Translingual Discourse in Ethnomusicology 2, 2016, 1–18
doi:10.17440/tde007

On Comparative Acoustic and Music Psychological Studies

ERICH M. VON HORNBOSTEL

Originally published as "Über vergleichende akustische und musikpsychologische Untersuchungen." *Beiträge zur Akustik und Musikwissenschaft* 5, 1910, 143–167.
Draft translation: Gerd Grupe, copy-editing: Jessica Sloan-Leitner.

Comparative studies on the acoustic dispositions and the musical expressions of various peoples concern three sciences: ethnology, musicology, and psychology. Depending on the viewpoint of the observer, the same empirical data material can lead his thoughts in different directions; whereat he is well advised not to anxiously avoid side glances to neighboring fields. Völkerpsychologie [folk or ethnic psychology] has so far almost exclusively limited itself to drawing conclusions from cultural objects or documents of various peoples, and it is only in recent times that comparative experimental studies with members of various races have been tackled. In turn, comparative music psychology appears as the most recent branch of Völkerpsychologie. This delay has internal and external reasons. The languages, which needed to be studied as an indispensable tool, immediately provided much material not only to the comparative linguist but also to the psychologist of language. Indirectly they facilitated a comparative psychology of religion by collecting myths. The acquisition of sufficiently numerous and sufficiently reliable basic information for a comparative music psychology, however, has only become possible through the use of the phonograph. On the other hand, the scholarly potential offered by non-European tonal art has been badly underestimated. To some extent, misled by melodies notated merely by ear and therefore often unwittingly translated into European ones, one believed the musical language of all peoples to be a natural universal language. Further, the analysis of dialectal differences, which were discernible after all to be a narrowly confined special field of musicology, was considered completely extraneous to psychology. These conclusions occurred precisely because the psychic fundamentals of all music were regarded as

universally human. To some extent one believed what the "savages" produce to be nothing but noise and nasty sounds, at the most comparable to the utterances of animals, but not to our tonal art.[1]

Even if the comparative studies of recent years have yielded only few final results, they have nevertheless led to many new questions, also in the psychological domain, and thus, I believe, have proven the two skeptical opinions outlined above to be erroneous.

Three methods have been employed so far for comparative acoustic and music psychological investigations: 1. experiments with non-European participants, 2. tonal measurements of musical instruments, and 3. studies of phonograms.

1. Investigations of the tonal sense – together with studies on other senses – have been undertaken first to check the issue of the existence of sensory physiological and psychological racial traits. In many cases travelers reported about the extraordinary acuteness of vision, hearing or olfaction among so-called primitive peoples, and mostly the feats, which had surprised the Europeans, were attributed to the superiority of the sensorium. These questions have not been answered completely until today, but almost all studies so far indicate that the extraordinary sensory feats of non-Europeans can be explained by the sensorium only to the smallest degree, if at all.[2] The information of various authors and even by one and the same author on various tribes is only then rigorously comparable if the experiments have been repeated under the same or exactly analogous conditions and with the same methods on Europeans, or at least on the experimenter himself. Experiments on the acuity of hearing often fail due to lack of sufficient silence. Myers[3] used Politzer's acoumeter ["Hörmesser"] or a stopwatch to determine

---

[1] Thus, as recently as 1908 an author writes: "Many peoples have hardly reached the first step of musical development so that their musical achievements are considerably surpassed by those of certain birds. Many still do not have a pronounced tonal system, many perform a completely non-rhythmic music which either sounds appallingly monotonous or constitutes a raving chaos of tones." (B. Hofmann, *Kunst und Vogelgesang* [Art and Bird Song]. Leipzig 1908, p. 164.)

[2] Concerning the visual sense cf. W. H. R. Rivers, Vision, in: *Reports of the Cambridge Anthropological Expedition to Torres Straits,* Vol. II, Part I, Cambridge 1901 (regarding our topic especially p. 12 passim, 42-45; thereat also a comprehensive survey of older literature); idem, Observations on the senses of the Todas, *Brit. Journal of Psych*. 1 (4), pp. 321-397, 1905; G. Fritsch, *Über den Bau und die Bedeutung der Area centralis des Menschen* [On the Construction and Significance of the Area Centralis of Man]. Berlin 1908. Concerning the olfactory sense cf. Ch. S. Myers, Smell, in *Cambridge Exp. Rep.* Vol. II, Part II, IV; G. Grijns, Messungen der Riechschärfe bei Europäern und Javanen [Measurements of Olfactory Acuity of Europeans and Javanese]. *Engelmanns Arch. f. Phys*. 1902, p.4.

