The ethnological study of music / by Charles S. Myers.

Reprinted from

ANTHROPOLOGICAL ESSAYS

PRESENTED TO

EDWARD BURNETT TYLOR

IN HONOUR OF HIS 75TH BIRTHDAY OCT. 2 1907

THE ETHNOLOGICAL STUDY OF MUSIC

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Introductory.—It is hardly surprising that the ethnological study of music has been neglected until recent times. For, in the first place, its recognition as a serious branch of scientific investigation has been very tardy. Not long ago we were all of us apt to look on primitive music just as the Greeks regarded the language of their neighbours. We now know that, disorderly and meaningless as unfamiliar language and unfamiliar music at first appear, an inherent order and a meaning are revealed after sufficient study and habituation.

In the second place, the subject has until recently demanded a worker who is alike a trained ethnologist and a musician. But within the last fifteen years, the use of the phonograph has enormously lightened the weight of musical knowledge, which the worker must otherwise take with him into the field. It is now possible for the ethnologist of very moderate musical attainments to collect phonographic records and other data of great musical interest which can be worked out by the specialist at home.

The theorist should henceforth have no cause for complaint of paucity of material. Nor need he longer rely on the unverifiable guesses and errors made by independent and often untrained observers in the field.

Contamination of primitive music.—There is hardly any other branch of ethnology where so much remains to be done, and where the opportunities for research are so rapidly vanishing beyond recall, as the study of comparative music. The borrowing and adulteration of music proceed apace. When tribes, formerly hostile, become pacified, fresh routes are opened up for the mutual exchange and contamination of different styles of primitive music. When sacred and profane European tunes are introduced by the missionary or the trader, unpolluted aboriginal music soon has a precarious existence.

We have evidence of these conditions in the influence of Arabic or Portuguese tunes introduced into Africa, and in the spread of favourite native airs throughout North America and throughout Australia.

The effectiveness of a borrowed tune amply compensates for the strangeness of the words that may belong to it. The words are commonly sacrificed to the tune. So long as the latter is acceptable, it matters little that the former are meaningless. We frequently find that liberties are taken with words, or that meaningless words or syllables are introduced into primitive music. Yet another cause of the presence of meaningless words lies in the antiquity of the music. The words become so archaic, or their sense was originally so involved or so symbolical that all meaning gradually disappears as the song is handed down from generation to generation.

The expressive function of music.—Music is a recognized means of intercommunication, and must hence be regarded as a language. But the language of music differs from verbal language in that it can communicate only emotions (or feelings), while verbal language serves for cognitive (intellectual) as well as for emotional expression. Thus when we employ words, we communicate not merely a feeling, say of joy, anger or sorrow, but also the events or ideas which are bound up in those feelings.

In expressing feelings by spoken language, our words vary in pitch according as we are making a statement or asking a question, our voice changes in loudness according as we are angry or calm, the timbre of our voice differs according as we are sarcastic or persuasive, the speed of our words and the rate of respiration alter according as we are excited or depressed. Now music, as we have said, can only communicate such states and changes of feeling. Music can awaken in us feelings of joy, excitement, sadness, resignation, courage, uncertainty and the like, but it cannot communicate to us the ideas which are the cause of such feelings. These ideas are the product of each hearer's fancy. That is to say, the language of music is devoid of acknowledged signs for *cognitive* expression.

To investigate the degree of universality of those signs in verbal and musical language which serve to communicate states of feeling, is a matter of no small interest. We would know how far the modifications of verbal language in respect of pitch, loudness, timbre and tempo serve as universal methods of communication, and similarly how far the feelings of sorrow, joy and the like, which

a given piece of music evokes in the community that produced it, are shared by the members of other communities more or less advanced in civilization.

The origin of music.—We may regard musical and verbal language as derived from a common source, namely from the tendency to give vent to feelings by vocal expression. There are, however, other theories as to the origin of music which lay stress on more special factors. One of the objects of the ethnological study of music should be the determination of the importance of these various factors.

It has been suggested, for example, that music arose from the imitation of notes of birds and other natural sounds—a conjecture closely analogous to the supposed onomatopoeic origin of verbal language. The suggestion has also been put forward that music began when primitive man vied one with the other in exhibiting his superior attractiveness before women. Other theorists, looking to the value of rhythmical music in furthering work and in dancing, and having regard to the delight taken by primitive people in the beats of the tom-tom, have laid chief stress on rhythm as the source of all music. Here, again, is a conjecture which can only be verified by the systematic study of primitive music.

