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HOW A MUSICAL EDUCATION SHOULD BE ACQUIRED IN THE PUBLIC SCHOOL.

By MAX MEYER, Ph. D., Fellow in Psychology, Clark University.

To what intent do we teach music in the schoolroom? Is it to enable every pupil to become a professional musician? Certainly not. Is music taught in the schoolroom because it answers the purpose of giving to the pupil as many opportunities as possible to develop the faculties of the mind, as we learn Greek and Latin merely for the purpose of mental training without any expectation of meeting any one to whom we may speak in Greek or Latin? Nobody has asserted, or probably will assert, that instruction in *music* serves this purpose. There is only one reason for teaching music in the schoolroom: to enable the pupil to enjoy music, to add to all that makes life worth living this one of the most noble sources of delight. And it is this capacity for enjoying the really artistic music that I mean by musical education.

Is it helpful for this purpose to teach the pupil who to play an artificially made instrument, or to use that instrument nature has given to him, his own voice, or to teach him musical theory? It is possible that it will help him to enjoy music if he is capable of playing an instrument by note. But to learn this requires so much time that the public school cannot afford this instruction, but must leave the pupil to get it for himself. What usually is done by the school is to let the pupils sing some songs and learn them thus by heart.

Perhaps it is not to be regretted that there is not sufficient time in the school for teaching the pupils to play an instrument. The majority of them would, in any case, remain bunglers, and, as every one is more or less inclined to think too highly of his own performance, would become accustomed to poor music and satisfied with it, at home and in the concert room too—a condition, of course, not favorable to the development of art. Instead of increasing the doubtful music of dilettantes a greater part of the public should be enabled to enjoy the works of the great composers when performed by a real virtuoso.

Still there remains the important question whether knowledge of musical theory can help one to enjoy music. Here we have to distinguish two sorts of enjoyment, the intellectual and the æsthetic. Intellectual enjoyment results from every mental

process that attains its end. If we succeed in settling difficulties, in solving some problem or other, we are pleased; *e. g.*, if we succeed in recognizing a picture, until then unknown to us, as a "van Eyck," or in distinguishing a harmony we are listening to, as a chord of the Fourth and Sixth. Quite different from this pleasure is the æsthetic enjoyment that results from the perception itself, *e. g.*, from the inspection of that picture, whoever be its painter, an enjoyment that cannot be enlarged nor diminished by knowing its originator, any more than the euphony of a harmony can be altered by the knowledge that it is a chord of the Fourth and Sixth. This æsthetic enjoyment is the only one we have to deal with here, because the intellectual pleasure, depending indeed upon knowledge of musical theory, is not at all a particularly musical one, but belongs to any kind of mental activity.

Now, we have to question what are the psychological conditions of æsthetic enjoyment of music. It is not easy to answer this question. But few investigators can be found who have wrought with success in this special field of psychology—"tone psychology," as Prof. Stumpf has called it. Here are to be mentioned not more than four names, one of them very old: Pythagoras, the Greek philosopher (about 570-500), Rameau (1683-1764), Helmholtz (1821-1894), and Stumpf (born 1848). In addition may be mentioned Riemann (born 1849). Of course many others have contributed to the psychology of music; however, their work is of less importance and without any considerable influence upon the development of tone psychology. Especially the innumerable text books of harmonics are quite worthless regarded from a scientific standpoint. They contain but mere enumerations of harmonies and resolutions of discords used by certain composers. Though the description of facts is the task of science, the facts have to be described not each separately from the others, but each one as a special case under a general law. Such laws are scarcely to be found in those text books. The rules we find there are like grammatical rules. They seem to have been laid down for the purpose that exceptions may be noted too. But rules that admit exceptions can by no means be accepted as scientific laws.

