

Musical Hearing

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Abstract: *In 1883, when the first volume of "Tonpsychologie" by Carl Stumpf (1848-1936) appear - become classics – the psychologists took notice of experiences made – for the first time - on a category of sound judgment. The experiments in determining the absolute pitch would challenge to numerous and controversial discussions.*

Key words: *musical hearing, absolute hearing, musical consciousness*

Introduction

Stumpf held a series of experiments to analyze the comparison judgments concerning successive sounds. In this regard, he stated that *the ability of judging the equality or inequality of those is the root of that skill developed extraordinary at the musicians, to determine the absolute pitch or the name of a given note.*¹

Stumpf's subjects were first David Popper, a famous cellist and composer, Schenkel (violinist), Sladek (bass), and the author himself, violinist.

Absolut musical hearing

Stumpf research on the three subjects finds a certain point, beyond where the focus is no longer useful, determined by two conditions: first acting favourably to a certain point; the second unfavourably influencing even at the beginning of the experiment; For some subjects, the name of the piano notes was accompanied by the proper representation of the keys.

In 1892, Johannes von Kries (1853- 1928) publish his study entitled about *Absolute hearing* defining it as *the ability to recognize at any time from memory, the absolute pitch of notes heard.*² Also, Kries emphasizes that people with absolutely musical hearing do not recognize the name of the note comparing it with another note that keeps it in memory but *independent of such a sound or image of a determined pitches of the same*³. In the author's opinion, the hardest thing to achieve for those with absolutely hearing is to reproduce after hearing his name.

In recognition of the absolute pitch there are some deviations, which can reach up to an ascending or descending semitone. This situation is possible either because tunings, or because they are not used consistently smaller steps than semitone, which increases uncertainty in smaller sound steps recognition. Also, the dissonant chords recognition is more difficult to be done compared to the consonant chords; the recognition of the sounds in singing vocal with many voices (without instrumental accompaniment) is possible if the interval between voices are perfect and imperfect consonant (fourths, fifths, third, sixth).

Kries extended the recognition of an absolute pitch of vowels, which are *sung sounds* same as the notes sung with your mouth closed - without the presence of vowels - is harder to recognize than a sung sound on a vowel.

In 1902 occurs an important musical and psychological study *Absolute Tone Consciousness* by Otto Abraham (1872-1926). Abraham uses the term *absolute hearing* to refer to the ability to name exactly a given note and to sing or whistle exactly the note formerly called.

¹ A.C. Ionescu, *Educatie muzicala*, Editura Muzicala, 1986, p. 9

² A. C. Ionescu, pag. 14

³ A. C. Ionescu, pag. 14

The author differentiates absolute musical hearing (or absolute tone consciousness) of relative musical hearing (or relative tone consciousness) in that the first situation does not occur any logical reasoning (or conscious thinking), but simply hearing of a note immediately refreshed by representation of but simply hearing of a note refreshed immediately the name of that notes; in the second situations is present reasoning with premises and conclusions. For this reason, O. Abraham proposed for the second, the term called *the intervals sense*.

By experiences and observations, the author concludes that absolute musical hearing is a faculty that can be learned through training and / or education.

Fritz Reuter, in *The Musical Hearing on Psychological Bases*⁴ (1925) tries to substantiate the theory and practice of musical education of hearing based on *apperception theory* formulated by W. Wundt (1832 – 1920). Depending on the variety of perception, it distinguishes three kinds of hearing:

1. Active absolute hearing
2. Passive absolute hearing
3. Relative hearing.

The *active absolute hearing* is the ability to reproduce from memory (without the accompaniment of any instrument) notes with a certain number of vibrations; Those with *passive absolute hearing* possesses a different structure of a sound memory for the number of the sound vibrations; name of a note can be recognized only if it was first presented to an instrument or voice singing; those who have relative musical hearing have the ability to recognize intervals, without however to determine the notes after their name.