Rhythm and melody.—While some examples of primitive music are characterized by a total absence of rhythm and appear to be melodic elaborations of the recitatif, in other examples rhythms of such complexity are introduced that they defy analysis by the civilized European ear. Not infrequently the accents or measures in the melody are opposed to those in the accompaniment. In India and apparently among the Arabs and certain other peoples, successive notes of very different duration are grouped together and recognized as a unit, each unit sometimes receiving a special name and having a special use according to circumstances.

Rhythm and harmony.—The widespread occurrence of complex rhythms among primitive peoples is perhaps intimately related to their generally scant feeling for harmony. In Europe the development of polyphony (in which various independent melodies are sung simultaneously) was regulated by the growing regard for consonances and dissonances. Certain tones when sounded together appeared agreeable, others were deemed unpleasant. Thus arose the distinction between consonant and dissonant combinations. The most perfect consonance is given by the octave, i.e. by two

tones whose vibration-frequencies stand in the ratio 1:2. (The number of vibrations per second determines the pitch of a tone.) The next most perfect consonance is given by the fifth, the corresponding ratio for which is 2 : 3. Then follows the fourth (3 : 4). Our attitude towards the various musical intervals has differed considerably at different stages in the history of European music. Thus the thirds, major (4 : 5) and minor (5 : 6), and the sixths, major (3 : 5) and minor (5 : 8), which are often called imperfect consonances, were not admitted as consonances until the thirteenth and fourteenth centuries. At the present day, not all the imperfect consonances are admitted into our system of harmonies. The harmonic tritone, for example (5 : 7), does not enter.

Fusion.—The degree of consonance is literally dependent on the extent to which the two tones 'sound together' (con-sonare). So complete is the fusion between a tone and its octave that even the most musically gifted people find difficulty in deciding whether two such tones are simultaneously sounding or only one. Less musical people make similar mistakes when the simultaneous tones employed are separated by a fifth, or by another less consonant interval. The less the degree of consonance, the less erroneous the decision. When the interval is distinctly dissonant, e.g. a major (8 : 9) or minor (15 : 16) second, or a major (8 : 15) seventh, there is practically complete absence of fusion.

As polyphonic music began to develop in Europe, the growing feeling for consonance and dissonance demanded that a strict uniform tempo be kept by the various executants. Clearly the harmonious effects would be utterly spoiled unless the parts were in exact time with one another. This condition was most easily attained when the accents recurred regularly and the rhythm preserved a fairly simple character.

Polyphony.—Polyphonic music is far commoner than is generally supposed in the music of other than European peoples. The purposeful use of simultaneous harmonies, especially of octaves and fifths, is not unusual among semi-civilized people. But the several parts are invariably permitted a freedom of movement which is denied to our own music, and the different simultaneous rhythms are allowed full scope for independent development. Such polyphonic music—or to adopt a more appropriate name that has been suggested, such 'heterophonic' music—surely demands of the native audience the same oscillations of attention as occur in us when we

listen to two persons talking simultaneously. Our attention turns alternately now to the one voice, now to the other, and we intentionally neglect the jarring effect of the simultaneous voices upon consciousness. For our comprehension of the sense, it matters little what times these speakers keep relatively to one another. In like manner it is not considered imperative for the individual parts of a primitive orchestra to keep a prescribed time. Variations are permissible, dictated by the taste of the performers.

Harmony in primitive music.—To what stage and by what steps the feeling for harmony has advanced among primitive people, can only be settled by systematic investigation. Attempts have been made to ascertain whether such people show a preference for consonant and a dislike for dissonant pairs of simultaneous tones, or whether they regard various pairs or triads of tones as differing in affective (e.g. exhilarating or depressing) value. But no satisfactory results have yet been obtained. It is clear that both native and European intervals should be presented, that the intervals should be sounded on native and not merely on European instruments, and that repeated judgements must be obtained before reliance can be placed on such comparisons. Other investigators have hoped to arrive at an answer by playing primitive melodies on the piano, harmonizing them now in one way, now in the other. But the likes, dislikes or indifference of the natives, ascertained by such a rough method of experiment, cannot be accepted as trustworthy.

We must bear in mind that the disorderly use of simultaneous tones in primitive orchestra or chorus does not necessarily imply an inability to distinguish between harmony and discord. One may be quite able to discriminate between two experiences, although in practice one may totally neglect the differences between them; we may, for example, give the same name to two really distinguishable objects. To argue that primitive man cannot distinguish blue from green (or salt from sweet) because he designates them by the same name would be absurd. But it is hardly less absurd to insist that the feeling for consonant intervals is absent among a given primitive people which totally disregards it in their music. It is quite conceivable that the neglect of the principles of harmony in primitive music may be due partly to the difficulties of securing exact intonation, partly to the peculiar intervals and scales which have become imposed upon them, and partly to such an uncontrolled desire for

massiveness of sound that any tendencies for putting their feeling for harmony into practice are at once repressed.

