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On the Significance of Ethnological Studies for the Psychology and Aesthetics of Musical Art[1]

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I. (Stumpf).

It seems to have become widely known by now that apart from serious professional work some skylarking has been going on at the Berlin Psychological Institute, where countless samples of exotic musical art, which are hardly pleasant to a European's ear and almost incomprehensible to his taste, have been collected. One may have already asked himself how these endeavors can have a deeper relationship to experimental psychology. Therefore, by presenting a few examples I, together with my friend v. Hornbostel, would like to take the opportunity to briefly demonstrate that this relationship does exist and that we have already encountered, or may expect, new insights and new issues regarding fundamental principles in the musical domain, which in turn are closely linked to more general psychological and aesthetical issues.

Let us recall that it was a psychologist, Theodor Waitz, who created the first comprehensive work on ethnology in German. While Herbart elicited psychology only from his own consciousness and in doing so proceeded by constructing rather than observing, from the outset Waitz was more inclined toward multifaceted and unbiased fact-finding. He dedicated a fine study to animal psychology and his *Anthropology of*

[1] From the *Proceedings of the 4th Conference on Experimental Psychology* [Bericht über den 4. Kongreß für experimentelle Psychologie], edited by F. Schumann, 1911.

Primitive Peoples [Anthropologie der Naturvölker] to comparative ethnology. The book appeared almost simultaneously with Fechner's *Elements of Psychophysics* [Elemente der Psychophysik] which put Herbart's contrasting endeavors on an empirical basis. But unlike Fechner, Waitz has found no immediate successors among psychologists. The new methods and issues of psychophysics took all the attention. Now it is time to refer to the ethnological studies again and combine them with the experimental ones. This insight is the basis of Wundt's *Völkerpsychologie* [folk or ethnic psychology] whose methodological fundamental idea we completely agree with. It remains to be seen whether we already have the necessary reliable material at hand for an undertaking of such a large dimension.

The domains of language and art highly lend themselves to linking experimental and ethnological research to one another. In both areas ethnological observations teach us to consider what we find around us to be seen as only one special isolated case of many, such as how current spoken language originated from a mass of means of communication. It is a long established insight that a sound psychology of language, even philosophy of language, is only possible if ethnologically founded, despite the fact that peoples without written language have not been adequately paid attention to so far.

In the philosophy of art this insight is taking longer to percolate. Still the theory of the arts includes almost no or at least not enough exotic material. Experimental aesthetics, however, originating in the wake of experimental psychology has yielded – as we have to admit – precious little in spite of some neat studies. It is high time for it, too, to link itself to historical and ethnological research: it must adopt the comparative method.

In this vein we already have felicitous, instructive, informative studies on the primitive drawings of indigenous peoples which have been advantageously linked to the results of the observation and the experiments on children's drawings. Likewise, we have excellent material on ornaments of indigenous peoples (Boas, v. d. Steinen, Stephan, and others). Here, too, new problems arise and the old ones receive new light.

Concerning the psychology and aesthetics of tonal art I have already pointed out, in the preface to my *Tone Psychology* [Tonpsychologie] and again several times later, the importance of ethnological studies. But very many notations of exotic tunes in early travelers' accounts, which have been adopted uncritically in works on music history, almost never guarantee the account's precision, because the European ear reads the intervals and rhythms it is accustomed to into what it hears and in this respect no psychological training has induced the travelers' self-criticism and scrutiny of individual intonations or rhythms.

Through the phonograph we now have the opportunity to gain wholly accurate impressions of exotic music devoid of any subjective conception. This is why extensive collections of phonographic recordings are a necessity. This necessity is all the more urgent due to the introduction of European culture on the one hand and on the other the extinction of many indigenous peoples, which will make the opportunity for such collecting scarce.

