Ambiguity and Multiplicity in Music Representation

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Two evident problems in representing music are ambiguity and multiplicity. It is clear that the 'same' music can be represented in different ways. Some differences are simply because different facets of the music are represented: a score represents different things from an audio recording. Here I am concerned about differences which have at their root actual differences either in the detail of the music itself or in how the music is conceived. (Whether the 'music itself' and 'how the music is conceived' are different things is an issue I will not address here.) I refer to these differences by the umbrella 'ambiguity and multiplicity'. 'Ambiguity' means that there are possibly incompatible differences in the music or the conception of the music, and we do not know which is correct. 'Multiplicity' means that there are differences which are possibly all correct.

My contention is that a single representation in such cases is a mis-representation, because information is missing. (An essentially similar point was made by Geraint Wiggins, in press.) Proper representation requires techniques which can accommodate ambiguity and multiplicity.

Three examples demonstrate different kinds of ambiguity and multiplicity. Firstly, how do we represent Leonard Cohen's song *Hallelujah*? It has been recorded by many artists, with some quite significant differences in the melody. Leonard Cohen himself sings the chorus at a higher pitch than the verse, ending the chorus at the same pitch level as the verse. Jeff Buckley sings the chorus at a lower pitch and ends the chorus on the lowest pitch of the song. K.D. Lang sings the chorus at the same lower pitch as Jeff Buckley but, after the first couple of choruses, sings the end at a higher pitch so that the highest pitches of the song come at the end of both the verse and chorus. Are the three performers singing different songs? If not, is there a common core shared by all which, when represented, *is* the song. Or is it better to conceive of *the song* through a Wittgensteinian concept of 'family resemblance'. If so, how do we represent it?

Secondly, the theme of the Allegro of the first movement of Mozart's string quartet in C is built on a motive which at first seems to be best represented as a step-wise rising fourth. In this interpretation, in the initial presentation of the motif at the start of the theme, the appoggiatura preceding the last note is an unimportant decoration. This is followed by a motive which has an appoggiatura (following a leap) as its important feature. Towards the end of the exposition, the leap is filled with passing notes, and we eventually hear this developed into a clear inversion of the opening theme. Now the appoggiatura is the important feature and the passing notes are decoration. It is silly to ask which interpretation is correct: the point of Mozart's handling of these motives seems to me to allow *both interpretations to co-exist*. (Fuller discussion of this example can be found in Marsden, 1989.) If we are to represent the theme of this movement of Mozart's quartet, therefore, how can we accommodate two conflicting interpretations?

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Thirdly, I draw on recent work I have done on Schenkerian analysis by computer (Marsden, in preparation). My results suggest that a reasonable formalisation of rules of reduction drawn from Schenker's theory allow an absolutely huge quantity of possible analyses of even short passages of music. The results suggest that one typical six-bar theme, for example, has, within a couple of orders of magnitude, as many possible analyses as there are stars in the universe! Schenkerian theorists have long been used to the concept that there are different ways of analysing the same piece (though Schenker's writings imply that there is only one best analysis: his analysis). Most of this massive number of analyses would properly be rejected by analysts as unacceptable, but even keeping just one in a million leaves a huge number. I suspect that proper representation of the Schenkerian structure (or probably we should say 'the Schenkerian structures') of a piece would require too many alternatives for a representation to list them all.

What strategies are there for dealing with ambiguity and multiplicity? Despite my comments above, we should not rule out the simplest strategy of simply accommodating listing of alternatives in a representation. It is true that I have given an example of a case where the number of alternatives seems prohibitively large, but these arise through combinations, and it might be that the number of possibilities in each local context is small enough for listing to be realistic. However, we would essentially be representing through disjunction, and computational theory has shown that reasoning with conjunctions of disjunctions can be complex.

Another strategy is to abstract away from the ambiguity and multiplicity and represent only those things which are constant. This is like Wiggins' concept of 'levels': by representing the Cohen song at an abstract level of main harmonies and outline pitch classes, we might be able to represent something which was common to all its realisations. I suspect, though, that we would lose useful information.

A third strategy would be to base representation on either probability or fuzzy logic: the representation contains differences each associated with a weight. This would allow something approaching the 'family resemblance' concept, and might allow compact representation of potentially a very large number of different fully realised versions (like representation at some level of abstraction) while still keeping information to distinguish outlying or very unlikely cases from the core (unlike representation at a level of abstraction). I know of fuzzy representation only being used in a few very specialised cases in music applications, and none of these could be said to represent 'the music'. Indeed, it is not clear what a fuzzy or probabilistic representation of music would look like in practice. I suggest it would be a promising avenue to pursue, though.

References

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