Styles and social function of music.—Some of the changes which the music of a given people has undergone in the course of its development may be revealed by a careful comparison of the older with the more modern tunes. Nearly every people, however primitive, preserves what we may term its classical music. Such music often becomes invested with a sacred character. It may be performed only in secret initiation ceremonies, or during religious observances. In this connexion the native myths regarding the origins of music and musical composition should be studied.

The position of music within a community is no doubt largely responsible for the number of coexisting styles of music, and for the degree of conservatism obtaining. When musical instruments are to be found in nearly every family as in Japan, there are many different styles of music, which are strictly confined to certain classes of performers. Where instrumental music is limited to professional players, its theory and practice are apt to be treated as secret, and are regarded as the property of the guild. Under such circumstances musical education is dependent solely on tradition, and any attempt at musical notation is discouraged. In Japan the beginnings of notation are to be seen, but the figures therein employed refer to particular instruments, e.g. to the hole which has to be unstopped on the flute, or to the fret on the guitar at which the finger has to be placed in order to produce the required note. Musical notation also exists in India and China, and was employed by the ancient Greeks and mediaeval Arabs.

Scales.—Tones may be regarded as the vocabulary of music. If we collect all the tones which a given people ever introduce into their music and arrange these tones as a scale in the order of their pitch, such a collection is analogous to a vocabulary of words. But just as not every word which is to be found in a dictionary is appropriate in a given literary work, so not every note which occurs in such a scale can be indiscriminately employed in a given piece of music.

We have thus to distinguish two kinds of scales, of which the one is obtained as described above, by collecting all the tones utilized in the various tunes of a given people, while the other is formed by collecting tones which are to be found in a single tune. We may term the former a 'general' scale and each of the latter

a 'particular' scale. The music of a given people, therefore, consists of a single general scale, and of a series of particular scales.

Now the tones which a people employ in their music are not merely dependent on their aesthetic appropriateness. Their exact pitch is in part determined by the construction of musical instruments, and by the difficulties of instrumental technique. The arrangement of the holes of flutes and of other wind instruments is sometimes dictated not by auditory considerations, but by principles of symmetry or by other determinants.

Moreover, mathematical principles have always influenced the fixation of the pitch of tones, wherever civilization has sufficiently advanced to enable calculation to do so. Among the Greeks, Pythagoras divided the string in the ratio of 2 : 3, and the Chinese shortened the pipe in the same ratio. They thus produced the interval of a fifth, and they divided the shortened pipe or string again in the same ratio, and repeated the procedure, thus obtaining a geometrical progression of fifths, bearing these relations to the initial tone :—

$$\tfrac{2}{3},\ (\tfrac{2}{3})^2,\ (\tfrac{2}{3})^3,\ (\tfrac{2}{3})^4,\ \&c.$$

Other mathematical principles have also played a part ; so, too, has the mystic value of certain numbers. It remains yet to be proved by accurate observation how far many of the abstruse speculations of the mathematical theorists are actually embodied in practical music. We may hopefully look to discovering the 'natural' intervals that are employed by a given people when these controlling influences of authority and convenience are, so far as possible, experimentally removed.

We must be on our guard against placing too great a reliance on the speculations of comparatively modern theorists. In the development of European scales, for example, it would be rash to suppose that the octave has always been the distance theoretically subjected to division. The earliest Greek melodies, for example, appear to have had a much narrower compass. The tetrachord is thought to have been the first attempt at a scale in Greece. It consisted of the interval of a fourth divided into three parts. Another added tetrachord subsequently completed the octave.

The mode of construction of the particular scales is found to vary widely among different peoples, and even among the same people at different times and in different kinds of music. Most usually the octave of the particular scales is divided into five or

seven tones. The five-toned or pentatonic scale occurs in every continent. A common form of it, found, for example, in Chinese, Japanese and Scottish music, omits the fourth and the seventh, so that the octave starting from *c* runs thus :—

c *d* *e* *g* *a* *c*, the intervals of which correspond to
1 1 $1\frac{1}{2}$ 1 $1\frac{1}{2}$ of our whole tones. Our
own heptatonic scale runs :—

c *d* *e* *f* *g* *a* *b* *c*,
1 1 $\frac{1}{2}$ 1 1 1 $\frac{1}{2}$

of which the intervals between *e* and *f* and between *b* and *c* are (approximately) half the size of the other intervals.

It is not unusual to find slight deviations from an otherwise strictly pentatonic or heptatonic scale. A given tune may be obviously pentatonic or heptatonic in structure, save for the inclusion of one or two comparatively unimportant or 'grace' notes.