According to Reuter, who possess *relative hearing* can reach the *absolute hearing*. A complete analysis of *absolute hearing* was made by Boris M. Teplov in his doctoral dissertation *The Psychology of musical abilities* (1940) where he develops seven themes:

1. The active and passive absolute hearing;
2. The characteristic properties of absolute hearing;
3. The sense of tonality;
4. The development of absolute hearing at children;
5. Absolute hearing training to those persons who do not possess;
6. About absolute hearing nature;
7. Absolute hearing and musicality;

In his opinion the absolute hearing is *the ability of recognition and reproduction of the pitch which is not a proportional basis with other pitch*⁵. Those who do not have absolute hearing can not determine a particular pitch without a comparison model; the ability of recognition and expression of the pitch are not found combined at the same person.

Therefore, the absolute hearing is of two types:

- a) Passive (without recognition and reproduction)
- b) Active (the recognition and reproduction of the pitch)

Starting from the definition according to which the sensitivity hearing means the ability to analyze and differentiation of both the pitches and the relationships between them, reaching thus the sensitivity hearing, known as the *absolute hearing consciousness* or *absolute hearing* which consists by case, in receiving and reproduction of the note, identify a note without reporting to another.

In his research in order to identify the absolute hearing in preschool children and elementary school children the psychologist C. Ionescu finds two stages:

First, includes children aged between two and five years, manifested by accurate reproduction of melodic cells or melodic motifs; second, comprise aged six and seven, stage

⁴ Fritz Reuter, *Das musikalische Hören auf psychologischer Grundlage*, Leipzig Kahnt, 1925

⁵ A. C. Ionescu, *Educație muzicală*, pag. 94

which includes musical name note learning. During this time the pitches representation is assimilated into consciousness, achieving the connection between pitch, sign and name.

After learning the sign graphics of the notes specific to their pitches, the configuration increases with a new component of finding (locating) the graphic signs corresponding with the pitches.

Prof. Ionescu believes are four possible situations in the process of recognition:

1. From the keyboard (or fingering) by name to the image formed in consciousness;
2. From the graphic sign by name to the image formed in consciousness;
3. From the name, by the graphic sign to the image formed in consciousness;
4. From the image formed in consciousness, by name, to keyboard (or fingering);

Also, by the way connections of the three systems - hearing, visual and vocal, appears manifestations of absolute hearing. The research examines all functions aspects of absolute hearing: the recognition of the pitches and the reproduction, relations between them, of the tonalities, proposing a new terminology: *complete and incomplete absolute hearing*.

Another way to test the range of recognition and reproduction is the sensitivity for accuracy of the equal-tempered tuning; they were considered timbre influences and intensity as well as the short duration of the notes.

Melodic Hearing

The experimental researches of musical psychology have been targeted in the different European schools, to the phenomena of perception, reproduction and recognition of different and separate pitches, reaching the amazing analytical results as obtained in first psychological school from Berlin by Carl Stumpf.

The perception and reproduction types of the separate pitches have been materialized for a while by hearing the *brightness of the sound* and the *quality of the sound*, terms introduced by Franz Brentano and kept by Stumpf, Max Meyer and Geza Révész.

Another study from 1980 by Christian von Ehrenfels (1859-1932) shows targeting attention towards relations that are established between notes. The connection between these notes is the main target, while identifying the pitches became a secondary objective.

According to Ehrenfels the melody is *something more* than a summative collection of some components that when relationships between them have the same organization, by transposition, it retains unaltered its configuration. This new concept has been defined by the two school psychologists in Berlin by founders: Kohler, Koffka and Wertheimer. According to this view, they were directed on melodic hearing by experimental research, conducted by Hans Rupp, Fritz-Brehmer, William Stern, B. M. Teplov, C.E. Seashore, Martha Vidor, Albert Nestle, Maurice Chevais. In the same context are mentioned the school psychology from Cluj and Bucharest teachers and researchers as Liviu Giurgea, Paul Popescu - Neveanu and Mihai Golu.

The development of melodic hearing melodic – as an education process - follows an upward beginning in kindergarten and ends in an evolved form in higher education specialized.

To know the results of researches of Romanian school in the evolution regarding the development of melodic hearing is necessary to understand and know the limits of this development. Then it has to be known the upward or downward profile of melodic hearing development according to certain parameters of the subjects - age, gender, family and school. In support of these ideas C.A. Ionescu presented an experimental research done around on 150 preschool children.