In 1899, upon the suggestion of Sigmund Exner, the Vienna Academy of Sciences founded a phonogram archive which not only incorporates music but languages and dialects as well, and the collection has grown to a considerable size due to regular support by the Academy and the government. The first beginnings of our Berlin collection date from the fall of 1900, consisting of recordings of Siamese music that I made together with Dr. Abraham (see volume III of the present publication), but it took until 1904 and various monetary contributions that we were enabled to start the real collecting. At present the archive already comprises of some 3000 recordings from all parts of the world. Apart from the lively interest on behalf of the explorers who have been equipped with devices and detailed instructions by us, this success is due to the excellent collaborators, namely Dr. Abraham and Dr. v. Hornbostel and more recently also Dr. Fischer and Dr. Wertheimer, whom I have been fortunate to find. Dr. v. Hornbostel, the tireless enlarger of our collection, has made the ethnological-musical studies his life-task. Recently, in the *Zeitschrift für angewandte Psychologie* [Journal for Applied Psychology] (see the reprint in volume V, 143 ff., of the present publication), he has given an overview of the suggestions that result from comparative musicology for general psychology and aesthetics. We may therefore limit ourselves here to a few main points that will be illustrated by demonstrations.

Prior to this it shall be noted that the precise analysis of phonographic recordings is not the only form of linking experimental with ethnological research. What needs to be added is firstly the study of natives concerning their acoustical and musical capabilities and secondly the measurement of pitches of musical instruments with fixed tuning. In these three aspects certain technical and methodological principles have gradually been developed and they alone will make scientifically useful results possible.

I would like to tie in my considerations to two phenomena: the phenomenon of equidistant scales of five or seven notes respectively and the phenomenon of the widely used parallel fifths and fourths.

1. Measurements of xylophones and metallophones have established that scales are used in Java and Siam where neighboring notes are separated from each other by equal frequency ratios. Initially we will call these scales equidistant in a merely physical sense. The Siamese scale consists of seven notes; the Javanese salendro scale (another, non-

equidistant one is also used in Java) consists of five notes per octave. We have fabricated these two scales, in two octaves each, on a small metallophone, by retuning the metal bars as they were provided by the vendor. The bars have the following vibration frequencies which double in the higher octave:

Java:	519,	596,	685,	786.5,	904,	1038.		
Siam:	519,	573,	633,	698.5,	771,	851.5,	940,	1038.

The proportion between two neighboring notes amounts to $\sqrt[5]{2}$, in the first case, to $\sqrt[7]{2}$, in the second; the logarithms are 0,060206 and 0,0430043 respectively.

On this musical instrument it is possible to first of all realize for oneself the strange impression of the scales. Then one can also hear the peculiar change popular pieces, such as the Austrian national anthem, undergo when the Siamese scale is used. One may also perform the Siamese melodies for oneself as we have recorded them, for instance the Siamese national anthem, which in spite of the shifted intervals, makes a strong and solemn impression on us.

Nothing can refute the even now current opinion among psychologists that our tonal system was the only possible one more compellingly than the existence of those scales; even if calling our system a "freely chosen" or merely conventional one is equally wrong. However, the extremely objectionable effect of the Siamese triads (there is only one type here, no major and minor) demonstrates that a harmonic music is impossible on this basis. As my experiments have shown, the pure major chord is most pleasing to the Siamese ear as well, but within their system there is no chance to hear it.

The behavior of our hearing is psychologically very interesting (as I repeat here for the sake of demonstration) for example, if one first strikes the bars 1, 3, 5 and then the 3, 5, 7 of the Siamese scale. The notes exhibit the same ratios among themselves but the first sequence is usually conceived of as a major, the second one as a minor chord, because *c-e-g*, *e-g-b* are such chords. If the first sequence is exceptionally understood as minor, then the second one is considered to be major, corresponding to the triads built from the minor scale: *c-e*^{b}*-g*, *e*^{b}*-g-b*^{b}. This is a striking case of long-lasting habituations which show some connection with Hering's memory colors. What's more, this musical instrument also shows the strangest changes of opinion and feeling with regards to the same tonal material, depending on the context in which one of the Siamese or Javanese intervals is inserted. Through such observations, Messrs. Abraham and v. Hornbostel were prompted to investigate how far, if at all, the detuning of an interval may go, under various conditions, without it ceasing to be considered a major third, a fourth etc. The limits may be pushed considerably in this respect.

