

A STUDY OF THE INDIVIDUAL DIFFERENCES IN ATTITUDE TOWARDS TONES.

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¹ I wish to express my gratitude to Dr Valentine—who has been working on the same subject simultaneously, but independently of me—for permitting me to incorporate some of his experimental results with mine in this paper. Originally these results formed part of a section of the paper which he submitted to me in September, 1912, for publication in *This Journal* (vi. 190—216). Dr Valentine, however, kindly consented to omit this section at the time, so that we might embody our results later in a single paper. This seemed desirable, since (i) in the previous March I had already read a paper before the Berlin Congress of the *Gesellschaft für experimentelle Psychologie*, in which I gave a *résumé* of my results, and (ii) in the section of his paper above referred to, Dr Valentine had quoted from the abstract of my communication which I had sent him. C. S. M.

I. INTRODUCTORY.

THE experimental results described in this paper are to be regarded as preliminary to an inquiry into the individual mental differences underlying man's attitude towards music. On general grounds it seems desirable to investigate the effects of such simple material as single (or paired) tones before making experimental use of the far more complex arrangement of tones employed in music. No *a priori* assumption is thereby implied that single tones (or pairs of tones) must make the same impression on a subject as would, say, a song or a symphony; indeed the difference between isolated tones and a piece of music must be at least as great as that between isolated words and a poem. Nevertheless interesting differences in the attitude of different subjects to single tones (or pairs of tones) may reasonably be anticipated and these may be expected to throw light on the nature of the well-recognized (but imperfectly studied) individual differences in attitude towards music.

The word 'attitude' is here used in its ordinary comprehensive sense, so as to include the whole of the resulting changes in consciousness,—that is to say, not merely the more immediate perceptual and affective results of the stimuli, but also the images and ideas, and the tendencies to action, which they more or less indirectly evoke.

II. EXPERIMENTAL METHODS.

The sounds used in these experiments¹ were produced from ten tuning-forks the tones of which ranged from 400 to 1300 vibrations per second, the pitch of each fork differing from that of its neighbour by 100 vibrations. The stem of each fork was horizontally placed in a support so that the two prongs lay vertically one above the other. Below the lower of the two prongs of each fork was fixed a stout but flexible steel band carrying on its upper surface a rubber knob. This steel band could be depressed by a simple mechanical contrivance and suddenly released. On the rebound of the band, the rubber knob on its upper surface struck the fork and threw it into vibration. The loudness of the tone depended on the distance through which the steel band was depressed. As this could be kept constant, the uniformity

¹ Dr Valentine's procedure will be found described in his paper in *This Journal* (vi. 191, 200).

of the loudness of the tones was insured throughout the series of experiments.

Such an arrangement of the forks was surprisingly successful in disguising the nature of the sound-producing instruments. Most of the subjects went through the experiments without knowing that the tones they heard were being produced by tuning-forks; several of the others only realised this towards the close of their sittings. The forks were always placed behind the subject. Each subject was investigated separately, some on two or more occasions. Each sitting lasted about three-quarters of an hour. In all, twenty-nine subjects were investigated, twenty-two men and seven women; they were drawn from University students, graduates and their wives. The subjects possessed all degrees of musical ability, careful note being taken of their tastes and proficiency.

The defects of this apparatus may be thus summarised: (1) such pure (overtoneless) tones as those emitted by tuning-forks, were of dull timbre and hence relatively uninteresting as compared with the richer sounds of musical instruments. (2) The production of the tones was unavoidably accompanied by the knocking noise of the steel band striking the fork. (3) The forks of different pitch 'rang off' at different rates, in consequence of which the experimenter had to silence them by damping them with his hands at the end of a constant interval (about three seconds) after they had been thrown into vibration. (4) There was inevitably a scientific atmosphere about the experimental procedure which prevented the subjects from taking up the desired aesthetic attitude so readily as when listening to a musical composition. But these drawbacks,—the dull quality of the tones, the noise of the knocks, the silencing of the forks, and the experimental atmosphere,—did not prove as serious as might *a priori* be expected. As a rule the subjects soon habituated themselves to them. It was only rarely that complaints were made of the want of interest in the timbre, the disturbing effects of the knocks, the disappointment at the too abrupt or premature termination of the sound, or the difficulties inherent in listening musically to such relatively meaningless material in the surroundings of the laboratory. Indeed these complaints, dependent as they were on individual mental differences, proved to be in themselves of psychological interest.

With rare exceptions (which will be noted later), the sittings began with the sounding of single isolated tones. Each time after a tone had sounded, the subject was encouraged to give as full an account as

possible of his general attitude towards it,—what came into his mind when he heard it, what he thought of it, whether it was pleasing or displeasing and, if so, why, etc. Leading questions were carefully avoided; all that was, as a rule, found necessary, after the subject had grasped what was required of him, was for the experimenter to repeat encouragingly, “Yes, anything else?” as he recorded the introspections which were dictated to him.

