

## Contribution to the Round Table

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My contribution to the Round Table proposes to extend the contributions of “cognitive archaeology” to the understanding of the emergency of modernity in general, and of music in particular. In this perspective, I think that the sound timbre (vocal and instrumental) may create coalescence. Let me explain what I mean, as it could hopefully generate a discussion:

1. thanks to the analysis via synthesis (i.e., through the digital analysis of the audio-musical signal), it has been amply demonstrated that our ability to recognize the timbric property of the instruments (wind, percussion, arch/cord, etc.) and of voice, depends on the dynamic evolution of the acoustic spectrum, in the first place on the attack transient (onset) that are in the range of the tens of milliseconds, or decay. This means that our perceptual system can instantaneously distinguish a sound of percussive origin (with a sharp attack) from another source that produces softer sounds.
2. in neuroscience, it is generally accepted that the right hemisphere has the role to analyze these spectral components and their temporal development, i.e., the timbre. The “lateralization” theory is also favored: the left hemisphere decodifies the language (words and script), while the right hemisphere could - perhaps – perform the neuronal elaboration of the music. The separation of the two operations would occur at the phonematic/phonetic language.
3. today we can state with a certain degree of confidence that the timbre is not a sound parameter, like pitch and duration, nor an invariant of form, but a “holistic” property of the sound. To use the terms of Steven Mithen, it is closer to the properties of the proto-language “Hmmmmm”.

It is paradoxical that only in the '70 of last century the nature of the most direct, intimate, and emotional property of the sound has been, at least partially, clarified. At variance with other properties (pitch, duration), which had been “mathematized” for millennia, a change in the scale of observation of the sound phenomena had to occur before the nature of the timbre and of the voice could be understood, and the deepest perceptive mechanisms produced by evolution could be investigated. The hearing, Nietzsche had said, is the organ of fear. But, we can add, hearing also satisfies the need to synchronize and locate ourselves in the darkness, and, based on timbre, we can distinguish voices, events, objects, animals, etc. Timbre is a fundamental ingredient of the auditory scene and occupies a broad extra-musical and pre-musical field. Nevertheless, it too naturally entered into the coalescence of music. To come to the theme of the Round Table: **Music: from necessity to emotion**. In listening to music, the original functions of hearing: the alarm, the recognition of sound sources work without any vital need, however if the complex mechanisms of hearing are not sufficiently stressed, you immediately feel the lack (as was the case in the early days of electronic music). The perception of musical timbre must be related to discrete pitch perception, since it also involves a cognitive construction based in part on blends of frequencies (spectral pitch). Timbre has always played a hidden role in the folds of the musical phrase level (melodic level), and performers have never stopped checking spectral and temporal properties as part of their arsenal of expressive devices. To this the emotional and aesthetic power of the timbre of the voice must be added. In the twentieth century Western music has placed timbre at the center of its production, worrying about the sound that is the stuff with which it is made.

A second theme in the discussion could be the presence of the number in music. Archaeology has found instruments of 40.000 years ago. Have the distances of the holes in the flutes, the quantitative/auditory measure of the openings been calculated? Likewise, is it possible to guess when the number has entered in the construction of the musical instruments? And, since the instruments have been found in different locations, can we think of different cultural niches? The instruments are cultural archives of sound. Probably, the imitation of nature with the musical instruments (Lucretius) has initiated a process of cosmological and ritual imagination (possibly related to the production of images).

To me, it seems reductive to consider music as an exclusive and direct communicational activity, without considering other complex mediations that characterize it. This leads to question whether it is possible to imagine a bottom-up construction of complex systems through feedback of interrelationships which build and characterize culture, originating auto-organized activities that achieve a certain degree of independence.