[3] Op. cit. II. Hearing (thereat also the very meager older literature).

hearing acuity, and F.G. Bruner[4] used the opening sounds of the electrical current of a telephone stepped by resistors. The hearing acuity of the Murray islanders (Myers) proved to be slightly lesser than that of Whites, likewise (Bruner) that of North and South American Indians, Filipinos, Ainu, and Congo pygmies. Very remarkably closest to the Whites were those Indians who had attended schools and those Filipinos who served in the military; and Bruner thinks that the acuity of hearing depends on the "intelligence" of the test person.[5] These findings apparently point to the main source of error that one faces when testing the senses of so-called primitive peoples. Notably, determining thresholds can strictly speaking only be compared if the observations are made when the same level of attention, i.e., the maximum effort of attention, is applied. In many cases one wants to test the acuity of the sensory perception or the accuracy of discrimination, but rather tests the subject's capability to concentrate on a certain stimulus or a certain question. Now it could also be of interest to compare the ability of members of various races to concentrate; and according to the general and regrettably somewhat vague information which we have for instance on the inner life of African Negroes, one should expect, particularly concerning the ability to concentrate, striking differences between races. Whether testing the senses can yield useful material in this respect appears to be doubtful for two reasons. First, the ability to concentrate on a specific stimulus is highly dependent on practice, and the differences observed in sensory thresholds of various subjects would certainly decrease and maybe partly disappear (healthy organs presupposed of course) if the experiments were always to be continued until a maximum degree of training was achieved. However, for practical reasons this is almost always impossible, even in our laboratories with educated, well-behaved, interested, and patient subjects, let alone with so-called primitives. Secondly, it needs to be taken into account that stimuli and questions usually used in experiments are completely unfamiliar and – according to Edinger's felicitous phrase – biologically inadequate. One has often observed with animals that certain stimuli may excite the sensory organ while not triggering a motor reaction. With fish, which pay such little attention to certain tones and sounds that even today

[4] The Hearing of Primitive Peoples. *Arch. of Psych*. 11, 1908.

[5] Bruner made them (unwittingly) reproduce very simple rhythms; this method has many advantages but introduces a new non-sensory factor into the experiment. Both Myers and Bruner also measured the upper hearing threshold with Galton's whistle. In spite of the adopted precautions, the experiments can prove little according to the latest studies by F. A. Schulze (*Ann. der Phys*. [4], 24, 1907), if Galton's whistle is blown with the rubber ball; at best they can be seen as tests of hearing acuity (threshold of intensity).

some consider them to be deaf, Piper[6] was able to evoke action currents in the auditory nerve through sound stimuli. According to R. M. Yerkes,[7] the [nervus] acusticus of amphibians is stimulated by tones and sounds without the animals fleeing. A lizard, too, which Edinger[8] observed and which "listens to the quiet crawling of an insect in the grass remains completely calm if one strikes a stone close above its head, shouts loudly, sings, makes noise". Animals, which have never seen a human being, are accordingly not frightened by human presence. Whales are reported to have rested their heads on the edge of a floe, which along with a part of Lieutenant Shackleton's South Pole expedition, had detached itself from the fast ice. The expedition leader could drive a car close to seals in order to photograph them, and he let a swarm of penguins – as the photograph shows – listen to a gramophone at close range.[9] Without doubt, however, all these animals are to flee as soon as an optical or acoustic stimulus affects them, which according to their phylogenetic experience means danger. The notion of the biologically adequate stimulus, which such observations on animals suggest, can however also be applied to human beings. Only phylogenetic experiences and congenital dispositions may perhaps be less relevant here than intra vitam acquired apperceptive attitudes. Thus, one will have to take into account which images, sounds, smells, etc. are essential to the existence of a people. Therefore the occasional observations of dependable travelers are likely more conclusive regarding the apperceptive abilities of test persons from foreign races than the defective perception of the ticking of a clock, of telephone sounds or the notes of tuning forks militating against them. The astonishment of the European regarding the former is, after all, exactly caused by the fact that in spite of excellent senses, perception and conception at first completely fail in an entirely foreign environment and vis-à-vis unfamiliar phenomena.

We have concerned ourselves with these considerations for so long because they not only are of utmost importance for the comparison of sensory functions but also for the assessment of the higher psychic abilities and even the cultural phenomena among various peoples. What has been said about the hearing acuity equally applies to the

---

[6] Aktionsströme vom Gehörorgan der Fische bei Schallreizung [Action Currents of the Auditory Organ of Fish at Sound Stimulation]. *Zentralbl. f. Physiol*. 1906, 293.

[7] The Mutual Relations of Stimuli in the Frog Rana Clamata Daudin. *Harvard Psych. Studies*, Vol. II, 1906; *Pflügers Archiv* 107, 1905.

[8] Beziehungen der vergleichenden Anatomie zur vergleichenden Psychologie [Relations of Comparative Anatomy to Comparative Psychology]. *Bericht über den III. Kongreß für exper. Psychologie in Frankfurt a. M.* (Leipzig 1909), p. 9.

[9] Im eisigen Süden [In the Icy South]. *Die Umschau* XIII, pp. 911, 933, 936.

sensitivity towards the discrimination of pitches. Myers[10] found it to be smaller in the Torres Strait than in Scotland but the improvement by practice was larger among the Papuans than among Whites. During occasional experiments with North American Indians I encountered similar experiences.[11]