After about eight single tones had been sounded, the subject was plied with pairs of simultaneous tones, or bichords¹. Each bichord was sounded by itself and the subject received the same instructions as had been given to him for the single tones—namely to give a full account of his attitude. After about sixteen such bichords had been given *singly*, bichords were given *in* (about the same number of) *pairs*, the subject being asked again to describe his experiences as fully as possible, especially as regards his preference for one or other member of a given pair. In some of the earlier experiments, similar preference judgments were invited for pairs of successive single tones.

The single bichords employed included those occurring in music and also those not thus employed. The following is a specimen list of the bichords submitted to a subject:

400	500	1100	500	600	600	300	600	300	800	1000	400	1200
700	600	1200	800	900	1000	400	1200	500	1000	1200	500	1300
400	600	800										
600	800	1200										

As an example of the pairs of bichords presented, the following will serve:

600	800	500	500	600	400	1200	1100	600	600	400	800
1000	1200	800	600	800	600	1300	1200	900	800	700	1000
500	600	1000	600	500	300	400	500	600	500	500	400
800	800	1200	1200	800	500	500	600	1000	800	600	700
500	600	600	600	500	300	600	500	400	600		
800	1200	800	900	800	400	1200	600	600	800		

III. THE VARIETIES OF ASPECTS.

Before attempting to discuss in detail the individual differences in attitude recorded by the subjects of these experiments, it will be convenient to summarise the main aspects from which a given tone (or bichord) may be regarded. They are four in number,—the ‘intra-subjective,’ the ‘objective,’ the ‘character’ and the ‘associative’ aspects.

¹ ‘Bichord’ is used throughout this paper as a convenient word for denoting any two simultaneously sounding tones.

Of these terms the three last have been already employed by Bullough in his similar experiments with colours¹, and are here used in a sense similar to that in which they were employed by him. That is to say, the objective aspect of a sound consists in the relation of the sound to the subject's standard of purity, pitch, etc., which a satisfactory sound should attain; the character aspect arises from the subject's tendency to personify tones, *i.e.* to endow them with human attributes and to regard them as distinct living entities; the associative aspect yields the various ideas (with or without concrete or verbal imagery) which a given sound may suggest. But in this paper the connotation of Bullough's objective aspect has been extended to include *any* attitude which induces a *passive* regard of the sound as having meaning or use as an independent object. Moreover, Bullough's remaining aspect, the physiological aspect, has been here extended to include not merely the sensory effects and the changes in feeling (emotion, mood or feeling attitude²) but also the experiences of *self-activity* which the sounds may produce in the subject; in consequence, the word 'intra-subjective' will be substituted for this aspect and Bullough's term 'physiological' will be limited to the first three of its five sub-aspects.

It will be convenient, then, to sub-divide these aspects according to the following scheme; the examples, illustrating these sub-divisions, have been derived from the introspective data of the subjects of the experiments.

I. Among the 'intra-subjective' changes must be recognized:

(a) Changes in the cognitive aspect of the subject's consciousness.

(i) Leading him to term the sound, *e.g.* strident, piercing, hissing, hard, firm, velvety, soft, solid, rigid, round, broad, pointed, thin, luscious, mellow, insipid, acid, etc.
(*physiological sub-aspect a*).

(ii) Exciting in him, definite tactual, motor, or organic sensations, *e.g.* tactual sensations in the tympanic membrane, stinging in the arm, tingling down the spine, thrills, shivery feelings, going through the head
(*physiological sub-aspect b*).

(b) Changes in the emotional state, mood, or feeling attitude of the subject, as instanced in feelings of desolation, dissatisfaction, depression, annoyance, aggravation, irritation, hurry, restlessness, laziness,

¹ This *Journal*, 1908, II. 406-463.

² Equivalent to the German *Bewusstseinslage*.

repose, delightful surprise, being carried away to a region of mysticism (*physiological sub-aspect c*).

(c) Changes of a conative nature in the subject's consciousness as seen in :

- (i) Motor impulses,—*e.g.* impulse to turn the head above and to the right, to bend low, to stop it, tendency to keep the head moving (*conative sub-aspect a*).
- (ii) Endeavour to determine the meaning or use of the sound, *e.g.* trying to connect it with piano sound, or with preceding sound, wondering what it suggests, inability to fix it in a scale, trying to fix its pitch or its interval, wondering if such a sound could come into a tune (*conative sub-aspect b*).

