COMPUTER-IMPLEMENTED MUSIC ANALYSIS AND THE COPYRIGHT LAW

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The problem

What copyright problems is a music scholar likely to encounter if, in making an analysis of a copyrighted work of music, he creates a machine-readable version of it and enters it into a computer?

The factual context

The discussion of this question will be better focused if we have in mind the context in which such an analysis is likely to be made. We shall, therefore, first present some background information.

Computers have been used in the historical and analytic study of music for about two decades. (They have also been used in musical composition, as well as in the study of the acoustics and the psychoacoustics of music, but these endeavors, however legitimate from the point of view of artistic or intellectual activity, do not concern us here.) Much of this effort — e.g., the extensive studies undertaken at Princeton University of masses of Josquin des Prez, who died in 1521 — deals with music that is in the public domain, but there is also a good deal of activity in the analysis of music currently under copyright protection.

This is hardly surprising, since many recent compositions, especially those of the Viennese school and its progeny, are the product of compositional processes incorporating the conscious use of various mathematical notions and are therefore fertile territory for the application of analytic techniques that are themselves mathematical in character. Clearly, computers may be thought the natural engines for the execution of analyses of this type.

While music computing shares certain characteristics with computing in other humanistic disciplines, such as literary research, it raises some problems that are sui generis.

An initial problem is to determine what, really, we take the work to be. As we shall see later in our inquiry, that question has been the subject of some dispute in the history of the copyright law. But, so far as the characterization of the work for the music scholar is concerned, we may say with considerable confidence that the object of study is the score, the notated version of the work music. To be sure, scholars study performances, most likely recorded ones, as well and utilize whatever ideas they glean from listening, but such ideas, too, tend ultimately to appear in the scholar’s work in the form of statements referring to the written image, the notation, of the musical work. In the case of computer-implemented analyses, what is entered into the computer is in almost every case not a rendition of the work, but a version of the notation. We shall, therefore, limit our discussion so as to exclude the marginal cases in which sound, rather than notation, is the computational datum.

A second problem arises because notation is processed by digital computers. The digital computer accepts only digital information as input. That is to say, the information read into the computer, whether from cards or tape, or through signals generated by an optical scanner or at a typewriter-like terminal, must be in the form of alphanumeric characters. These include the letters of the alphabet, the numeric digits, and ‘special’ characters such as punctuation marks, mathematical symbols, and commercial signs (like the dollar sign), but no sharps or flats, quarter notes, clefs, rests, or any of the other symbols by means of which music is notated. Hence entering a work of
music into a computer requires, first of all, transcribing it into some computer-readable notation.

This cannot be done by simply letting a given alphanumeric character 'stand for' some particular music symbol, since music notation, in addition to employing a set of symbols differing from those of ordinary language, also deploys them differently. Writing down ordinary language requires no more than one dimension; in principle one could write a novel onto ticker tape. Music notation, however, makes essential use of two dimensions; which symbol is vertically aligned with what other symbol is not a matter of accident (where a line-break happened to occur) but conveys information, since in general vertical alignment signifies temporal simultaneity.

In the early days of music computing each scholar, almost without exception, devised an ad hoc system of transcription for his own project. Such systems proliferated until the early 1960's, when various general-purpose systems came to be proposed. In the mid-1960's the relative merits of these became the subject of heated debates, which need not be rehashed here. To simplify our discussion — and at the same time to put the sharpest possible point on the copyright problem — we shall assume that the work of music to be entered into a computer has been transcribed into computer-readable form by means of the DARMS system, which was initially developed at Columbia University, in 1964-1965, under a grant from the Ford Foundation. (It is sometimes referred to, informally, as the Ford-Columbia representation.)

The context in which this development took place must be briefly mentioned. What was being developed at Columbia was a computer-controlled process of music printing, or, more precisely, of producing master plates for music printing. In order for a computer to control the production of a printing plate, it obviously had in some sense to “know” what music was to be printed, and with a degree of precision and refinement that previously-developed methods for the digitalization of music notation were incapable of reflecting. It was of the essence to represent not only what the pitch and duration of a note were to be, but also whether its stem was to go up or down and whether, if the duration were that of an eighth note or less, the note was to bear a flag or to be attached to one or more beams. In short, the notation had to be encoded in such a way that all of its graphic properties were preserved, so that these might be reconstructed at the other end of the process. This need led the investigators at Columbia to develop a new encoding system, for the simple reason that no system then extant was able to fill it. As a consequence of that fact, the original score of a work of music is reconstructible in every detail from a DARMS encoding.

In spite of the fact that DARMS trafficks in the graphic aspects of a score rather than in musical 'meanings,' it seemed clear from the beginning to its sponsors that it would also be a useful representation for purposes of computer-aided analysis, precisely because, as was pointed out above, analysis takes the notation as its object. DARMS enables a scholar to process an isomorphic image of the original notation, with no information either added or deleted; to the extent that he processes a work in DARMS, he is dealing with hard data unglossed by any theoretical interpretations. To keep one’s facts and theories at least conceptually separated in this way is highly conducive to scientific hygiene, and it is therefore not really surprising that, controversial though DARMS may have been when first generally unveiled, it has since become the most widely used encoding system, bidding fair to become the world standard.

The legal context

It must be admitted at the outset that no clear-cut answer to the question that we have raised will emerge from our discussion. This is so in part because, especially in a legal system such as ours, how the courts will decide a particular matter is frequently uncertain before the event. The precise point at issue may not have been addressed by the terms of the governing statute nor previously decided by a court. But even where the written law or the case law seems to establish a position, one cannot assume that the outcome to any specific controversy is foreordained. For the genius of our legal system is its flexibility, and the courts have at their disposal a rich repertory of techniques to distinguish away, limit, or overrule previous decisions that might stand in the way of the desired resolution of a particular case, and their ways of construing statutes to the same end are no less ingenious.