While a certain hearing acuity, albeit not a very high one, is an indispensable prerequisite of any musical activity because dealing with tones presupposes a normal hearing organ, nobody will assume hearing acuity to be a criterion of musical ability. This is different to the sensitivity to discriminate pitches. Even if we usually find that it rises to a very high maximum with continual practice, there are, nevertheless, many cases where it is surprisingly low: the respective persons are hardly able to discriminate tones in mid-range between a third and a fifth, and for a higher or lower register, they are not able to even discriminate between those which are a sixth or seventh apart. Formerly one has called these cases not very aptly "tone deafness".[12] But it can hardly be assumed that it is a kind of pathological deficiency. Especially rare are only the very extreme cases; persons who give numerous wrong answers to the question of "which tone is higher" even in the middle register in spite of a quite considerable difference between the stimuli are in no way rare among so-called unmusical people.[13] Among them, too, the ability to discriminate increases with practice, and even more so when the subject's initial skills of discrimination were quite weak. I know of one case in which a child asked a piano teacher at the beginning of the lesson why there were black keys since they produced the same notes as the adjacent white ones. This initial "tone deafness", too, completely disappeared eventually with some practice. Even subjects with excellent discrimination sensitivity within the range of musical tones prove to be "tone deaf" in extreme registers. The transitions from the worst to the best discrimination sensitivity are therefore smooth and it is impossible to divide

---

[10] Op. cit. Myers used a sort of boundary method with two tuning forks, one of which could be adjusted by a sliding weight.

[11] I operated according to the method of *r*- and *f*-cases with four sliding weight forks which were tuned to suitable small differences before each test series and presented for a comparison in pairs. The procedure certainly is very dependable but makes such high demands on the subjects' patience and is also so time-consuming that it can only rarely be applied for ethnopsychological purposes. More details on these as well as the experiments mentioned below will be dealt with in a future publication. The experiments were carried out, mainly among Indian schoolchildren, in Pawnee and Chilocco (Oklahoma) in 1906.

[12] Grant Allen, *Mind*, 1878.

[13] Stumpf, *Tonpsychologie* [Tone Psychology], I, 327 passim, II, 158, 362 passim.

people according to discrimination sensitivity into the two common groups of "musical" and "unmusical"; but the discrimination sensitivity is indeed a useful criterion for establishing types and distinctions within musical ability. I also find it noteworthy that all so-called "tone deaf" people pay closer attention to other aspects of the tones presented than pitch in particular: intensity, timbre (tone color) and accompanying sounds, duration, etc. As is well known these aspects are common to both tones and [noisy] sounds. In nature [noisy] sounds occur almost exclusively and being able to distinguish them is of great biological importance to man. It is therefore not really astonishing that somebody not used to dealing with tones would pay attention to those aspects of sounds which can be observed in all auditory sensations. Such considerations also make it comprehensible that peoples who use tone producing instruments rarely or not at all, such as the North American Indians, attach less importance to pitch in their songs than to timbre (in the widest sense) and phrasing, in short: to aspects which would be deemed less important by a European musician, and for which we therefore have only a very imperfect nomenclature.

Thus, if the discrimination sensitivity for pitch, albeit with certain restrictions, is a criterion for differences in musical ability, it is so in a completely different way than has often erroneously been assumed.

In fact, the sensitivity for discriminating tones has been confused with that for (successive) intervals. If an interval *a*-*b* is not detected to be different from an interval *a*-*b′*, it cannot, however, be inferred that the tones *b* and *b′*, too, presented in isolation one after another, were indistinguishable or vice versa. A sequence of two tones is in fact psychologically something else than a mere sum. Moreover if two intervals are compared with each other, not four individual sensations are compared but two sensory complexes. And this is the case even outside of any musical context, including in laboratory experiments. Now if for instance the šrutis of ancient Indian music theory – i.e., intervals (of about a third- or quartertone) from which the various steps of the scales are thought to be theoretically made up – are interpreted as the smallest possible steps, one cannot draw conclusions from it concerning an imperfect discrimination sensibility for pitch. Presumably also the ancient theorists did not have this in mind but instead maybe the smallest of intervals, where the second tone not merely appears as if being out-of-tune against the first one but rather as a new, different tone; thus the whole functions as a musical [scale] step. Conversely, the use of such small intervals has led to admiration of the musical ability of Indians as well as Arabs and Hellenes, in whose music theories analog features can be found. One has overlooked however, that these narrow tonal steps do not occur as such – except maybe in musical embellishments where the exact size of intervals does not matter at all – rather they only represent the differences of the larger

intervals if they actually have more than mere theoretical relevance.[14] It is a misleading parlance to speak of "quartertone music" where one can find for instance major and minor thirds as well as neutral ones. But perhaps the conclusion by analogy is permitted in that the intervals of merely slightly different sizes affect the overall impression of the melody in a certain way by being characteristic elements of the musical context. Therefore, concerning the musical ability and training of said peoples, the fine ability to discriminate intervals and their musical emotional effect is to be admired. The judgment of the purity of intervals common among us is also extraordinarily acute. Now, if a larger number of different intervals is employed in the music of the Indians than among us, it does not necessarily follow that their discrimination sensibility for an individual interval is superior to ours; they only have to keep a larger number of standard intervals with their characteristic emotional tint in mind.[15] This latter, memorizing[16] certain intervals and the ability to judge their "purity," seems to be what is commonly called "awareness of intervals". Studies by Stumpf and Meyer[17] have already shown that the judgment of purity has nothing to do with the awareness of consonance, however defined.