II. Under the 'objective' aspect must be recognized :

(a) Appreciation of the sound as having meaning or use, the sound being regarded

- (i) As if it were language,—*e.g.* an admonition, a question, an affirmation ;
- (ii) As if it resembled the behaviour of some other (non-musical) sound,—*e.g.* a throb, an echo ;
- (iii) As if it were a musical note,—*e.g.* about F♯, a note in Church music, a leading note, a major third.

(b) Consideration of the sound in relation to the subject's standard of purity, pitch, etc., which a satisfactory tone should attain, —*e.g.* a small sound that ought to be big, too loud for that particular quality of sound, below what I should have liked, not what I should have expected, this interval not suited to the *Glockenspiel*, died away too quickly, horribly short, a nice tone, a good harmony, needs resolution, I pass it, rich, poor, beating, reedy, metallic.

III. Under the 'character' aspect are included such 'anthropomorphic' replies as pretty, gentle, solemn, grave, sedate, dignified, mysterious, stupid, silly, sad, horrid, grotesque, bony, bare, angular, clumsy, *piquant*, fidgetty.

IV. Under the 'associative' aspect are included :

(a) Suggestions of an instrument, *e.g.* gong, finger bowl, cathedral organ, fog siren, keys of pianoforte, alarm bell, musical box ;

(b) Suggestions of music, *e.g.* the opening chord of the Dead March, a certain passage in 'Tannhäuser,' a note in one of Brahms's *Intermezzi*, it might be the end of a chorus, the Valse in 'Faust' ;

(c) Suggestions of surroundings in which the instrument or music is sounding, *e.g.* a finger bowl of definite shape upon a table, a ventilating fan in a railway carriage, a fog siren heard from the promenade at F—, ascending mountain in a train with distant whistle of the engine, someone dressed in black clothes and with dark hair bending over a violoncello, myself holding a table fork and striking it on the table, atmosphere of boy with guitar in Spain, someone clumsily dropping his hands on the keys of an organ within the dimness of a church, a man playing the organ in C— college chapel.

(d) Symbolic suggestions, *e.g.* the head and beak of a parrot looking its silliest, a narrow stream of grey light in movement, a halo, looking through a misty grey limitless veil, feeling something opening and something big emerging of which I could not get hold, a cylinder, a prism with its edge upwards, a bilaterally asymmetric figure, a plane, a circle crossed by lines in all directions, pushing my finger into an unresisting solid.

IV. THE RELEVANT ATTRIBUTES OF THE SOUNDS.

The attributes of the tonal stimuli, influencing the attitude of the subjects in these experiments, may be considered under five heads,—duration, loudness, pitch, timbre, and tone-combination.

Duration. As has been said (p. 70), the duration of the tones was objectively constant. Notwithstanding this, duration played a part in influencing certain subjects. For, owing to varying attention and interest, one tone appeared to last longer or shorter than another, so that occasionally a subject commented on the tone being “horribly short” or remarked that “you stopped it too soon,” etc. (cf. p. 76).

Loudness. Here again, although every effort was made that the tones should sound with equal objective intensity (cf. p. 69), we have an attribute which cannot be left out of account. For it was impossible to prevent the tones of different pitch from ‘ringing off’ at different rates. Hence the attention of the subject was occasionally drawn either to the rate of decreasing loudness of a given tone, or to the loudness of the tone at the moment it was silenced after a constant interval. Moreover, loudness, it must be remembered, is not merely dependent on the physical strength of the stimulus; it also involves at least two, individually variable, psychical factors. The first of these is connected with the varying ‘aggressiveness’ of tones according to their pitch; in consequence of which high tones appear louder than low

tones, even when the stimuli are of equal objective strength. The second subjective factor consists in apparent variations in loudness of a tone which is objectively of constant strength; a tone may often *appear* to gain or to lose in loudness after it has first been heard (cf. p. 108).

Pitch. Tones of different pitch vary in what has been termed tone-character¹. Such variations are generally described by the subjects in terms of cutaneous and motor experience, very high tones appearing 'fine,' 'pointed' and 'light,' very low tones appearing 'massive,' 'round' and 'heavy.' Tone-character may be also expressed in visual terms (high tones being described as 'bright' or 'glaring,' low tones as 'dark' or 'sombre') and perhaps (but far less frequently) in other sensory language.

The origin of such experiences is still a matter of dispute, but one 'explanation' can at once be dismissed. It has been repeatedly suggested that they are the result of association,—that high tones, owing to their being produced from small brass instruments, appear pointed and bright, whereas low tones, being produced from ponderous dark-coloured instruments, come to be regarded as massive and sombre. We shall later discuss the subject more fully in connexion with auditory synaesthesia (p. 81).