Many other forms of the pentatonic scale besides the above are described, of the derivation and interrelation of which we are wholly ignorant. Thus in Japan the following forms (and others) appear to be in use :—

c *d* *f* *g* *a* *c*,
1 $1\frac{1}{2}$ 1 1 $1\frac{1}{2}$

c *d* *e*♭ *g* *a*♭ *c*,
1 $\frac{1}{2}$ 2 $\frac{1}{2}$ 2

c *d*♭ *f* *g*♭ *b*♭ *c*,
$\frac{1}{2}$ 2 $\frac{1}{2}$ 2 1

c *d*♭ *f* *g* *a*♭ *c*,
$\frac{1}{2}$ 2 1 $\frac{1}{2}$ 2

c *d* *e*♭ *g* *a* *c*,
1 $\frac{1}{2}$ 2 1 $1\frac{1}{2}$

c *d*♭ *f* *g* *b*♭ *c*,
$\frac{1}{2}$ 2 1 $1\frac{1}{2}$ 1

c *d* *f* *g* *a*♭ *c*,
1 $1\frac{1}{2}$ 1 $\frac{1}{2}$ 2

Many forms of the heptatonic scale were recognized in early European music, but in modern times they have become limited to two, the major and the minor. Among the ancient Greeks, for example, we find the following modes :—

(*a*) the Lydian :

c d e f g a b c,

corresponding to our major mode.

(*b*) the Ionic or Hypophrygian:

$$c\ d\ e\ f\ g\ a\ b^{\flat}\ c,$$

(*c*) the Phrygian:

$$c\ d\ e^{\flat}\ f\ g\ a\ b^{\flat}\ c,$$

(*d*) the Aeolic:

$$c\ d\ e^{\flat}\ f\ g\ a^{\flat}\ b^{\flat}\ c,$$

corresponding to our minor mode.

(*e*) the Doric:

$$c\ d^{\flat}\ e^{\flat}\ f\ g\ a^{\flat}\ b^{\flat}\ c,$$

(*f*) the Mixolydian:

$$c\ d^{\flat}\ e^{\flat}\ f\ g^{\flat}\ a^{\flat}\ b^{\flat}\ c,$$

(*g*) the Syntonolydian:

$$c\ d\ e\ f^{\sharp}\ g\ a\ b\ c,$$

and further complications, derived from these, have been described.

These different 'modes' are here written out, all beginning on *c* merely in order to facilitate comparison. Apparently the Greeks employed different modes according to the metre chosen, and they came to attach broad distinguishing characteristics to each of the modes. The Dorian mode, for example, was reputed to be severe and virile, others to be smooth, erotic, suitable for boys, and so forth. But writers differ so much in their attitude to the various modes that it is impossible to lay much stress on their opinions. It is not improbable that if we had more information as to the ways in which different kinds of music are regarded by the theorists among modern semi-civilized communities, some light might be thrown on the at present obscure views held by the ancients.

In certain forms of Arabic music and on the Scottish bagpipe, the following heptatonic scale occurs:—

	g	*a*	*b*-	*c*	*d*	*e*-	*f*	*g*,
showing intervals of	2	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$1\frac{1}{2}$	$1\frac{1}{2}$	2	semitones.

It will be observed that this scale gives a neutral third of three and a half semitones, intermediate between the major and the minor thirds.

The origin of the pentatonic scale is unknown. It is easy to conjecture that after the octave the fifth (e.g. *c*—*g*) may have been the next recognized interval, and that by taking a fifth from *c* downwards—thus reaching *f*—and by raising the latter an octave, the four tones *c*, *f*, *g*, *c* may have been reached. By such means the

interval of a whole tone *f*—*g* would be also reached, and this interval, once fixed, may have been imitated by placing a tone *d* at a similar distance from *c*, and a tone *a* at a similar distance from *g*. Thus we arrive at a pentatonic scale of the form *c*, *d*, *f*, *g*, *a*, *c*.

Equal temperament.—We have just hinted that small intervals may be produced by judging equal distances. This seems actually to have determined the formation of scales in Siamese and Javanese music. The octave is here divided into seven and into five equal intervals respectively.