The experiment contained four points:

1. questions about family musical environment;
2. the singing of a known song;

3. the perception and reproduction of separate notes from first octave, played at an electric keyboard and sung by subjects;
4. the perception and reproduction of some of the 44 melodic formulas, from the simplest to the most complex, representing the stages of musical hearing development;

Following this research, the author concludes:

- The preschool subjects conceive the melodic formula similar with a line, shorter or longer, uninterrupted, without pitches represent stopping points;
- The preschoolers singing takes the form of uninterrupted glissandos, up and down (or vice versa) from a pitch to another;
- Their intonation is centred in the middle of their voice ambitus, where the child can sing without vocal strain;
- When preschooler finds difficulty in intonation, they change deliberately the melody, avoiding even the small downward third leaps that turn into a major second (this actions is determined by the individual psycho-physiological peculiarities).

So, we understand that besides certain features related to our evolution in the society as well, and a certain artistic availability of each person, using an equal-tempered tuning instrument is very important in educating melodic hearing.

For students, the melodic dictate and tonal solfeggio have a significant contribution through functional and configuration tonal character to develop melodic hearing.

Harmonic and Polyphonic Hearing

Harmonic hearing is the second main subsystem of musical hearing. According to Hermann von Helmholtz (1821-1894) consists harmonic hearing consists in consonance and dissonance perception. The definitions given by this author about consonance and dissonance were formulated in his work about sounds frequencies and chords called *On the Sensations of Tone* (1863).

If two musical sounds are emitted simultaneously, their concordance is generally disturbed by sounds frequencies produce between them by the overtones of each two sounds, so a larger or smaller part of sound mass splits into discontinuous fluxes and the bi-chord becomes harsh. This report is called by Helmholtz *dissonance*.

If there are certain ratios determined between numbers vibration, which occurs an exception to this rule, which is not formed audible frequencies, whether these frequencies of simultaneously sounds are very poorly perceived by ear, and they do not cause unpleasant disturbances we call these cases *consonance*.

Helmholtz says about consonance that it can recognize depending on the smoothness sonority; dissonances are recognizable by harshness sound.

Carl Stumpf believes harmonic hearing *consists in perceiving degree of interference simultaneous sounds*⁶. Sound merging is the ratio of two special contents of the sensation, which form not only a sum but a whole. The theory about sound merger analysed by Stumpf generated interest for other representatives of psychological musical schools.

With H. Rupp begin a new period of harmonic hearing research, which will continue with Hungarian psychological school Geza Révész, in school from Graz with Maria von Briessen, in Russian school with E. Maltsev and Boris M. Teplov. In Romanian psychology the harmonic hearing was analysed by psychologists Paul Popescu - Neveanu and Mihai Golu in works as *The Sensitivity* and then P.P. Neveanu in *General Psychology Course*.

⁶ A. C. Ionescu, pag. 196

The Romanian psychologists defined the harmonic hearing through an analysis character "identifying the characteristics of pitch, duration and interval of sounds" as well as the synthesis character *operation to integrate and merge them into a unit configuration, spatial organized*.⁷

Harmonic hearing has different structure forms also as the emotional experience of music, leaving far behind the melodic hearing.

The Polyphonic hearing is psychologically explained by natural historical evolution, being conceived as a stage between the melodic and harmonic hearing and also as a preparation of the latter. The harmonic perception of polyphonic music implies the existence of the following premises:

- sound sharpness to compared pitches and intervals;
- clear sound representations about song structure as a whole;
- the ability to differentiate into melodic field;
- sense of chord.

Conclusion

The absolute hearing is the surest assumption which contributing to a rapidly evolving and certain understanding of musical language by forming an inner hearing, imaginative, as a form of knowledge of the sound world expressed through artistic and musical emotion.

The musician can not be considered as a factor separately, in isolation, but only in the psycho-sociological dimensions of the society in which it is integrated. Therefore, his behavior (professional performance exercised to the highest artistic level - higher education) makes up the contemporary note of the research on this aspect of subjects endowed with absolute hearing.

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⁷ P. Popescu - Neveanu, Golu. M, în C. A. Ionescu, p. 218