and human language textual documents is that several music events can happen simultaneously, while several instruments can each also play several notes simultaneously. Text, on the other hand, operates on one dimension only: it is monoplanar. In addition, in a multimedia context, other types of events need to be mapped and synchronized to music events, and vice versa. This multiple layering on space and time dimensions results in a much more complex phenomenon, which should be marked, than, for example, a markup language focusing on a procurement system. No XML parser can handle this complexity, such as to present multilayered markup in a manner music users have become accustomed to. Such rendering aspects need to be handled programmatically by the application. An easy way out would be to leave it to the application to handle all music aspects, but that would defy the purpose of trying to utilize XML to mark the structured content of music that might then rather not be used at all. One design goal would thus be to make as much as possible explicit through markup that an application can use to render this complexity appropriately.

There is yet a further challenge when it comes to music. Performed music can be measured against absolute time and absolute frequency, but written music (i.e., notation) often lacks explicit reference to time or frequency, except with reference to relative terms that can be interpreted by a performer in many ways. Reference to absolute time is of course very important for synchronization in computing devices, while referencing to frequency is important for computer synthesis playback devices.

**PAGED AND SCROLLED**

In the presentation of information on a computer screen, there are two fundamental formats: paged and scrolled. The screen’s dimensions serve as a window, or viewport, behind which data of any dimensions can be viewed. Paged representation is not a requirement of the properties of a screen, but rather a relic, transferred from the world of paper publishing. In the early days of human language writing, papyrus surfaces were scrolled. Only when the printing press was introduced was there a technological requirement that printed surfaces do not run continuously, as single sheets were placed on a table to be pressed with characters on their surface. Modern printing presses again operate with long rolls of paper that need to be cut in order to obtain pages. When music was originally written as music notation, the available print surfaces were accepted as norm, and hence, customs developed, such as for staves to be fitted to the width of the printed page. This segmentation of a staff is not an inherent music requirement, but merely a conventional requirement of the printed page, of typography.

Printing of music onto the printed page also gave birth to a complex set of typographical customs. Among attempts to develop an XML-based markup-based language for music, the Holy Grail seems to be to develop a language that could visually render music notation that reflects a manuscript, and its conventions, precisely. Efforts seem to be more concerned with the typography of the visual rendering of music than with
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