But while we can only dimly conjecture the causes and methods that have resulted in the construction of such 'equally tempered' intervals, it is easy to understand the origin of the similarly tempered general scale to which those of our own instruments that have fixed tones, e.g. the piano or the harmonium, are attuned. Our particular scales are almost always heptatonic, consisting approximately of five whole-tone and two half-tone intervals. These intervals, as we have said (p. 243), were once arranged in various orders, each order constituting a mode. In modern times, however, our scales have become restricted to two modes, the major and the minor, the most important difference between which consists in the interval between the first and the third tones of the scale. The major mode contains the major third (4 : 5), the minor mode the minor third (5 : 6). The intervals of our scale came at one time to be determined by the consonant relation of tones to one another. Thus the distance *c*—*g* was in the ratio 2 : 3, *c*—*f* in the ratio 3 : 4, and so on. But difficulties at once presented themselves when the scale of a melody instead of beginning on *c*, as in a previous melody, now began on *d* or *e*. A little consideration of the new ratios involved will show that such changes of key necessitate the construction of new intervals which are often not quite identical with the tones of the previous scale. It was in order to overcome this difficulty that the system of equally tempered tuning, now in vogue, was introduced. The octave is divided into twelve equal intervals of a semitone. None of the intervals, whatever be the key of the major or minor mode, exactly corresponds to the requirements of strict harmony. Every interval within the octave is a compromise which is satisfactory in so far as it allows us to employ a comparatively small series instead of an enormous number of notes, in instruments like the piano which have fixed tones.

It has been shown that, in spite of such artificial mistunings to

which from infancy our ear is exposed, musical persons still tend to sing truly consonant, instead of tempered, intervals and to play consonant intervals on instruments like the violin which have variable, instead of fixed, tones. We have consequently to recognize 'instrumental' scales, as well as the general and particular scales with which we have hitherto dealt. Further, we see how important it is to study not only the instrumental but also the vocal music of a given people.

Quarter-tones.—The Arabian theorists included quarter-tones in the scales which they constructed, and it has been stated that in Syria a scale occurs consisting of equally tempered quarter-tones. The various quarter- and third-tone scales described by Arabian and other writers are probably always general scales; they are rarely, if ever, particular or instrumental scales. When quarter-tone intervals occur in any piece of Arabic music, the notes concerned are only grace notes or play an otherwise unimportant part in the melody.

In Indian melody, however, these grace notes are considered to be of very great importance in adding to its expressiveness. Here we find the so-called 'śrutis', intervals varying between one third and one quarter of a tone, which are treated as essential features of the melody. Yet these śrutis never appear to be fixed by the frets of the stringed instruments; they can be produced only by slightly varying the tension or the position of the finger at the place of the frets. Much inquiry is yet needed before the problems of Indian music can be settled. At present we can only regard with considerable suspicion the hitherto generally accepted view that in the Indian general scale the octave, with its seven intervals, is subdivided into twenty-two tones. Recent investigators have suggested that the Indian general scale is identical with our tempered twelve-tone scale of chromatic semitones.

The 'rāgas' play a most important part in Indian music, but in the face of so much disagreement among writers on the subject we can form no clear idea as to what rāgas are. Certain of them are deemed appropriate for certain seasons, some can be played only in the day, others by night. The rāgas are symbolized as individuals, male and female (rāginīs).

A rāga is not to be identified with a scale, inasmuch as there are several different rāgas in the same scale. Nor is it synonymous with the mode, as different rāgas appear in the same mode. Yet every rāga is said to have a definite mode, and to obey the succession of

intervals found in a definite scale. Mixed rāgas also occur, formed from the union of different modes and scales. At present the whole problem of Indian music is involved in obscurity. Its solution requires the co-operation of native and European musicians, so that the traditions and claims of the one may be verified by the accurate and unbiassed observations of the other.

Harmonic intervals in melody.—In the tunes of very primitive people, who always sing in unison and have no knowledge of polyphonic music, we often meet with successive tones which, if sounded together, would produce true consonances. It has been suggested that such consonances have been actually heard by these people, owing perhaps to their chance occurrence in nature or to the occasional want of strict time when members of a chorus are singing together. We may reasonably question whether such accidentally occurring instances of fusion are responsible for the existence of harmonic intervals in the melodies of very primitive folk who never practise polyphonic music. The appreciation of a relation between consecutive tones is a far more plausible explanation, but we are entirely ignorant of the psychological and physiological basis of such appreciation.

So far as the smaller intervals are concerned, we have to bear in mind that approximately whole-tone and semitone intervals (seconds) are exceedingly common among such people, and that in folk music generally the frequency with which the various intervals are used decreases proportionately with their size. It is highly probable that the smaller intervals have been determined rather by the feeling for equal tone-distances than by any feeling for simultaneous harmony. The feeling for tonality may also have helped in the definition of and preference for the smaller intervals in melody.

Tonality.—By the feeling for tonality we mean the underlying recognition of a tonic; that is to say, a certain tone of a melody is regarded as the centre of gravity, to which all the other tones come to have a felt reference and seek for the sake of restfulness to return. The tonic is not necessarily the lowest, nor need it be the final tone of the melody. The feeling for tonality has developed *pari passu* with the growing feeling for harmony; but in a low degree it may certainly exist independently of the latter.