Not infrequently subjective changes of pitch may be experienced in listening to a given sound (cf. p. 107). The tone appears to rise or to fall in pitch, showing a behaviour similar to what has been just described under the heading 'loudness.'

Timbre. Even tuning-forks fail to produce a tone entirely free from overtones. Moreover, since in daily experience it is impossible to alter the pitch (or loudness) of a tone without changing its timbre (or *vice versa*), it is not surprising that the effects of changes in timbre and in pitch are difficult to separate. The most characteristic expressions alluding to timbre are 'richness,' 'warmth,' 'brightness,' 'softness,' and their opposites.

Tone-combination. Between timbre and tone-combination there is probably a gradual transition, depending on the relative strength and pitch of the tones present, and perhaps on the analytical powers of the subject. The absence of accompanying tones, whether they be loud enough to be regarded as fundamental tones or weak enough merely to give the experience of timbre, might *a priori* be considered to be the basis of judgments of 'purity.' But it is doubtful whether even a

¹ Cf. my *Text-book of Experimental Psychology*, 2nd ed. Cambridge, 1911, i. 32 ff.

highly musical person would *necessarily* call a hypothetically pure tone, which has been absolutely freed from accompanying tones, absolutely pure. Purity in sound, as in colour, is a relative term and is dependent on various standards; the timbre of the human voice, the timbre expected from the instrument producing the sound, the particular pitch of the note, are all factors, *inter alia*, influencing the subject's standard of purity at any moment.

It is curious how often in these experiments the less musical subjects utterly fail to notice that two tones are present until their attention is directed to it. They consequently treat a bichord just as if it were a single tone, describing it in terms of richness, fulness, etc., and their opposites, or alluding to its sensory or affective effects on themselves. Even such attributes as clearness or blurredness may be employed by subjects who are nevertheless unaware that more than one tone is present. The recognition of the presence of more than one tone, at once yields answers in terms of 'fusion,' 'blending,' 'harmony,' 'discord' and the like.

V. MORE DETAILED CONSIDERATION OF THE ASPECTS.

We pass now to further illustrations of the various aspects already enumerated on pp. 72-74, and to a consideration of the inter-relation of these aspects.

1. *The Intra-subjective Aspect.*

The Physiological sub-aspects:

The following replies illustrate sub-aspects *b* and *c*. Sub-aspect *a* will receive later treatment in connexion with synaesthesia (p. 81).

H. "I felt a touch on the tympanum." "I felt a stinging up the right arm as if the first finger touched a copper spring that rebounded." "I felt warm in the ear." "I had a lazy feeling." "It was aggravating, irritating."

G. $\frac{400}{700} \frac{1000}{1200}$. "Gave me a tingling at the end of the right thumb, like what occurs when attention is directed to a part of the body." [This continued for some minutes and finally prevented further experiments. After a short walk outside the laboratory the experiments were resumed, but almost immediately the tingling returned.]

Aa. $\frac{400}{700}$. "I just listened to it. I liked it and was sorry when you stopped it."

$\frac{600}{800}$. "I liked it. I had a distinct feeling of annoyance when you stopped it."

$\frac{800}{900}$. "It was too beautiful. A sense of being uplifted, as if I were listening to it with the very tips of my ears."

The physiological sub-aspects are thus essentially passive aspects. The subject surrenders himself to the effects of the sounds. Contrast the self-activity inherent in the conative sub-aspects.

The Conative sub-aspects:

Psychologically the two sub-aspects *a* and *b* are nearly akin, both involving self-activity, the former of a lower impulsive, the latter of a higher intellectual type. From the affective and aesthetic standpoints, however, the former is closely related to the physiological sub-aspects, the latter to the objective aspect. Feeling an impulse to turn the head easily passes over into definite motor sensations, whereas such a professional attitude as trying to determine the pitch, or wondering what is the meaning or use of a sound, is clearly apt to result in the objective aspect from which the sound is regarded as an independent external object having definite meaning or use.

The following replies will serve to illustrate further the conative sub-aspect *b*:

J. 1200. "I wondered what was the difference between this and the last."

300. "Pleasant, but I cannot say why I think so. I tried to connect it with piano sounds but could not."

900. "It puzzled me, and made me wonder if it was a sound that could come into a tune."

$\frac{600}{800}$. "I can't join it on to piano sounds; I try to imagine it in its place in a piece played by a pianola."

$\frac{600}{1000}$ $\frac{800}{1200}$. "I began to think what relation they are to one another, whether one is an octave of the other or how far they are apart."

C. $\frac{500}{700}$. "It needed resolution, and became pleasant when resolved. I kept the top note constant and raised the lower."

$\frac{700}{800}$. "Unpleasant. I couldn't do anything with it. I wondered if it was a semitone."