The acoustic memory – respectively, the ability to recognize acoustic phenomena – has hardly been investigated among non-Europeans for obvious reasons. Only some indirect conclusions concerning their ability are possible. The memory for absolute pitches, the so-called absolute tonal awareness, is often regarded as an indication of particularly high musical ability. It certainly is correlated to the latter, but it is not an indispensable prerequisite. It may lack eminent musicians, and be quite easily instilled in children, especially when they have had little to do with music. On the other hand, parrots and starlings, as far as they have been observed thus far, may reproduce melodies presented to them by whistling only on the original pitch. This would distinguish their achievement substantially from that of man who does not care on which tonal step a melody starts in order to determine its peculiarity.[18] The fact that singers in the course of phonographic recordings very often adapt their intonation to

---

[14] The mix-up of the (theoretical) scale degrees with the tone steps used in musical practice has already been criticized by Aristoxenos (*Harmon*. 28).

[15] Whether outside of a musical context as well, is doubtful, however. Cf. A. H. F. Strangways, The Hindu Scale, *Sammelb. d. Intern. Mus. Ges*. IX, especially p. 498.

[16] In a twofold sense: as the ability to recognize and to reproduce; the motor memory also plays a role here (but not exclusively).

[17] Maßbestimmungen über die Reinheit konsonanter Intervalle [Measurements on the Purity of Consonant Intervals]. *Beitr. z. Akust. u. Musikw*. Heft 2.

[18] Cf. Otto Abraham, Das absolute Tonbewußtsein [The Absolute Tone Awareness]. *Sammelb. d. Intern. Mus. Ges*. III.

the tuning pipe, which is sounded in order to reconstruct the original pitch during later reproductions of the phonogram, demonstrates that there is no difference here between so-called primitive peoples and Europeans.

On the other hand, the extremely small fluctuation in the intonation when a melodic section is repeated, e.g., in songs of the Hopi Indians (Gilman[19]), shows that the memory for intervals within a melodic context may also at times be excellent among so-called primitive peoples. Quite amazing, however, is some persons' memories for melodies. Thus, individual Pawnee Indians for instance keep several hundred melodies in mind.[20] However, in these cases the musical memory is supported not insignificantly by the enormously fixed association of melody and lyrics.

Making people sing tones and tone steps they have just heard has proven to be an appropriate means for the investigation of musical thinking.[21] In the case of well predisposed persons, the connection between the acoustic and the laryngeal motor apparatus is so close that the process of immediately reproducing what has been heard may be considered to come quite close to a reflex. In any case, for the most part it falls into the domain of the unconscious. Birds and very small children who reproduce melodies by singing do so completely without any further testing after they have heard the melody several times: the newly acquired capability is suddenly there.[22] Therefore, older children or adults who shall reproduce a tone by singing in most cases do not search for the required pitch but try to react immediately and determinedly, be it right or wrong.[23] The occurring errors are instructive for the way the tone presented in singing is grasped. Very often it is registered in all its qualitative peculiarity and one tries to reproduce it as such, i.e., in its absolute register. However, if this register is too low for the subject's vocal range, the person will sing the lowest tone he is capable of producing. Moreover, the timbre can be more important to the subject than pitch and he therefore reproduces the former as precisely as possible, while the latter only very roughly. Instead of the

---

[19] Hopi Songs. *Journal of Amer. Archaeol. and Ethnol*. V.

[20] Similarly also in Europe. Cf. John Meier, *Kunstlieder im Volksmunde* [Art Songs in the Vernacular] (Halle, 1906), p. LXXXIX passim.

[21] The following refers to the experiments with Indian children mentioned already on p. 470 [sic!]. [here: p. 5, footnote 11]

[22] Cf. Stumpf, *Tonpsychologie* [Tone Psychology] I, p. 294. The same holds true for the reproduction of speech sounds, cf. C. and W. Stern, *Die Kindersprache* [Child's Language], p. 129 (a) and 130 (c).

[23] After all, the degree of muscular training co-determines the result. In the case of children, too, spontaneous singsong and babbling precede imitation by singing and talking. In general (biologically appropriate) active games precede mimicry.

given tone itself or its octave, some subjects reproduce its fifth or fourth which indicates that also tones which stand in these relationships are similar to each other like tones in an octave relationship.

One also has to take into account that acoustically inclined subjects may still orient themselves after the primary memory image. Conversely, for those who are not acoustically inclined, the mental picture of the tone disappears together with or at least immediately after the termination of the stimulus. Through the combination of all these factors, imitation by singing also becomes a test of musical ability. The individual differences emerge even stronger if the tone to be sung is not presented in singing but by whistling or on a musical instrument. Due to the difference to the timbre of the singing voice, a complication is introduced in all cases (also for the musical subjects). This complication has a quantitatively significant bearing on the relationship between correct and wrong reproductions.

Likewise, in experiments on the reproduction of tone steps by singing, characteristic mistakes are very instructive. Often the sizes of tone steps are reproduced only approximately, i.e., a semitone or more too large or too small. Very often subjects, who generally respond correctly, mix up octaves, fifths, and fourths; some reproduce descending intervals better than ascending ones (the melodies of Indian tunes are almost always descending!), etc. On the whole, attempts at mimicking by singing again demonstrate the paramount significance of apprehension which is conditioned not only by the disposition of the individual but by the musical custom of the country as well.