Just as words are grouped into a single sentence and the sentences are grouped into paragraphs, chapters, and so on, so the individual tones of music are grouped into a single section, sections

into a single phrase, &c. The combination of such parts into a unitary whole has been greatly furthered by the feeling for tonality, the felt relation of the individual tones to a tonic. In the most primitive music the feeling for tonality appears to be just dawning, and here we find a corresponding minimum of unification and method. It is as if the attention of primitive folk were incapable of combining more than a few consecutive notes into a connected whole. For a few seconds, perhaps, we catch a glimpse of tonality and tonal relation, and then the tonic, or, as we should say, the key, changes or maybe it is lost in the general chaos of disorder. More definite traces of tonality have been met with in Chinese, Siamese, and Japanese music, among several tribes of the North American Indians, and in India where, it is stated, a special word, *ansa*, exists, denoting the tonic.

Awareness of absolute pitch.—Owing to the growing influence of the feeling for harmony and tonality, we tend to judge of the pitch of a tone in melody not absolutely but by its harmonic relation to the tonic or to some preceding tone. Our attention is diverted more and more completely from the absolute characters of a given tone or tone-combination towards its relation as part of a larger whole. Our musical education leads us to regard the interval as of greater importance than the absolute pitch.

Nevertheless, in certain individuals, especially among the most musically gifted, awareness of absolute pitch is unquestionably present and may become developed among them to an astonishing degree. A single note struck on the piano can be instantly named and identified. If confused at all, the note is apt rather to be confused with its octave than with any neighbouring tone. The answer is given as unreflectingly as if the subject were asked to name a presented colour. Each tone, like each shade of colour, comes to be individually and absolutely recognized. Each immediately revives its special name, *a*, $a^{\sharp}$, *b*, &c. Some individuals excel best in giving a name to a given tone, others in reproducing the appropriate tone when the name is given.

We are entirely ignorant of the extent to which, and the frequency with which, this awareness of absolute pitch occurs among less civilized and primitive peoples. Individuals in whom it is strongly developed would naturally be averse to transposing a melody or series of tones to another key. When once they had heard a tone or learned a musical phrase, they would repeat it after a prescribed lapse of time

(say, one minute or half an hour) in precisely the same pitch as that in which they had originally heard it. Another method by which a subject's awareness of absolute pitch could be tested (in which memory is not involved) would be to put a native instrument into his hands and to ask him at once to reproduce on it a tone which is sung or played to him by the investigator. The success with which the subject can directly accomplish this without any groping or error would indicate the extent to which his awareness of absolute pitch is developed. The constancy with which from day to day instruments are attuned to the same pitch or songs are sung in the same key would also serve as indications. Among ourselves the transposition of a melody into the corresponding mode of another key is accompanied by a decided change in affective value.

Conditions affecting apparent pitch.—The awareness of absolute pitch has been shown to be closely dependent on the timbre of the tones. Thus a person who succeeds perfectly well on one piano may not succeed on a strange piano or on a different kind of instrument.

The effect of timbre upon pitch is very striking. A sound rich in overtones emitted, for instance, from a reed instrument appears distinctly sharper than one of the same pitch emitted from the flute, which is comparatively free from overtones. A loud sound is also apt to be judged of higher pitch than a soft one. Care must therefore be taken in comparing the pitch of tones produced from different instruments or with different intensities. For like reason it is of interest to discover whether a native language has separate words for denoting pitch, intensity, and timbre.

We have always to be on our guard against purely accidental deviations from strict intonation. We may detect them by procuring repeated phonographic versions of the melody at different times from the same or different individuals. Deviations from exact intonation are to be expected among primitive folk who are careless and unmethodical in their artistic production generally. Such errors naturally tend to be overlooked by the people in the absence of any controlling feeling for harmony. Such errors are encouraged by difficulties of technique, by temporary excitement, and by the various feelings associated with the various tone-intervals. We ourselves, for example, tend to exaggerate the difference between major and minor thirds, making the former too large, and the latter too small.

Our attitude towards strange music.—It is easy to see how a regard for regular rhythm, harmony and tonality, and the principle of

equal temperament are responsible for the attitude of European civilization towards music generally. No sooner do we hear a piece of primitive or advanced music than we endeavour to interpret it in terms with which custom has long familiarized us. Absolutely without reflection we read into the music regular accents, we arrange it in bars, we declare it to be in such and such a key, and to be in the major or in the minor scale, we identify its intervals with those of our own to which they most nearly correspond. We forget that the complexities of rhythm may far exceed what we are accustomed to, and that primitive music knows little of tonality, and nothing of major or minor scale.