R. 600. "I tried to see if the sound meant anything. It didn't."

V. $\frac{500}{700}$. "Pleasant. I wonder what it suggests, but cannot say."

$\frac{1100}{1200}$. "Ugly. I don't see what is coming next."

$\frac{700}{800}$. "Unpleasant. Ugly in itself. A discord. I wondered how it would resolve, what would happen to it."

N. $\frac{500}{800}$. "I am, as usual, thinking of the relation. A minor sixth. I saw *f* and *d* but I am inclined to correct it to *e* and *c*. I cannot feel satisfied until I have determined the relations (this comes first) and their pitch."

R. $\frac{600}{800}$. "I cannot help trying to see what they are, because I am always analysing sounds."

V. $\frac{600}{800}$. "I was busy making it out."

2. *The Objective Aspect.*

Tonal, like visual, stimuli may be considered not only from the standpoint of their subjective effect on the recipient, but also as external entities. When the sound is regarded as an independent inanimate *object* we term the recipient's attitude 'objective'; when, on the other hand, the sound is regarded as an independent living *subject*, we say that the recipient adopts the 'character' attitude. The objective aspect comes to be naturally adopted by unmusical subjects who fail to experience any sensory, affective, or conative changes or who fail to regard the sound as endowed with such activities. *Faute de mieux*, the musical, as well as the unmusical, subject regards a sound merely as lifeless external object. In general an aesthetic experience cannot be obtained from this aspect. But under certain conditions the objective aspect may quite well serve as the basis of an aesthetic experience. Subject *S*, for example, who is in a very low degree musical, states that she always tends to "read poetry into the beautiful," and accordingly translates into verbal effects the sounds used in these experiments:

1200. "A sad haunting sort of echo. I like it."

300. "Like an admonition,—quite outside myself."

1000. "Very plaintive, like a question."

$\frac{300}{700}$. "A worrying question. Perplexing."

$\frac{500}{800}$. "Rather the opposite of a question. It seems to affirm something."

To this subject the tones appear as symbols, and hence it is not surprising that they may have an aesthetic value and an activity of their own. But even when the tone is considered as a *non-symbolic* concrete object, it may have in itself an activity or its relation with neighbouring tones may have an activity that evokes aesthetic appreciation. And even when it is not endowed with such activity, the sound, although treated from the objective aspect, may yet possess an aesthetic value. The frequently intellectual outlook of a musician on the material presented to his ear, is a clear proof of such an occurrence. The experience of beauty is hence not determined solely by the character (and intra-subjective) aspects; it may also be based on the purely objective aspect.

That the relation between tones may be considered as analogous to objective activity will appear from various illustrations given in the course of this paper. In Subject *I*, "*the music* forms (it is not *I* that form) patterns while I hear it, though I feel myself to some extent

concerned in their movement¹. The pattern is in three dimensions, up and down (corresponding to variations in pitch) and in a third plane (corresponding to volume).” So in passing from $\frac{500}{600}$ to $\frac{500}{800}$, when the two bichords immediately follow one another, there is a “movement of ascent as with all melodies. The sounds move, but yet no spatial quality is involved. There is no pattern here; the music itself is the pattern; nor is there any image.”

In dealing with the objective aspect, in connexion with these experiments, it is interesting to note that in all four subjects, who complained of the knocking sound inseparable from striking the fork, this aspect predominated.

F. 500. “The ‘attack’ is obliterated by the knock. The knock bothers me.”

G. 300. “I am disturbed by the hitting noise.”

$\frac{300}{400}$ $\frac{500}{600}$. “I am much disturbed by the mechanism of producing the sound.”

V. $\frac{700}{800}$ $\frac{1000}{1200}$. “I object to the click of the striking. I think it more noticeable in the dissonant intervals. Minor third preferred.”

X. 600. “The knock is very disturbing.”

500. “The sound is at first obscured by the knock. The knocks detract from the naturalness of these sounds and make them rather laboured.”

3. *The Character Aspect.*

It might be thought, and indeed it has been suggested², that the character aspect is derived from the intra-subjective aspect—that a sound comes to be characterized as ‘gentle,’ ‘clumsy,’ ‘fidgetty,’ ‘grave,’ etc., because it evokes or might evoke *in the subject* impressions of this kind, making *him* feel gentle, clumsy, fidgetty, grave, etc., and causing him to project these experiences as characters of the object.

This, however, is surely open to question. When a person, in whom the character aspect is well developed, regards a colour as ‘dishonest’ or a sound as ‘stupid,’ he does not in the least feel dishonest or stupid himself. Such characters as ‘jolly’ or ‘high-spirited’ may be ascribed to a sound or colour by the subject even under conditions when he himself feels sad or depressed; and in consequence of such antipathy he will shun that particular sound or refuse to wear that particular

¹ This doubt as to how far the music and how far the self is concerned in the activity of the ‘patterns’ exemplifies the close relation (already noted on page 77) between the objective aspect and the conative sub-aspect *b*.