First of all the psychological possibility of such scales gives the psychologist a riddle to solve. In my essay about it, I have assumed that the individual scale degrees appear as equal-sized tonal steps to the relevant peoples' musical hearing. In principle it could also be possible that to them they constitute some other constant ratio, such as getting constantly larger or smaller from low to high, or that they possess no ratio of magnitude or similarity whatsoever, producing only the same feeling instead. But one cannot deny that the given assumption is the simplest and most obvious one. One may still leave it open how the notion of equality is produced, whether by direct comparison of the pitch distances or by comparison of special "transitional sensations" [Übergangsempfindungen] or "complex qualities" [Komplexqualitäten] or "degrees of coherence" [Kohärenzgraden] or such the like. I have ascribed the formation of the said scales to the present ability to discern equal vibration ratios as equal distances of perceptions, a capability which has been pushed back in our world by getting used to our own intervals. One can also find the same effect within the peoples where the music comes from, the effect as we find it now has been achieved only very gradually and after a multitude of trials. Be what it may: it needs to be emphatically stressed that the striking and certain fact of physically equidistant scales may be ignored in no case. Instead some explanation must be attempted.

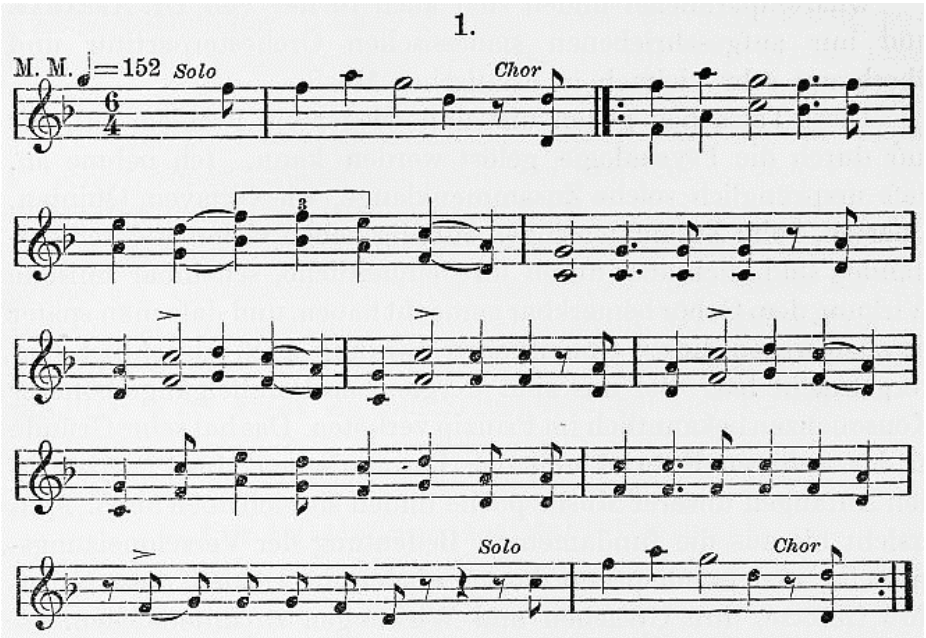
The only one who to my knowledge has taken note of this is Wundt. Unfortunately, however, I cannot accept the explanation that he seems to hint at, for he misses the indication of the dimensions of the individual bars. So he seems to assume that the Siamese and Javanese had gradated the size of wooden bars according to some principles first and then adjusted their hearing to the scale thus produced. But this is completely impossible. The bars are not at all homogenous and all bear marks that they have been tuned according to certain requirements of hearing by gradually filing off and hollowing out of individual areas. Thus it is not the hearing which adjusts to the sight, but vice versa shape and size were formed according to the desired tone. In addition a sort of wax has been and is still used in order to aid in the tuning. From the mere length, width, and thickness of the bars on the whole, apart from these details of form, nothing in the least could be deduced regarding the principle of tuning. Furthermore, if we were to actually assume a bar length graded according to whatever rule as a point of departure, the lengths l_1 and l_2 of two consecutive bars whose pitch shall fit the Siamese scale – with everything else set equal (i.e. the simplest case) – would be represented by the equation