2. Tone measurements on musical instruments – if they are not carried out directly on the spot immediately after the instrument has been tuned by a native musician – have to be limited naturally to those where one is sure that their tuning has neither suffered from transport nor has been modified or corrected by technical devices during a performance. Among musical instruments with fixed tuning, those with a manufacturing and tuning process that is technically simple should be preferred. This allows for even a less skilled instrument maker to realize his musical intentions. For these reasons especially two types of musical instruments have proven to be particularly useful for tonometric studies: panpipes and xylophones.[24] The determined instrumental scales are, however, primarily important for the generation of music theoretical and ethnological hypotheses.[25] Several findings,

[24] Under certain conditions other instruments as well.

[25] Especially if not only the intervals but also the absolute pitches coincide, scales can serve as – in my opinion very reliable – evidence of cultural connections. Cf. my "Notiz über die Musik der Bewohner von Süd-Neumecklenburg" [Note on the Music of the Inhabitants of South New

however, also give clues for tone psychological considerations. For example, pairs of panpipes with absolutely identical tuning can be found in Northwest Brazil: the homologous pipes when blown at the same time produce unisons (completely or nearly) without beats. If the natives compare successively in order to tune and do not employ beats as an auxiliary means, which is rather unlikely, one can deduce that the pitch discrimination sensitivity of these Indians is really excellent.[26]

On Javanese and Siamese xylophones, A.J. Ellis[27] and later Stumpf[28] have found scales whose intervals are not, as is otherwise usually the case, constructed according to the principle of consonance. Two adjacent tones always have the same frequency ratio. Whole tones and semitones do not alternate as in our diatonic scale but, as in our tempered chromatic scale, any melody could be started on any scale degree without altering its intervals. Since the use of such scales can only be explained by the assumption that tone steps corresponding to the same frequency ratios are also perceived as equally large, it stood to reason to interpret the existence of "distance scales" as a confirmation of Weber-Fechner's law. Weber and Fechner themselves had argued that same musical intervals, i.e., frequency ratios, appear the same to us on any absolute pitch. This argument, however, is not conclusive particularly in the case of European intervals because here an evaluation of the distance, if this happens at all, is almost always accompanied by an evaluation of the consonance. This source of error is precluded, however, as far as the penta- and heptatonic Javanese and Siamese distance scales are concerned. Nevertheless it seems doubtful they can prove anything regarding Weber-Fechner's law because it does not refer primarily to differences of the quality but of the intensity of stimuli. Furthermore, this law has been confirmed in its domain proper only with certain limitations and not with absolute accuracy. Therefore, it would be rather strange if regarding quality it should be valid in the domain of tones, and only in this, in full rigor. Therefore, as Stumpf emphasizes, it is not possible to state that this is a matter of two cases of one law but only that a logarithmic formula proves to be of value in various domains. While the tempered scales of

---

Mecklenburg] in Stephan and Gräbner, *Neu-Mecklenburg* (Berlin, D. Reimer 1907); "Über die Musik der Kubu" [On the Music of the Kubu] in B. Hagen, *Die Orang-Kubu auf Sumatra* (Frankfurt a. M., Baer, 1908) and "Über einige Panpfeifen aus Nordwest-Brasilien" [On some Panpipes from Northwest Brazil] in Koch-Grünberg, *Zwei Jahre unter den Indianern*, Bd. II (Berlin, Wasmuth, 1910).

[26] Über einige Panpfeifen aus Nordwest Brasilien [On some Panpipes from Northwest Brazil], op. cit. p. 379.

[27] On the Musical Scales of Various Nations. *Journ. Soc. of Arts* XXXIII, 1885.

[28] Tonsystem und Musik der Siamesen [Tonal System and Music of the Siamese], *Beitr. z. Akust. u. Musikw*. III.

said civilized peoples are most likely posterior transformations of other scales, their exact creation required the ability to equalize tone steps without mathematical or physical tools only by ear. According to measurements on musical instruments (and phonograms) of various origin, this ability seems to be widespread. Studies are still ongoing as to what its actual psychological basis is. Regarding other sensory domains, self-monitoring of the comparison of so-called noticeable differences of sensations has shown that judgment may rest on completely different processes depending on the circumstances,[29] and the like seems to be the case with tones as well.

3. The characteristics of tone sequences in contrast to simultaneous sounds have become especially apparent through the investigations of non-European music. In our music, too, we distinguish melody from harmony; but since the 11th century, truly monodic music has become almost completely extinct in Europe – except for the east under Asian influence. The development of harmony and polyphony has resulted in a certain one-sided form of the tonal system and of rhythm, i.e., the two essential fundamentals of melody. By overwhelming habit we have become unable to assess a melody purely melodically without reinterpreting it according to our tonal system and an assumed harmonic accompaniment. The music of non-European peoples, however, a few regionally and temporally limited exceptions notwithstanding, has developed or has been preserved purely melodically. Exotic musical pieces therefore present the melodic element in an unadulterated way so to speak. A psychological theory of melody will have to be based on this purely melodic and not, as usually has been done so far (Th. Lipps[30], Weinmann[31], M. Meyer[32]), on our harmonic music. In this regard the following observations seem to me to be of particular importance.

In monodic music, especially in unaccompanied singing, one finds an enormous amount of intervals which regarding their size fall in between two intervals of our tonal system (neutral intervals); and they do not just occur as accidental products of untrained singers but also in the case of completely non-varying intonation. In other songs the intonation changes in the course of the melody, but in an entirely regular way: either the pitch constantly shifts upwards, i.e., the

---

[29] Cf. Fröbes, *Zeitschr. f. Psychol*. 36 (especially p. 257 passim); Jacobsohn, op. cit. 43 (p. 80 passim); Heine, op. cit. 54 (p. 67 passim).