² Cf. Bullough, *op. cit.* 446 ff. He, however, distinguishes *two* processes in the derivation—(a) the ‘exteriorisation’ of the physiological aspect and its ‘objectivation’ as a physical attribute, and (b) the translation of the physical attribute, by ‘empathy,’ into a psychical feature of the object.

colour. Moreover, it would be ridiculous to suppose that sounds bearing such characters as 'bare,' 'bony,' 'stupid,' 'humble,' 'trivial,' 'unfortunate,' or 'futile,' could evoke, or must necessarily ever have evoked, corresponding experiences in the subject himself.

The independent origin of the character aspect is supported by the following extracts from the reports of Subject Z, in whom this aspect was well-marked. They show that the intra-subjective aspect, so far from dictating the character aspect, may arise from it.

300. "I felt a sound which was very strong and masculine, with a strong individuality about it. Just as I feel some robust sensation after exercise, so I felt towards this sound. *The masculinity of the sound suggested to me this condition of my person.* There was nothing displeasing in the sound."

700. "Quite pleasant since it was very light-hearted, without any really deep emotion. *When I felt the sound light-hearted, I became light-hearted almost simultaneously.*"

$\frac{500}{800}$. "Rather unpleasant, because it was a sound that had no emotional feeling in itself at all."

$\frac{1000}{1200} \frac{500}{800}$. "The first was miserable, like insects dying and hence gave me a feeling of rigidity."

Another suggestion has been often made that the character aspect is derived from association, a sound coming to be described as 'grave,' because of the suggestions to which it gives rise.

Bullough has already sufficiently urged various objections to this explanation¹. Moreover, in two subjects, N and X, of the present experiments, precisely the converse process is demonstrable, the character inducing an association—'stupid' for example, suggesting 'a stupid parrot,' 'materialistic' suggesting the idea of 'a successful tradesman.'

Although, I believe, the *origin* of the character aspect is to be sought neither in the conscious projection (or 'distancing') of actual or potential subjective feelings nor in the conscious transference of associated experiences, there can be no doubt that the character aspect may occasionally be *determined* by such intra-subjective and associative influences. It has happened not infrequently in these experiments, especially in the case of subjects in whom the character aspect is weak or seldom manifested, that a doubt arises in their minds whether such a quality as sadness is experienced merely in themselves, or whether it really (or also) belongs to the sound. In the process of 'distancing' to which Bullough has drawn attention², the required attitude of impersonal detachment towards one's feelings (so essential for aesthetic experience),

¹ *Ibid.* 443 ff.

² *This Journal*, 1912, v. 87-118.

is attainable either by regarding them almost from the standpoint of the on-looker, while still recognizing them as subjective, or by consciously projecting them into, and more or less identifying them with the sound itself. Nevertheless, in those subjects in whom the character aspect is *well developed*, there is no conscious process of projection of this kind. The sound is treated by them as having personality from the outset, and, simultaneously with its perception, is endowed by them with one or more anthropomorphic characters. They do not actually feel these characters in themselves before they ascribe them to the sound, nor do they project these characters into the sound by a process of 'distancing' before they actually experience them in themselves, any more than they would necessarily feel them actually or potentially in themselves before ascribing them to a *person* whom they would characterize as honest, light-hearted, and so on. The characterization of sounds among ourselves has the same basis as animism among primitive peoples; both arise from the innate tendency to treat all objects—primarily all natural objects, later all aesthetic objects—as if they were human, not from a tendency to treat them as if they were one's self. This innate tendency to characterize aesthetic objects has, I believe, a psychological basis broadly similar to (though at a higher 'level' than) that which is responsible for certain forms of synaesthesia; these forms we shall now examine.

4. *The Associative Aspect.*

(a) *Synaesthesia.* The subject of synaesthesia may be appropriately considered under the associative aspect, to which as we shall show in certain forms, it bears a close relation.