$$l_2 = \frac{l_1}{\sqrt[14]{2}}$$

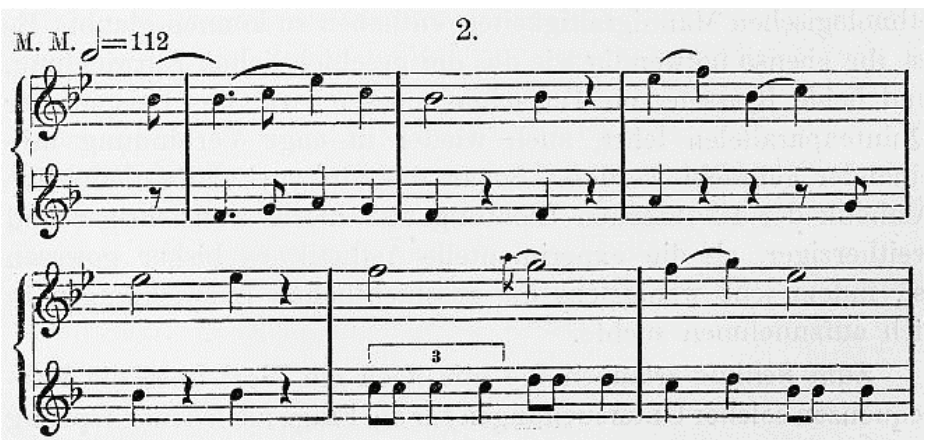
– and how the Siamese would have come to this formula would be even harder to comprehend than how they came up with the selection of the notes itself.

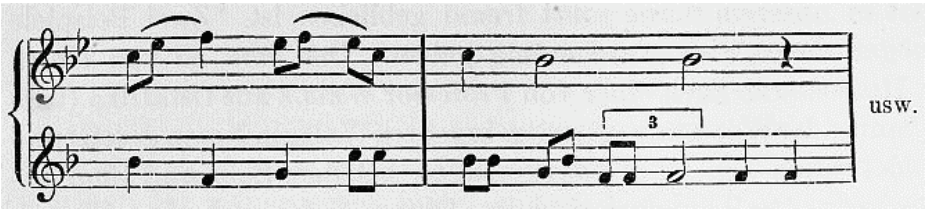
This is a case which urgently requires the collaboration of experimental-psychological with ethnological studies; and even more so in the interest of psychology than that of ethnology. Because you know, gentlemen, which wide-ranging and over decades discussed issues in the psychology of the senses are addressed if such a precise accordance of a geometrically graded series of stimuli with a likely arithmetically graded series of stimuli is encountered somewhere. Messrs. Abraham and v. Hornbostel therefore have proceeded from here to an experimental investigation by testing anew the question of the production and recognizability of equal sensational distances in the tonal domain. Since our habituation to the intervals of the diatonic scale forms a downright obstacle, they have mainly chosen distances of less than a semitone. But I don't want to anticipate the two gentlemen's publication on this.

2. We now come to the second topic of my presentation. With regards to the systematic use of simultaneous notes, it is understood that everywhere, also with indigenous peoples, men and women sing in octaves. Nevertheless, this can by no means be taken for granted, but rather points directly to the question of what this widespread trait, which most likely has given rise to it, is based on and where the impression of unison stems from. Here we encounter the fact of [tonal] fusion. And it is very instructive that not only parallel octaves but also parallel fifths and fourths are often found in exotic music both with primitive peoples and with those civilized peoples to whom multipart music has otherwise remained alien. Two examples shall illustrate that. One has been notated by Mr. v. Hornbostel based on a cylinder brought from East Africa (from the tribe of the Wanyamwezi) by Professor Weule. It forms part of a dance song where solo and chorus alternate. The pitches are to be read one octave lower (tenor).