Thus it comes about that many examples of primitive music are incomprehensible to us, just because they are not so readily assimilated as those which are more nearly related to our previous experiences. Our attention is continuously distracted, now by the strange features and changes of rhythm, now by the extraordinary colouring of strange instruments, now by the unwonted progression and character of intervals. Consequently much familiarity is needed before we can regard such music from a standpoint that will allow of faithful description. We have first to disregard our well-trained feelings towards consonances and dissonances. We have next to banish to the margins of our field of consciousness certain aspects of music, which, were it our own music, would occupy the very focus of attention. Thus incomprehensibility will gradually give place to meaning, and dislike to some interesting emotion.

Appendix

The manipulation of the phonograph.—The principle of Edison's phonograph is familiar to most people. A wax cylinder rotating about its horizontal axis is driven by clockwork (or by other mechanism). A recording diaphragm, the 'recorder', is brought to bear on the revolving cylinder. The recorder consists essentially of a very thin glass disk, to the lower surface of which is cemented a sapphire pointer or style. This sharp style cuts a shallow groove on the wax cylinder. While the cylinder is revolving, the recorder is so moved that it marks a continuous spiral groove from end to end of the surface of the cylinder.

To obtain a phonographic record or 'phonogram', a blank cylinder is placed on the phonograph, a trumpet is affixed to the

recorder, the clockwork is started, the style of the recorder is lowered on to the surface of the cylinder, and the desired sounds are made to enter the trumpet. To reproduce the record, all that is done is to substitute the 'reproducer' for the recorder. The former, like the latter, consists of a thin disk of glass, but to it is affixed a blunt sapphire style which, when brought to bear on a phonogram, follows the spiral groove and accurately reproduces the movements previously made by the sharp style of the recorder. These movements are communicated to the glass diaphragm of the reproducer and transmitted to the external air as vibrations of sound, where they are reinforced by means of the trumpet attached to the reproducer.

A complete outfit for taking and reproducing phonograms consists of (1) phonograph (and accessories); (2) wax cylinders; (3) recorder and reproducer; (4) spare parts in duplicate.

1. The phonograph which I recommend to travellers is called the Edison-Bell Standard Phonograph. It is enclosed in a well-made box, and weighs 19 lb. It can thus be carried without difficulty. I have heard surprisingly good records taken in the field with lighter and cheaper phonographs, but I consider it dangerous to depend on them, as the clockwork of such instruments is liable to run irregularly, and in other ways to wear badly.

The accessories comprise trumpet, oil-can, oil, and brush.

The same trumpet can quite well be used for recording and for reproducing phonograms. In my experience the best form measures about six inches in diameter at the mouth, and is about fourteen inches long.

The makers of the instrument supply the most suitable oil, and give the purchaser directions for occasionally oiling certain parts of the mechanism. A broad camel's-hair brush should be used for dusting the cylinder after its surface has been traversed by the sharp style of the recorder.

2. The wax cylinders are supplied each in a separate cardboard box, which is lined with cotton-wool. Spoiled cylinders cannot easily be used for taking new records. It is true that most phonographs are fitted with a sharp cutting edge for the purpose of shaving the surface of useless records, but so much practice is necessary before a clean even surface can be obtained that the shaving mechanism should, as far as possible, be avoided. The cylinders are extremely fragile, but the manufacturers pack them so that the loss due to breakage is negligibly small. In dry climates the

cylinders keep well, but in the damp a mould forms in and on them, which seriously impairs the success of the record. I have found that the cylinders keep well in the damp heat of the tropics, if each is wrapped in oiled paper and is enclosed in a tin case. Fresh supplies of cylinders, if wanted, can easily be sent out safely packed.

3. Recorders and reproducers vary both in type and in efficiency. The purchaser should explain to the makers the kind of music which he wishes to record, and should test the recorder before employing it in the field.

4. It is important that the cylinder should revolve at the same rate during reproduction as during the taking of the record; for the speed with which a phonographic record rotates determines not only the tempo but the pitch of the sounds which it reproduces. When a note of given pitch is sounded before the trumpet at the time of taking the record, and when a note of precisely the same pitch is later reproduced by that record, we can be assured that the cylinder is rotating at the same speed during reproduction as it was during the taking of the record. Accordingly, a pitch-pipe, such as is sold at the music shops, should form part of the phonographic equipment. This, when blown, emits a tone of definite pitch, e.g. $a' = 435$ vibrations per second. Just before any desired record is taken, this pitch-pipe is sounded before the trumpet. Of course the clockwork must not be stopped or its speed altered after the pitch-pipe has sounded.