[30] *Psych. Studien* [Psychological Studies] (Heidelberg 1885); Zur Theorie der Melodie [On the Theory of Melody], *Zeitschr. f. Psychol.* 27, 1902.

[31] Zur Struktur der Melodie [On the Structure of Melody], *Zeitschr. f. Psychol*. 35, 1904.

[32] Contribution to a Psychological Theory of Music, *Univ. of Missouri Studies* I, 1, 1901.

melodic curve continuously changes its level so to speak[33] (as often happens in a similar way but in the opposite direction in our a cappella choirs unknowingly and against the singers' intention); or the pitch of a main melodic tone is kept throughout the whole piece but the tone steps starting from or returning to it become larger (or smaller) at certain points of the melody, namely always in the same manner at analog points. Likewise, in the course of various repetitions of the "same" point in the melody, intervals may occur which differ so strongly that to our ears the sense of the melody is fundamentally altered, e.g., *g e c* instead of *g* e^b *c* etc.[34] All these peculiarities in my opinion can be explained most easily by the assumption that a pure melody does not depend primarily on a precise interval size but only on an approximate one.

Maybe in order to obtain a rough idea of circumstances one may first group the intervals according to their emotional effect into two classes: stepping and skipping. With the former the distance would be wide enough for the transition from the first to the second tone to be recognized as a distinct step and not as merely being out-of-tune, but at the same time not as wide that the transition appears to be a more forcible (skipping) one as in the second group. Admittedly, it will not be possible to draw the line between the two groups once and for all, but it will differ with different peoples, levels of development of musical thinking, etc. In fact, the same interval may at times perhaps appear to be stepping or skipping to one and the same listener depending on the melodic context and the manner of performance (e.g., legato, staccato). Thus, we come to the second issue relevant to music psychology: the melody's overall gestalt.

It is a banal truth that for the consciousness of the listener the spoken word is not the sum or sequence of individual sounds. This is contrary, for instance, to what the phonetician identifies in his analyses. This will become particularly obvious also to an educated and literate person when he starts learning a foreign language merely by listening and imitating. Even a single word often is only a grammatical and not a psychological unit. Namely in the incorporating languages of North America (and in others) one may call the extensive formations which express a unified thought equally well as sentences or words. But in European languages, too, some shorter sentences or collocations have condensed to units and attained the grammatical function of words,

---

[33] This is especially true of North American Indians; cf. Stumpf, Lieder der Bellakula-Indianer [Songs of the Bellakula Indians], *Vjschr. f. Musikw*. II, und Phonographierte Indianermelodien (nach Gilmans Notierungen) [Phonographed Indian Melodies (after Gilman's Notations), op.cit. VIII.

[34] Cf. especially Gilman, Hopi Songs, op. cit. and my Wanyamwesi-Gesänge [Wanyamwesi Songs], *Anthropos* IV, 1909.

e.g., Gottseibeiuns [German: the Evil One, i.e., the devil], aujourd'hui [French: today], selfmade-man, Nolimetangere [Latin: Don't touch me].

In a melody the unifying function of meaning ceases to apply but apart from that the conditions are quite analogous. What we recognize first when hearing an unknown melody and what is present in the mind as a unified whole when it is reproduced, are neither the tones nor the intervals but *motifs*. Of course this unity is not simultaneousness in the strict sense: the succession of tones actually constitutes the main difference between melody and harmony, and between motif and simultaneous sounds. The specific quality of one after another rather is one characteristic of the phenomenon as a whole just as in the case of visual moving pictures and in general any perceptions based on elapsing time. Without specific analysis, to which the naïve, directly grasping mind is not adapted, motifs therefore appear as elements of the melody. In them the melodic movement, i.e., the up and down of tones, with its directions and changes of direction and its peculiar qualities which we characterize as sliding, stepping, skipping, etc. is combined with the continuous or sudden change of loudness. The rhythm, in addition to the two mentioned aspects (tone movement and dynamics), is also determined by the relative duration of tones. Tempo and timbre (understood in the widest sense, i.e., including accompanying sounds) play a role as well. Special focus can be put on all of these elements so that they can be perceived on their own, i.e., analyzed, such as pitch, loudness, and timbre of each single note. However they are also implied in the motif (or, if you will, "constitute" it) just as the elements of the single sensory sensation in the latter. Since so many factors determine the motif's overall effect it is understandable that changes of a single factor within certain limits do not necessarily result in a substantial change of the motif's gestalt. Certainly, not all factors contribute equally to the formation of the gestalt and presumably the ranking of these data will change according to cultures and musical custom. Thus, for instance larger deviations from certain interval sizes will affect the melodic gestalt considerably only when the ear has grown accustomed to exact intonation through musical instruments with fixed tuning. For us, too, the characteristics of a melodic gestalt rest primarily on other factors, including the rhythm and the direction of the tone movement. This is already evident from the fact that we can recognize well-known melodies merely from the rhythm of knocking sounds; that the so-called inversion of a motif – while keeping the rhythm – changes the melodic gestalt almost beyond recognition; that in the case of purely melodic phrases, e.g., fast passages, even our classics pay little or no attention to the size of individual intervals and rhythm; and so forth.