The second one is a part of a Chinese instrumental piece performed by a transverse flute and a guitar. The latter usually doubles the flute a fourth below. The piece is notated by Dr. Fischer after a cylinder sent to us from Shanghai by Mrs. Prof. du Bois-Reymond.





Parallel fourths can also be found in the Siamese orchestral score notated by Dr. Abraham and myself and in general very often in Asian music.

These facts confront us with a problem that again can only be solved by psychology. I assume that originally notes sounding simultaneously such as octaves, fifths, and fourths were produced by chance, along with many others, but stood out to the ear due to their homogenous, apparently unison effect, and that they have been produced deliberately as well because of this homogenous effect later. As is well known, such parallel voice leading of higher consonances is essentially forbidden to us. This has its rationale in the further development of harmonic music. But in the beginnings of our musical era they can be found after all. This shows the fundamental significance of [tonal] fusion, and from it the motivation arises again to investigate it, its laws, and its causes and effects.

Yet another example of how ethnological and experimental psychology must collaborate. Like that there are plenty of ethnological facts which give new insights and suggestions to the music psychologist. Yet concerning the aesthetics of tonal art one is almost obliged to say: it is built on sand if it reckons to be able to afford neglecting the in-depth scrutiny of ethnological multifariousness. It is equally necessary as the study of historical development and both classes of facts must be brought to a close connection with each other again, as the example of parallel fifths shows. At least by aiming at incorporating historical developments, even the old speculative-deductive aesthetics of the Hegelian orientation has been more far-sighted and broad-minded than experimental aesthetics has been so far in this respect.

To conclude allow me a word on the consequences of such studies for the issue of the origin of music in general. It is obvious that without the most comprehensive and reliable ethnological material one will be completely in the dark regarding these questions of origin. The phonogram archives will shed light in this respect and have already done so in many ways. Most likely very primitive melodies evolved on the basis of deliberate small tonal steps which were not related to each other. Among the presently available ones, the Vedda songs, which Dr. Wertheimer has published based on recordings made by Mrs. Prof. Selenka, might fit here. This root of tonal art, the fixing of mere distance rela-

tionships between notes, can be found more highly evolved among civilized peoples in the system of distance scales. But the tonal steps based on fusion and consonance relationships have been much more fruitful. Our contemporary European music constitutes the highest development of this branch. I have published reflections to this effect on the origins of music recently and will soon elaborate on them more extensively.

II. (E[rich] M[oritz] v[on] Hornbostel)

1. On the emergence of multipart music

Apart from the doubling by a consonant interval as characterized in the preceding presentation, originally monophonic songs may also develop into multipart ones in another way. With the widespread alternating singing where the solo of a lead singer is superseded by a chorus with a refrain or repetition, often one of the two enters too early. This premature reaction, probably triggered by the tension of an abundant expectation, may so to speak lead by chance to simultaneous sounds: an effect that is later produced deliberately and more worked out. In this way as the melody of the lead singer's solo and that of the chorus are more and more shifted one upon the other, and as the quality of the simultaneous sound is noticed more and more, polyphonic forms of rising complexity (drone, ostinato, discant with contrapuntal voice leading) emerge.[2]

From another angle the music of so-called primitive peoples sometimes comes close to our multipart forms. Here and there, particularly in Eastern Melanesia, one finds an extensive and artful use of the falsetto being reminiscent of the yodeling of our alpine people. This may have been inspired by experiences with pipes where the fundamental tones switch very easily to the harmonics. These yodeling songs are characterized like ours by a large range – which is precisely facilitated by the falsetto – and the preference for large intervallic leaps. When several people sing together in different registers, countermovement of voices easily results in simultaneous sounds, which appear to us as both consonant and euphonic. But sometimes with these multipart songs, as in many cases of purely melodic music, our subjective impression may prove to be a delusion based on musical habits. Even severely smaller fifths sometimes appear in a compelling way as "pure" to us.

