THE APPLICABILITY OF THE INTUITIONISTIC FUZZY SETS APPROACH TO MUSICAL LANGUAGE

Luben Botusharov

We look at music both as a natural language and as an art that occurs as a primary and secondary modeling system, after Lotman,[1] thus musical language and musical literature. The stanza of a song (for instance the single statement of the melody in a folk song) can be the limit of the language unit and the smallest artistic form. A similar phenomena is that of the proverb which has simultaneously linguistic, logical and artistic structure. The theme of a symphony can be seen as a linguistic configuration, and often in traditional musicology utilizes the terminology of linguistics, for example Satz in German. However, the theme exists as an element of a composition, that is in "music". The major argument against acceptance of music as a natural language is the inability to prove the dual divisibility of musical language as we can with verbal language. Nor is the musical language translatable. These problems also pertain to musical semantics. This difficulty is overcome to a significant degree in traditional music, which has not yet lost the direct link to a given situation and its suggestion of ritual. Musical language is exceptionally multi-semantic, probably, belonging to the so-called soft languages.[2] If this traditional music looses its connection to the specific ritual situation, on the one hand it becomes at if a dead language, on the other hand it reveals a potential for neologisms. Thus in each musical system, including that of individual composers, the primary musical language can be discovered again and again. However, this is not always necessary. Cultural continuity ensures a minimum of known meanings, which allow the rationalization of modifications and neologisms in the process of artistic communication.

If we turn our attention to the experience of musicology to describe musical meaning and to restrict the polymorphism of aesthetical information in the musical literature, we ascertain the usefulness of the expressions and classifications near to the conception by L. Zadeh for linguistic variable and fuzzy sets.[3] However, we often find such a degree of indeterminacy of membership in some fixed set, which

corresponds to the idea of extension of fuzzy sets as intuitionistic fuzzy sets.[4]

In the sphere of significance of musical language we also meet phenomena which cause us to reject the law of excluded middle. As in linguistics, we can accept that the lowest level is that level which finishes the segmentation (E. Benveniste). Usually we imagine the musical pitch as having a particular place on the staff and corresponding key on the keyboard. But in traditional music, as in contemporary sonorous style or electronic compositions, the musical sound is not always a member of a usual, fixed, finite set, with the degree 0 or 1. (A simple degree of membership in tonal systems can be based not only on whether the scale is well-tempered, but whether the scales are sufficiently stable.) There are many examples in performance of music without fixed scales, with mobile tonal elements.[5] Usually they exist in some definite zone and can be described as fuzzy variables. There are occasions when the musical meaning is expressed by contrasting sound clusters, by the play of timbres (melody in its loosest conception), whose degree of belonging as an element of some pitch system (again in the loosest meaning of the word) is once again indeterminate, as in musical semantics. And here, the applicability of intuition1stic fuzzy sets is possible. We observe analogous phenomena in the area of musical rhythm and meter. We can not always determine whether in the process of performance a given sound duration belongs to one or another value of an accepted rhythmical system.

We see that from the lowest level of musical language to the expanded sphere of musical literature, we continuously meet with indeterminacy, which we not only cannot solve and thus experience aesthetically. But we can try to describe these phenomena with the help of intuitionistic fuzzy sets.

References:
1. Lotman, J. Die Kunst als modellbildendes System. In: Kunst als Sprache. Leipzig. 1981.
2. Nalimov, N.N. Verojatnostnaja model' jazika. Moskva. 1974.
3. Zadeh, L.A. The Concept of a linguistic variable and its application to approximate reasoning. Berkely. 1973.
4. Atanassov K. Intuitionistic fuzzy sets.- Fuzzy Sets and Systems. Vol. 20 (1986), 87-96.
5. Alekseev, E. Rannefolklornoe intonirovanie. Moskva. 1986.
   - Summary: The pitch nature of primitive singing.