5. A spare recorder and reproducer should be taken, as well as spare glass diaphragms and cement, in case of breakage. It is easy to replace the broken glass disk of a reproducer or recorder and to cement the style to it. A spare trumpet, oil-can, brushes, and pitch-pipes should be taken in case of possible loss. It is also advisable to take certain screws and leather parts of the phonograph in duplicate. A screwdriver should be included in the outfit.

Before a phonographic record is taken in the field, it is advisable to hold a rehearsal of the performance, especially if the singers or performers are inexperienced. Individual voices will be found to differ considerably in the successfulness of the records which they yield. A powerful voice will often yield a most unpleasantly sounding phonogram. This is particularly apt to occur if the singer be not placed so as to sing directly into the centre of the trumpet. If he be sitting sideways near the instrument, so that his voice falls obliquely on to the trumpet, a very jarring and unfaithful record will

result. If a group of singers or an orchestra of instruments be making the record, they should be grouped in a semicircle before the phonograph, the most important soloists being placed nearest to the mouth of the trumpet. When the piece is made up of several simultaneous parts, each with a more or less independent tune or rhythm, it may be advisable for the investigator to take more than one record, placing now one singer or player (e.g. drummer), now another in the foreground of the phonograph.

The speed with which the cylinder rotates varies with the extent to which the clockwork is wound up, and can be regulated by means of an adjustable head attached to the instrument. Before a record is taken the clockwork should always be fully wound up. The rate of rotation of the cylinder should roughly be two revolutions per second. It can easily be gauged by lightly placing the finger upon the small wheel over which the leather band passes. The rate should be faster for music in which the tones are prolonged than for music of a more lively and less monotonous kind, but the speed just mentioned will be found generally serviceable.

The title of the song should be sung into the phonograph before the record is taken. This is to be followed by the sounding of the pitch-pipe, which should serve as a signal for the musicians to begin. A number should be allotted to each record taken. The title and the number of the record should be written on the outside of the tin or cardboard case of the record, and should correspond with the number in a note-book, in which are written the names, tribes, &c., of the executants, the instruments used, the significance, words, &c., of the music.

The phonograph should be similarly used to record the sounds of instruments which cannot be relied on to keep their pitch when they are sent to Europe. All stringed and reed instruments come under this head, and such percussion instruments (e.g. gongs) as are attuned by the attachment of pieces of wax. Even when the necks of the stringed instruments are provided with frets, the performers frequently vary the intonation by slightly changing the position of their fingers. Similar variations are sometimes produced in the case of wind instruments by only partially uncovering the holes.

Records when once taken should be reproduced as seldom as possible. It is advisable that they be returned home so that the records may be mechanically copied on to other cylinders without needless delay. Or permanent moulds may be prepared from the originals, and duplicate cylinders can be made from the moulds.

When properly cared for, the wax records last for a very considerable time without showing serious signs of deterioration.

The transcription of phonograms.—For the purposes of transcribing the phonographic records, two instruments are necessary. The first is a metronome for determining the tempo of the music and its variations. The second is some form of apparatus which will produce tones of any desired pitch within a given range. Either an Appun's 'Tonmesser' or a Stern's 'Tonvariator' can be employed for this purpose. The former consists of a box of metal tongues, any one of which can be made to vibrate at will by means of air driven from bellows. The tongues need to be carefully tuned so as to give tones successively differing by one or two vibrations. The latter is a vertical cylindrical vessel provided with a narrow upper neck, over the top of which a blast of air is driven, throwing the air contained within the vessel into vibration. The pitch of the tone thus emitted can be varied by diminishing or increasing the height of the cylinder. The base of the cylinder consists of a movable plate, the position of which can be delicately adjusted by a rod and screw action attached.

The phonographic records should at first be roughly transcribed in what appears to the observer to be the most nearly corresponding notation. Then the pitch of the most important and prolonged tones of the tune is carefully determined by comparison with the tones of known pitch produced by the Tonmesser or Tonvariator. Any given tone can be prolonged on the phonograph by holding up the lever which plays upon the spiral steel thread. By this means the reproducer, instead of travelling along the spiral groove cut in the wax cylinder, remains stationary, continuing in the same groove and reproducing an unchanged note while the cylinder is rotating. But such procedure, if unduly prolonged, converts the spiral groove of the record into a circular groove, and so causes serious damage to the record.

Graphic records.—Graphic records of a tune may be produced in the field by an arrangement which allows the vibrations of the recording style to be written on a travelling sheet of smoked paper. Such smoked surfaces also afford valuable means of recording complex rhythms. In place of the drum, stick, or rattle, a Morse key is provided, and the taps made by the performer on this key are electrically communicated to a 'time-signal' which is brought to bear on the smoked surface. Below these markings another time-signal, electrically connected with a silent clock, marks fifths of seconds.

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AT THE CLARENDON PRESS OXFORD 1907