We owe Pythagoras the statement of the law under which certain tones are related to certain others. In cases of simultaneous tones the relation may be called consonance, its absence or—with simultaneous tones—rather its existence in a less degree, dissonance. The discovery of Pythagoras was that the psychological relation to each other of any given tones can be determined quite independently of the ear, so that it can be predicted what psychological effect certain tones will produce. This effect depends on the simplicity or complexity of the ratio

of the vibration rates, viz., of the numbers of vibrations made by the sounding bodies in a unit of time. However, Pythagoras did not distinguish in detail, as modern psychology attempts to do, the different kinds of psychological effect, using only those two quite general terms: consonance and dissonance. Nevertheless his discovery is the basis of every further investigation in the psychology of music.

After a torpor of more than two thousand years our science returned to a new life. In 1700 the French physicist Sauveur communicated to the "académie des sciences" a series of investigations upon sounding bodies. He gave this science the name acoustics. The further development of acoustics took place in two directions, one more physical, the other more psychological. We have to consider here but the latter.

Sauveur's investigations in acoustics were used by Rameau in his construction of a theory of harmony. This theory, published 1721, was as highly esteemed by some people as it was scorned by others. Rameau started from the fact that a sounding body generally causes us to hear a larger or smaller sum of pitches, partial tones, the vibration rates of which are to each other as 1:2:3:4:5. Now, any harmony may be apprehended, by identifying octaves, as a sum of partial tones belonging to a fundamental tone "1," that need not really be present in the harmony, *e. g.*, C in the chord $c'-e'-g'$, $C=1$, $c'=4$, $e'=5$, $g'=6$. Many of his contemporaries attacked Rameau's theory, since they misunderstood it, as if he had required that tone "1" be a real fundamental bass, whereas he meant by it only an ideal one. It is a pity that Rameau did not restrict himself to numerically describing the relations of tones as they are found in harmony and melody, but tried to explain those facts by hypotheses more or less metaphysical. That property of sounding bodies of producing partial tones can hardly be itself—as Rameau thought—the cause of the psychological effect of harmonies.

Helmholtz was less interested in the merely psychological problems than in the physical and physiological ones. So he particularly inquired into the physiological conditions of our auditory perceptions, nevertheless to the great advantage of psychology. Even tone psychology shows us how much the progress of psychology—though far from being identical with that of physiology—depends upon the latter.

It was Helmholtz, who caused it to be generally recognized that a compound air wave after reaching the ear must be resolved into a number of single stimuli, each of them effecting one of the simultaneously heard pitches. However the particular way in which Helmholtz thought this resolution of the air waves to take place, viz., by means of resonators, tuned fibres in

the ear, cannot be any longer maintained, since it contradicts a great number of more recent discoveries. But there is no difficulty in explaining that resolution of air waves by the ear in another way,¹ so that we need no longer be content with the meaningless expression of former times, that the soul was able to distinguish and recognize the most complicated form of waves.

While Helmholtz's work had its center in physiology, Stumpf attempted from the merely psychological standpoint to penetrate into the secrets of auditory perceptions. Nevertheless his work is based upon the results of modern physiology and physics. The results of his researches are embodied in two volumes on "tone psychology" and in some smaller articles; while further contributions are to be expected.²

It is a matter of course that the problems there discussed belong to the first elements of tone psychology, and that therefore the outsider who wishes to know the final results of science is not much concerned in them. Nevertheless these investigations are of great value, since a scientific research that rushes immediately upon the final aims without having settled beforehand the important, although less interesting elements, ultimately can conduct but to a seeming success. It may be mentioned that Stumpf has shown that all the attempts hitherto made to explain physiologically or psychologically the relationship of tones in melody and the consonance or dissonance in harmony, including that of Helmholtz, are to be regarded as unsuccessful, and that for the present we must be content with the mere fact of relationship and consonance itself.

Of others who have contributed to the psychology of music I will mention, by the way, only Riemann, whose investigations in musical accentuation seem to be becoming influential in the further development of tone psychology.