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[2] Cf. my preliminary report in the *Proceedings of the 3rd Conference of the International Music Society* [Bericht über den III. Kongreß der Internationalen Musik-Gesellschaft], Vienna 1909, 298 ff.

Finally a very peculiar form consisting of two voices shall be mentioned, which can hardly be derived from one of the aforementioned ways of emergence. It demonstrates the variety of conditions of aesthetic appeal in an especially striking manner: namely the sequence of simultaneous major seconds which can be found in the dance songs of the inhabitants of the Admiralty Islands, but also elsewhere (for instance in Istrian folk songs). One might think that they developed from recitative songs of very small range through accidental discrepancies in the unison, but so far we do not have enough evidence for that. Also the fact that major seconds, namely the interval 7:8, are comparatively closer to consonances, than for example minor seconds, does not provide sufficient reason; on the one hand the singers' intonation does not catch an interval with a simple ratio and on the other hand it would remain incomprehensible as to why one does not prefer the much more consonant thirds to the seconds.

2. Rhythm

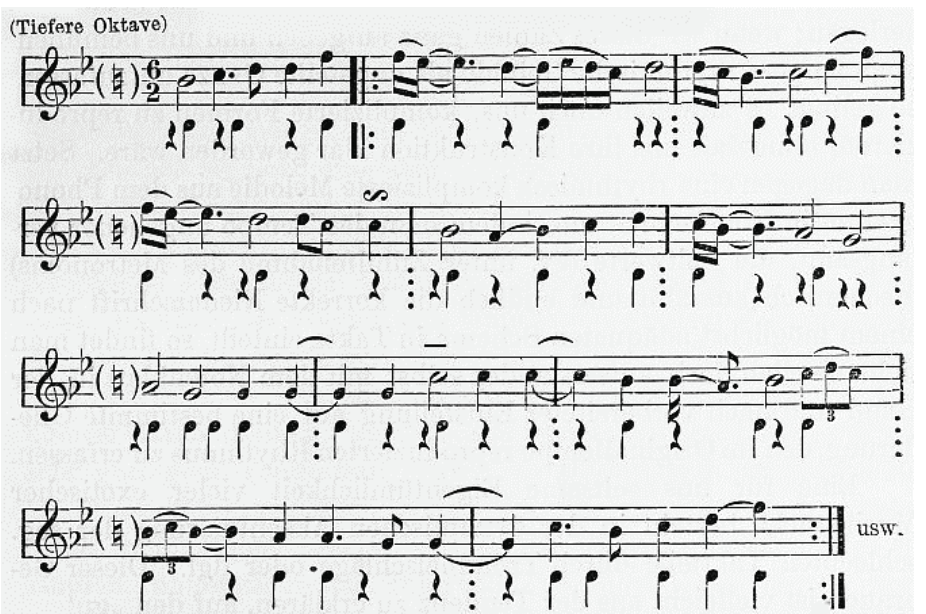
While the development of multipart music in its higher and highest forms is dependent on the memory aid of notation, rhythm, especially with peoples who exclusively or at least mainly practice monophonic music, has reached a level which would be looked for in vain even in the creations of the most modern European composers. We are so used to a simple distribution of accents, that for us measures of five or seven beats which are even common enough in European folk songs – namely in Eastern Europe – are already considered a piquancy. We view the constant alternation between 3/4 and 6/8 time, which is especially popular among African Negroes and is additionally spiced by extensive use of triplets, as especially intricate; if these triplets cross, as we would call it "the bar line", we have reached the limit of our comprehension. Actually we are used to "counting", to split the rhythm into small equally long pieces (measures) mostly built on the same pattern of accents. If we abandon this counting completely and try to grasp longer rhythmical patterns as undivided wholes, too, we sometimes succeed in reproducing more complex forms without understanding their construction. However, if one transcribes a rhythmically complicated melody from a phonogram by reducing the tempo enormously, counting mechanically the durations (maybe with the help of a metronome), and finally arranging the correct notation according to a scheme as adequate as possible into measures, one will sometimes, even with the notation in hand and after preparing oneself for a certain grouping, still feel incapable of grasping the rhythm reproduced in its original tempo.