How long a melody may be in order to still function as a single motif will partly depend on its gestalt itself (rests, phrasing), and partly again on the grasping musical mind, its development and its customary attitude. In primitive songs one usually finds very short constantly repeated motifs. The next advance, then, seems to be a deliberate variation of the motif during the repetitions. Furthermore, the motif is shifted during the repeat usually by a fourth or fifth. Presumably the same kind of similarity exists between a tone and its upper fifth (lower fourth), albeit to a lesser degree, as between a note and its octave.[35] The fact that in spite of a greater similarity (tonal relatedness) not the octave but the fourth or fifth are employed for the transposition could be explained by the fact that the octave is too large as a melodic tone step and that the change in tone color in the case of such a large interval is also already quite noticeable. Then again, the vocal range and the inconvenience and difficulty of such large steps for the larynx could also provide explanation.

Longer melodies constructed out of several single motifs have an overall gestalt, too, which is preserved in spite of certain variations. Again, it is impossible here to set up any generally valid norm for the type and limitations of variations. An interesting case in point is the Indian rāgas.[36] The term may best be translated as "melody type". Nowhere in the Sanskrit literature is this term defined explicitly, i.e., regarding features. According to more recent melodic samples which we possess, it is enormously difficult for a European to determine what melodies belonging to the same rāga have in common and what distinguishes various rāgas from each other, although he, too, senses similarities and differences. For the Indian, feelings are also linked to the individual rāgas, which may partly have a musical nature, but partly be determined by religious or magical associations. Analogs to the Indian rāgas can also be found among other civilized peoples: the Chinese, the Arabs, the Hellenes *(νόμοι)*, and perhaps also the Javanese. But one does not need to search for examples from so far away: in many works of our newer composers, variations can be found whose commonalities with the theme can hardly even be explicated by a music expert. Even more so, the average listener only vaguely guesses. The composer, however, must have had a common rāga in mind.

Originally rāga is likely to have been understood as the overall gestalt of a melody. But already among the Indians the term for the

---

[35] See above p. 155 [here: p. 9]. Stumpf, *Beiträge* V.

[36] On the following cf. Abraham and von Hornbostel, Phonographierte indische Melodien [Phonographed Indian Melodies], *Sammelb. d. Intern. Mus. Ges*. V, 1904; C. R. Day, The Music and Musical Instruments of Southern India and Deccan (London, 1891); Strangways, The Hindu Scale, op. cit.

rhythmic form (tāla) has detached itself from the term rāga. One "sets" a rāga to a certain tāla, similarly to the way hymns or students' songs are sung "after a well-known melody". Thus, rāga would strictly speaking mean melody type aside from rhythm. But the tāla as well is not as poor in content as our "measures" (3/4, 4/4). Rather, tālas are rhythm types. What has been said about melodic motifs can apparently be readily applied to sound sequences, e.g., drum strokes. Not beats or measures but rhythmic motifs, units of a certain characteristic form, are the elements of larger rhythmic formations. The rhythmic motifs, too, are short and simple in primitive settings and are repeated continuously without change: gradually they increase in length and complexity. From the fact that among many non-European peoples several such motifs are performed simultaneously, it can be deduced that those longer and more complicated motifs are still regarded as formal units. Basing a theory of rhythm on ancient metrical feet as has been attempted namely by R. Westphal[37] is only practical as long as one deals with the simplest rhythmic settings, where "simple" is meant in the mathematical, not in the psychological sense. Our European music needed to make do unavoidably with mathematically simple rhythms (uniformly executed measures) because of the joint performance of many people. The non-harmonic non-European music, however, could develop more freely especially in the rhythmic domain and thus the rhythmic comprehension of some African Negro tribes for instance is far superior to ours.[38] Many African drum and xylophone rhythms are completely incomprehensible to us and remain so even after intensive study. In some cases we are able to reproduce the rhythm from memory without being able to count it out, i.e., to analyze it in our way. Again in other cases one can convince oneself by mechanical devices that certain also numerically expressible laws underlie a rhythmic motif, but still be unable to grasp the motif and reproduce it.

The concurrence or rather the counteracting of different rhythms can already be interpreted as a kind of multipart relationship (rhythmic polyphony[39]). In many cases a rhythmically free constructed vocal melody is accompanied on the drum by a not too long and repeated always unvaried rhythmic motif. Once its characteristic gestalt has been grasped and one has become familiar with it, the attention can shift mainly to the vocal melody and more or less casually take note of the

---

[37] *Elemente des musikalischen Rhythmus* [Elements of Musical Rhythm]. Jena 1872.

[38] Cf. Ch. S. Myers, A Study of Rhythm in Primitive Music. *Brit. Journal of Psychol*. I, 1905.