After this digression, showing how little has yet been done in tone psychology, we may turn back to our question: what are the conditions of æsthetic enjoyment of music? Doubtless the potentiality of æsthetic effect of music is based upon the property of pitches of being related to each other in different rates, of being more or less consonant. This property has not yet been duly examined, as we saw, but so much is true, that with a quite inconsiderable exception everybody is endowed with the faculty of being affected by musical tones according to their relationship, so that the common expression, this one and that one has no ear for music, can seldom be regarded as justified.

¹ I have shown this in my paper "Zur Theorie der Differenzttöne und der Gehörsempfindungen überhaupt," *Zeitschrift für Psychologie*, Vol. XVI, pp. 1-34, 1898.

² C. Stumpf: *Beiträge zur Akustik und Musikwissenschaft*.

In accordance with this statement we find that every one, almost without exception, likes to hear single melodies, whether sung or played on an instrument. But in the case of polyphonic music, sonatas, symphonies, etc., we find many people saying they could not acquire a taste for this music. In order to understand this, we have to inquire after the psychological conditions causing the difference in æsthetic effect of music composed for a single voice and of polyphonic music.

Let us assume some one hears a sound consisting of ten tones. What then is the relation of attention to these ten tones?

Usually one takes for granted that our attention can be fixed upon one psychical content only, not simultaneously upon several ones. Although this in the strict sense of the word is wrong, it is right in as far as, lacking particular practice, we are unable to turn our attention equally to several things at the same time. Attention is usually fixed upon one psychical content in a high degree, upon some others but slightly, upon the rest of real sensations not at all.

The unpracticed hearer of these ten simultaneous tones has his attention drawn to only one of them, or, more exactly speaking, to only one pitch. Only one tone sensation possesses sufficient psychical energy to be marked as a certain pitch, all the others lack that energy. But the latter do not remain completely ineffective, but cause what is called the quality of the tone. Which of the ten tones thus overwhelms the others, does not depend upon chance, but upon certain, although not yet quite exactly known, conditions, of which relative intensity seems to be the most powerful one.

Now let us apply this to the hearing of music. Any one—supposing that he is among the slightly practiced average men—hearing a melody sung or played, with a not too complicated accompaniment, will fix his attention on the tones of the melody. The tones of the accompaniment he usually does not mark as pitches, but as a continually shifting quality of tone, belonging to the melody tones. Surely in this case the hearer loses a great deal of æsthetic enjoyment, this being considerably higher when the hearer is able to perceive the accompanying tones as pitches instead of as quality of tone. But the enjoyment of a piece of music still more complicated, *e. g.*, a sonata, is impossible at all to such a hearer, because, in this case, the æsthetic enjoyment is conditioned by discrimination of the single pitches.

We have, therefore, to look for means to help fix attention upon each several tone simultaneously. Then, what we called quality of tone partly disappears; and in its place there is a real plurality of perceived pitches. Only when all the pitches of simultaneous tones really are perceived, has music the power to affect the hearer by all its beauty, by its artistic structure of

auditory sensations in simultaneousness (harmony) and succession (melody). Although this division of the attention to each several tone very often is not possible at all because of the chord being composed of too many tones, it is an ideal to which we have to approach nearer and nearer.

Now, there are various ways to aid the discrimination of simultaneous tones on the part of those who are not so highly gifted as to be capable of giving a divided attention to simultaneous tones without much practice. We may let them listen to each voice of polyphonic music separately and thus commit it to memory. Then in the complete piece of music the different tones of each chord are nearly equally stimulating to attention, and it is not as easily possible for one of them to overpower the others and be the only one perceived as pitch, while the others remain unperceived as pitches and become effective only in the quality of tone.

To learn by heart the single voices is, however, hard work and takes much time. We have, therefore, to look for an easier method of enabling the hearer to turn his attention to the tones which will occur, by having him know what these tones are to be.