Of the twenty-nine subjects investigated, one, referred to as *M*, proves to be a remarkable case of coloured hearing. His condition has been already described in detail in a separate communication¹. Certain general features may be repeated here. The colours which sounds evoke in him vary with the pitch of the tones, the highest audible notes being colourless, and the colours changing to green, greenish blue, blue, pink, orange and brown as the pitch is lowered. The colours vary slightly according as a given tone has been preceded by a higher or by a lower tone; they are also dependent on the timbre of the tone, a tone rich in overtones yielding a higher colour than one of the same pitch but poor in overtones. The two colours can usually be distinguished

¹ This *Journal*, 1911, iv. 228—238.

when a bichord is given; sometimes, however, the subject replies "a medley of colours," "other colours playing around," "a muddy mixture," "a complete mixture of colours," etc. The colours appear quite definitely to the subject at concerts (especially at orchestral concerts), but he usually suppresses them. Individual voices are differently coloured for him, but words evoke no colours. The sounds do not produce 'images' of colour. He is convinced that he does not 'see' the colours unless the sounds recall a coloured object, *e.g.* "the sky after sunset," a "B.A. hood," "a pink finger bowl," as occasionally happens.

Five other subjects, *H*, *L*, *O*, *Y* and *Z* give evidence of coloured hearing in a slighter degree.

To *Z* high notes appear as if dark and reddish, low notes as grey; he compares the first of the bichords $\frac{400}{700} \frac{1000}{1200}$ to 'grey,' the second to "a darker grey, glowing like a cinder"; the tone 1300 is like a "pure red." "I have never noticed these resemblances to colour before," he said, "they must come when I have no other thoughts or associations, but attend merely to the tones as such." He says the colours are *like* the sounds; they have the same effect upon him as the sounds.

Subject *L*, on hearing the tone 700 after a preceding 900, remarks "like orange is to yellow." The same subject, upon being given the bichord $\frac{800}{1000}$, says that it "wants more body or colour"; when, immediately afterwards, he is given the bichord $\frac{600}{800}$ he replies "more purple in colour"; he insists that he has no visual images of these colours.

Coloured hearing is also shown by the subject *O*, who, when confronted with the pair of bichords $\frac{800}{1200} \frac{600}{1200}$, prefers the second "because it is mellower" and describes a ball of light grey colour, seen slightly to his right, as accompanying his idea of mellowness; and, when confronted with the pair $\frac{400}{700} \frac{600}{1000}$, prefers the second for its combination (*cf.* p. 84) and obtains with it a faint image of a fine pink colour. The same subject with the bichord $\frac{600}{1200}$ obtains a "light salmon pink colour, a rich colour such as Burne-Jones used—a clear visual image without limitation of field¹." With the tone 800, *O* sees a narrow stream of grey colour in mid-air which seems "to rise obliquely as the pitch seems to rise. There is nothing material about the light."

¹ Curiously enough, *M* describes the tone 600 as "a rich dark Prussian blue, suggesting pictures—a Burne-Jones blue." *Cf.* also *Y* above for the bichord $\frac{600}{1200}$.


Subject *H* describes the bichord $\frac{400}{600}$ as purple and maroon, which are "like the lights one feels rather than sees, as in shutting the eyes in a bright light or in pressing on the closed eyelids. There is no outline or demarcation between the purple and maroon. They seem to fill the entire field."


Subject *Y*, on hearing the bichords $\frac{400}{700}$ $\frac{800}{1000}$, describes the first as "dark," the second as "bright and yellow"; and on hearing the bichords $\frac{1000}{1200}$ $\frac{600}{1200}$, he describes the first as "light," the second as "a dark steel colour." The second of the two bichords $\frac{500}{800}$ $\frac{600}{1200}$ produces in him "the visual image of a deep blue spot with a bright centre which radiates downwards."

These are the only replies in which colour plays any part. From an examination of them it would appear that colour may arise (i) as a *sensory attribute* of sounds, not involving visual imagery (cf. subject *M*), (ii) as an *analogy*, experiences of colour being regarded as similar in form to those of sound (cf. subjects *Z* and *L*), (iii) as a *visual image* of colour either filling the visual field or restricted to a coloured object (cf. subjects *H*, *O* and *Y*).

Of these three varieties the second and third are closely related to the symbolic associations to which reference will be made immediately. The first, on the other hand, would appear to be related to that group of answers in which sensory language, other than that of colour, is employed. It is a matter of common experience that sounds of different pitch appear to us as massive or light, round or pointed, hard or thin, without involving any corresponding imagery. For most of us auditory sensations are more prone to evoke such tactual or tactuo-spatial attributes than visual or other sensory attributes. But with his coloured hearing, *M* finds the attribute of blueness to "come more easily," to be "more distinct" than, say, that of thinness of sound. On one occasion he describes the tone 700 as suggesting "a thick soup taste"; other subjects occasionally return replies in similar gustatory terms, *e.g.* for *D* and *K* respectively the tones 300 and 500 are "mellow," for *K* the tone 800 is "acid," for *I* the bichord $\frac{600}{800}$ is "insipid, like an alkaline taste." This suggests that what has been called 'tone character' (cf. p. 75) may reveal itself not merely in tactual but also in visual, gustatory or perhaps in other sensory terms, which do not necessarily involve a corresponding sensory impression or image.

