WHERE DID RAMEAU GO WRONG? A NEURONAL POINT OF VIEW

Leisiö, Timo

University of Tampere, School of Social Sciences and Humanities: Music Research
timo.leisio@uta.fi

Jean-Philippe Rameau's theory of tonality (Rameau, 1722/1971) is brilliant but based exclusively on acoustics (physics). No living being furnished with an auditory system has any other access to acoustic processes than through electric and chemical activities in various neuronal networks of its auditory system.

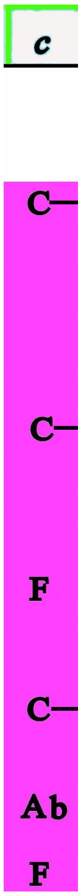
We know quite little about the function of auditory neurons and therefore it is unfair to criticize researchers of music and speech for studying sound structures only on acoustic grounds. However, there are valuable data available already which seem to lead to a uniform neuron-based theory underlying a new method for the analysis of melody. This theory is effective due to the fact that the auditory system of modern humans is basically shared by the majority of mammals. Thus, for instance, modern humans are equal as listeners but only until various cultures intervene and lead to stylistic polymorphism and to differences in the interpretation of heard stimuli. This conclusion is evident in the light of the neurophysiologic theory of Gerald Langner (to be published soon between two covers). According to him the period of a harmonic tone activates at least six neurons on three different layers of the inferior colliculus of the auditory midbrain. A cluster of activated neurons follows one after the other and a listener experiences a sensation of a firm "tonic" and the flow of musical processes in time.

So, where then did Rameau go wrong? His conclusion was that melody cannot be separated from harmony whose root is its fundamental bass. This is correct in the western polyphonic music but *invalid in any monophonic melody* because *a melody* activates the auditory neurons quite differently than *an accompanied melody* does. When analysing a melody Rameau did actually not analyse a melody but its polyphonic accompaniment (based on fundamental bass). This neuronal conclusion can be visually illustrated by simple examples and they may uncover why a tonal-based analysis is sometimes unsatisfactory and can even be called anachronistic as a method, as is done e.g. by Michael Tenzer (2006).

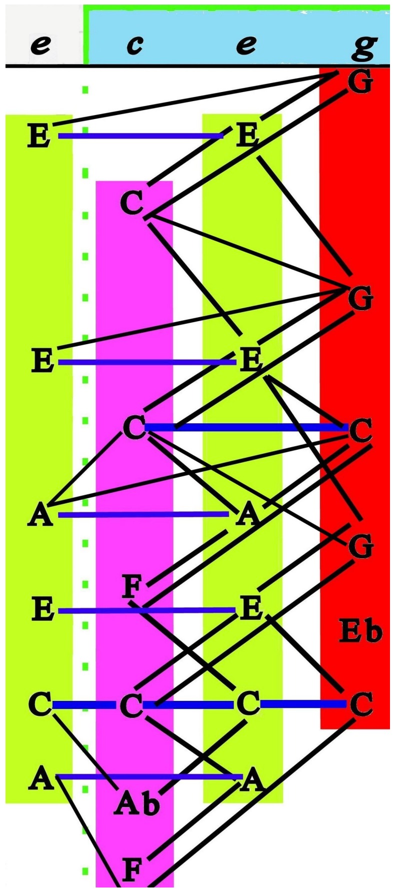
If the focus of analysis is melody and if the melodies analysed are selected from any region of the world, the tonal theory is invalid because it always takes it for granted that the tones of a melody automatically correspond to tonal degrees of a tonally definable key (G major, E flat minor, F sharp minor). For instance *Mary had a little lamb* is automatically defined a major tune but what is the justification? There is no other argument but a social consensus of musicians and researchers and anyone understands that no social agreement is enough to justify any conclusion of any branch of academic enquiry or science.

There is a method for the analysis of melody based exclusively on the Langnerian harmonic theory of the neuronal function of the auditory system. This musical theory is universal and entitled *Seeker Tone Theory*. According to this the four-tone *Mary had a little lamb* represents a certain group of *proto-pentatonal alleles* and this allele can be encountered in various parts of the world (even if performed in several different ways).

1



2



In Figure 1 the sung tone ***c*** activates a cluster of six neurons presented as a purple column. In Figure 2 tone **e** activates its cluster of six neurons seen on the left as a green column. When this sung tone is accompanied by the C major triad its tones ***c**, **e*** and ***g*** generate clusters of their own shown as simultaneously activated columns in purple, green and red. The neurons whose electric oscillations are harmonically related are connected by lines. Each line means that two simultaneously occurring spikes enter a Coincidence Neuron which is now activated as well. Thus, the number of lines in Fig. 2 presents roughly how differently the auditory neurons are activated by a solo singer (1) from that activated by a singer accompanied by triads (2). If the number of lines between two tones of a solo song (1) is two or three, their number in an accompanied song (2) can be counted as multiples of ten. This means that the auditory system is not only governed by one prominently activated neuron (like C in Fig. 1) but by several prominently activated neurons (like C, E, A, F and Ab in Fig. 2). This fact *invites a listener to harmonize* the performed melody with chords in accordance to C, E, A, F and Ab — but *not to analyse* the melody as it stands.

(The author is preparing a presentation of this theory as a book in English. The theoretical work was supported by the Academy of Finland in 2010-2011 [Project 135480] and in 2002-2003.)

References

Langner, G. (n.d.). http://www.labome.org/expert/germany/darmstadt/langner/gerald-langner-569462.html

Leisiö, T. and Ebeling, M. (2010). Neuronal Basis of Seeker Tone Theory. A Mathematical Solution. *Musiikki* 2.

Rameau, J.-P. (1971). [1722]: *Treatise on Harmony*. Mineola N.Y: Dover Publications, Ltd.

Tenzer, M. (2006). Introduction. *Analytical Studies in World Music*. Oxford University Press.