We may call in the aid of visual sensations. We might give the hearer the score, so that he can see at any time how many and which tones he will hear and thus be enabled to pay attention to them. But for this it is prerequisite to have learned to read the score. The great majority of men, however, having no sense of absolute pitch, notwithstanding a perfect knowledge of notes, are unable by seeing a certain note to reproduce an associated corresponding pitch. They are able to conceive a certain pitch only by selecting out of the notes the intervals. Under these circumstances one may think it well to give up the notes entirely and to compose a score of notations of intervals. But in this way a clearly arranged picture of musical forms can hardly be gained. Obviously it is preferable to arrange a picture by means of notations of musical phrases. The number of phrases is of course smaller than that of intervals. Moreover it is far easier—in spite or rather because of the greater complexity—to associate with a certain sign a phrase than a single interval.

A method similar to this has recently been adapted by Hövker, a German teacher of music. He has described his method in an interesting essay, entitled: "*Die graphische Darstellung als Mittel der Erziehung zum musikalischen Hören.*"¹ In order to give his "pictures of musical forms" he keeps in the

¹Sechzehnter Jahresbericht über das Herzoglich Anhaltische Landessemninar zu Cöthen, 1898.

main the customary musical lines and notes, but rejects with good reason that great number of musical signs which are absolutely necessary for performing music but thwart the purpose of giving the hearer an easily readable programme.

As a specimen of such pictures of musical forms the beginning of a fugue of Bach's is given here.

Höcker uses these pictures even at the first instruction in music in order to call the pupil's attention to the fact that every song, however small and simple it may be, is composed of partial tunes, of phrases. Each phrase is represented by a figure gained by connecting the heads of the notes by means of dashes. Thus the pupil is accustomed to look for the component parts also in the larger and more complicated compositions, and by so doing to cultivate his æsthetic judgment. But still more helpful than for distinguishing the single *successive* phrases are these pictures for clearly perceiving the structure of polyphonic music with regard to the *co-existence* of tones.

Höcker reports to us some instances which prove the value of his method. A slightly talented person, but one who had taken for several years regular instruction in singing, playing and theory, could not acquire any taste for sonatas, symphonies, and fugues, not being able to understand them. By the help of these pictures he very soon became capable of showing the theme on the picture of a fugue in three voices in whatever voice it was heard. Still more surprising are the results in persons who are not acquainted with musical notation at all, and therefore not capable of note reading. Usually after a short practice they become able to associate the single figure with the tune heard and to understand the structure of a whole piece of music by means of these pictures. So when hearing music they know by looking at the picture how to turn their attention in order to enjoy the music.

Thus there appears the possibility of enabling a majority of people to enjoy artistic music without the drudgery of acquiring a perfect acquaintance with musical notation. However, the use of such pictures, although not very difficult, re-

quires some practice to be successful. Not likely to be considered by an adult as interesting in itself, this practice should be acquired during the school years.

I need not explicitly say that I do not reject instruction in singing and playing. But I do not grant that a man may be regarded as musically educated when having acquired only that technical skill. Doubtless it will be advantageous for every pupil to learn to sing and to play; and many better talented ones may acquire even thus a sufficient practice for æsthetic enjoyment of music. But the faculty of *enjoying* music by hearing is far more desirable than that technical skill in itself; and where only one or the other is possible, one should not hesitate to choose this æsthetic capacity.

The system as used by Hövker will not probably prove to be the best attainable. It is the first step on a way hitherto untraversed. But by introducing this system into the public school an opportunity would be given also for its improvement by experience. Furthermore it is often difficult to find out what melodious parts have to be regarded as psychological units and therefore to be represented by a separate figure. I hope that in this respect my own work of analyzing music into the smallest psychological units will prove to be helpful.¹ The application of the psychological theory of music to the practice of teaching is doubtless a promising field for the teacher who recognizes the necessity of improving the method of teaching music.

¹ Elements of a Psychological Theory of Melody, *Psychological Review*, Vol. VII, No. 3, pp. 247-273, May, 1900.