For us a peculiar trait of many exotic musical pieces is the dynamic accentuation of so-called weak beats by drum strokes or the like. This

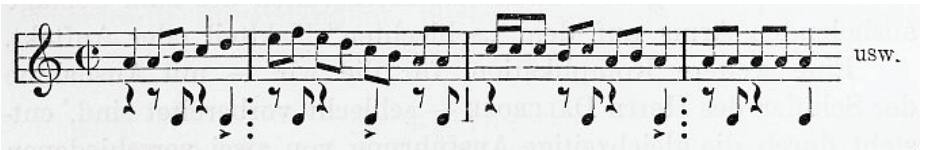
use may perhaps be explained by the tendency to contract the muscles on the "strong", i.e. the subjectively heavily accentuated beats of the melody; in case of a suitable tempo the relaxation of the muscles and thus the dropping down of the arm raised for the stroke will occur on the "weak" beat or upbeat.

A further complication, for which we – except for the students of Mr. Dalcroze – are ill-prepared, arises from the simultaneous execution of two different rhythms. In the comparatively simpler cases, a song is accompanied by regular drum beats, so that for example three strokes always fall on four time units of the singing. More complex examples, which can especially be found in Oriental cultures but among many African Negro tribes as well, exhibit a rhythmical counter motif in the percussion instruments with its own distribution of accents completely independent of the vocal rhythm. These rhythmical motifs very often are of considerable length, and correspond for instance to twelve measures of common time in the vocal part and are then repeated unchanged or with slight variants regardless of whether later on the same parts of both rhythms will coincide or not. The two following examples are by far not among the most complex ones.

Hindostani song with drum accompaniment.
(From Abraham and v. Hornbostel, "Phonographed Indian Melodies", *Sammelbände der Internationalen Musik-Gesellschaft* V, 372.)



Tunisian Melody; lute and drum.
(*Sammelbände der Internationalen Musik-Gesellschaft* VIII, 28.)



For some African tribes learning the drum language may be a valuable aid in rhythmical training. In any case it supports grasping rhythmical forms without reference to an arithmetic arrangement. At least in this respect we too behave like the Africans: our rhythms deviate, as can be seen in the graphical recordings, from the strict mathematical time grid, and upon repetition are amazingly reproduced with exactly all these deviations.

3. Structure

Even in the most primitive music that is still accessible to us today, for instance the songs of the Veddas, we find the short and very simple melodic motifs arranged according to certain principles. The music of the Oriental civilizations shows how far the formal complexity in the temporal domain may go even without visual aids. Their attempts at music notation have remained without almost any practical significance. Thus many Chinese musical pieces display an artificialness of structure which also characterizes the poetry of that people. How the musical lines assemble to form a strophe, the motifs to a line (parallelism) strikes one as no less refined than the immensely varied ways of varying a motif, some of which (transposition, modulation, sequence, inversion, augmentation etc.) are also common in our art music while others – for example replacing individual notes with their fifth or fourth – is completely alien to us. One and the same motif often refers to several other ones at the same time, because of similarities in various respects; the possibility to combine the same sequence of notes in different ways appears to be a deliberate attraction in many cases. For these formal relationships many an analogue may be found in the ornamentation. Even without denying the fundamental differences of the spatial and temporal arts, a comparative study might disclose common psychological foundations of the aesthetic impact in both fields.