[39] Rhythmic polyphony can be found especially among civilized peoples: in the Persian-Arabic countries, India, East Asia, and in the Malay territory; but in West Africa as well.

accompanying drum rhythm. This resembles an image where the portrayed person is set apart from the background of modestly patterned wallpaper. Several examples have been found in non-European music, albeit not among the most primitive tribes, of not only rhythmic but also tonal multipart organization.[40] If the drum accompanying the singing produces a tone with definite pitch to which the singer can adjust his intonation, a very simple and widespread type of multipart music already arises: the drone or pedal point. In other cases one tone is repeated rhythmically or sustained constantly by a wind or string instrument or a vocal part. The melody proper is set apart from it just as from the accompanying drum rhythm. And as the latter need not consist of regular strokes, the drone need not consist of one single tone but can be replaced in the course of an ongoing development by a simple melodic motif repeated unaltered. The attention is unequally divided here between this motif and the main melody just as in the case of rhythmic polyphony (ostinato). Finally, two or more melodies of greater extent can also be combined as long as they are of adequately similar gestalt, i.e., special cases of one and the same rāga so to speak. This form ("heterophony") initially only develops in instrumental music and can therefore be found primarily among civilized peoples (Farther India, Indo-China, China, Java, perhaps also Hellas), though rudiments have already been located among African Negro tribes.

All these multipart forms are characterized thus that while several melodies sound simultaneously, they can, nevertheless, be grasped as melodies, i.e., as successive complexes (polyphony). Little or no attention is paid to the simultaneous sounds as such, and dissonances are therefore not considered disturbing. However, the development from the originally purely monodic music also takes a completely different direction. Stumpf's theory of consonance which traces consonance back to fusion, i.e., the unity of simultaneous sounds, is strikingly corroborated by the second line of the development of multipart music. In the case of the most consonant interval, the octave, the unity of the simultaneous sound is so great that it is initially not recognized or at least not paid attention to. This is why wherever men and women join in choral singing they do so in parallel octaves in agreement with the different vocal registers of male and female singers. Regarding the degree of fusion, the octave is followed by the fifth and then the fourth. Indeed we find parallel fifths and fourths as the next step in the development of harmonic music in European music of the early Middle Ages as well as still today among some so-called

[40] Cf. my preliminary report "Über Mehrstimmigkeit in der außereuropäischen Musik" [On Multipart Organisation in non-European Music]. *Ber. über den III. Kongreß d. Intern. Mus. Ges. Wien, Mai 1909* (Wien and Leipzig, 1909), p. 298 passim.

primitive peoples. This use which is very displeasing to our current taste becomes understandable in that simultaneous fifths and fourths are still quite close to monody while at the same time sound more resonant. What has changed in the course of time is not the degree of consonance of intervals but their emotional value. Parallel fifths appeal to primitive people exactly because they are so consonant and hardly obscure the effect of the underlying pure melody; we dislike them because they are too consonant, they sound "empty" to us, not to speak of the effect of parallel voice leading.

In this context some observations on the emotional effect of European chords on exotic musicians shall be subsequently mentioned. A member of the Siamese court orchestra whom Stumpf[41] studied found Siamese motifs with simple harmony on the piano "not bad, but too many notes". Out of various single chords presented to him, he found major chords OK and this was even more so the case as the simultaneous sounds came close to the order of harmonic partials; minor and seventh chords were rejected. So here again we see preference for the intervals with most fusion. Annamite and Cambodian musicians with whom G. Knosp[42] conducted experiments reacted in just the same way. They, too, liked major triads, but called minor triads and various seventh chords "abominable, incomprehensible, obscure, weird". Setting the native melodies to European harmony appeared to be overcharged to them. After all, these people from Southeast Asia due to their very old musical culture are not as far from European music as peoples who know almost no instrumental music and also have no vocal multipart music. Occasionally[43] I have let North American Indians evaluate major, minor, and augmented triads according to the method of paired comparison. Many of them did not even understand the question or made wild guesses in order to please me by offering a judgment although they were apparently indifferent to the chords. Regarding the others who had offered a more definite evaluation, the only result of this plebiscite was that all tastes were present which were possible according to the permutation method.[44]

The gradual development of multipart music, which can be traced fairly well especially among very musically gifted Africans, shows how

---

[41] Tonsystem und Musik der Siamesen [Tonal System and Music of the Siamese], op. cit., p. 104 passim.

[42] Über annamitische Musik [On Annamite Music]. *Sammelb. d. Intern. Mus. Ges.* VIII, especially p. 153 passim, 161 passim.

[43] See above p. 5, footnote 11.

[44] Observations of this kind are in my opinion suitable to rebut theories once and for all according to which purely melodic tone sequences could be considered to be "spread chords" [arpeggios] and be explained as a "latent feeling of harmony" as has been claimed particularly for Indian songs by Fillmore and others.

the two lines of development, which we have called the harmonic and the polyphonic, respectively, do not proceed side by side independent of each other but rather constantly influence each other mutually. In the case of polyphonic music, attention is grasped by several melodies at the same time, as [different] melodies. In the case of purely harmonic music, one single melody is grasped in a more resonant timbre so to speak. Eventually one learns to distribute attention to both aspects. In this way harmonic-polyphonic forms emerge where several melodies do not run side by side independent of each other but rather the parts mutually adapt to each other in a way that at least at central melodic positions, harmonic intervals occur. To be sure, the predominance of the melody, its great freedom and unlimited development potential in tonal as well as in rhythmic respect, is curtailed in this process. However the musical understanding is increased by age-long education in such a way that the music gains more and more new freedoms and development potentialities in lieu of those that have been lost. And especially in our countries and in our time music tries to forget the last remnants of its Middle Ages bound by rigid rules.