(b) Symbolic associations. That the second and, especially, the third varieties of synaesthesia show a close relationship with symbolic associations, is indicated by the following illustrations:

O. $\frac{400}{1200}$, $\frac{600}{1000}$. "Second pleasanter. With the first pair I had a visual image of a broad step and a small step beneath it [drawn ]; with the second I had a faint image of a fine pink colour, rich but not glaring."

O. $\frac{1000}{1200}$, $\frac{500}{800}$. "Second pleasanter. In both cases there was an image of a line. The second sound was curved and gradually went into a straight line [drawn ]; I followed this line, which itself was stationary."

O. $\frac{1100}{1200}$, $\frac{1300}{1000}$. "First pleasanter. I had the idea of being carried away, soaring in mid-air, into a region of mysticism. The second sound gave me the idea of lines crossing, and the notion of a clash."

E. 1100 1300. "The first has a big knock and a small tone. I visualised the former by a black disc about one inch in diameter, with a white dot placed 'at 5 o'clock' within the disc representing the latter. The second tone had the knock and sound of equal intensity; these I visualised as two equal overlapping discs, the black disc lying to the right of the white."

T. $\frac{300}{700}$, $\frac{500}{800}$. "With the first I saw two notes on paper, one above the other, thus ;, with the second I saw them more widely apart."

O. $\frac{500}{800}$. "I had rather a feeling than an image of a big stream gushing forward from behind me and pushing me on; the primary factor was the image of my movement."

Z. $\frac{800}{900}$. "Very rich, entirely covering me, like waves coming to envelope me."

W. 1000. "A watery feeling like a lake; greenish."

W. 700. "It has the clearness of glass about it."

N. $\frac{600}{1200}$, $\frac{500}{800}$. "The first is grim and insistent. I saw a lot of spears upheld by people, and saw the glitter on the spears."

N. $\frac{1000}{1200}$. "A silvery sort of sound."

B. $\frac{300}{500}$, $\frac{500}{800}$. "With the second, I had a visual image of a tiny silver bell in the air before me; this probably arose from the thought of a silvery sound."

E. $\frac{100}{800}$, $\frac{800}{900}$. "With the first pair I saw two little brass balls, a little to the right of and above me, rubbing one another towards and from me."

Y. $\frac{800}{900}$, $\frac{800}{900}$. "With the second I saw two separate rods or fingers."

Y. $\frac{600}{1200}$, $\frac{500}{800}$. "I had the impression that the second contained three notes. I saw three tiny little balls, arranged in a straight line."

Z. $\frac{400}{700}$, $\frac{1000}{1200}$. "The first is big like a cylinder and moving quickly. The second is more like a bell, motionless but spreading out."

E. 800 1000. "The first appears as a cylinder, the second as a prism with its edge upwards."

N. 900. "Rather stupid, like a stupid parrot in the C— Zoological Gardens. I saw the parrot's head and beak,—nothing more,—looking 'at its silliest'."

A study of the introspective data shows that these symbolic associations involve the compresence of either the intra-subjective aspect or

the character aspect, and a strong tendency to the associative. This conclusion is borne out by a study of the predominant aspects of these nine subjects *B, E, H, M, N, O, W, Y* and *Z*. *B* shows very strongly the intra-subjective and character aspects; she refers to feelings of strain, depression, hurry, and to feeling as if she were bending down, and she describes sounds as buzzing, piercing, thin, squeaky, soothing, comforting; she characterizes tones as sad, sedate, seeming to wail. *E* shows very similar features; he refers to sounds as upsetting him and drawing him off his balance; he mentions feeling as if he were toppling over, strange feelings of surprise, feelings of attraction and curiosity, thrills across his shoulders, and he describes sounds as soothing, grating, irritating, capable of being grasped as a unity; he characterizes tones as funny, lonely, etc. Subject *H* is also strongly of the intra-subjective type; she mentions feelings of laziness, surprise, excitement, interest, freedom, warmth in the ear, touches on the tympanic membrane, stinging up the arm, she describes sounds as tingling, aggravating, annoying, boring, irritating, disappointing; she also characterizes sounds occasionally as hoarse, crude, clumsy, *piquant*. So too, *O* is strongly of the intra-subjective type; he mentions impulses to bend low and to the right, as if reaching for a low object, and he refers to being carried to a quite different atmosphere; he also characterizes sounds occasionally, *e.g.* as thin-souled. Similarly, *Z* mentions feelings of tranquillity, sorrow, oppression, and robustness, and he describes sounds as rich, round, soft; he characterizes them as masculine, shallow, light-hearted, buoyant, and musical. Also, *T* mentions feelings of rest, expectation, doubt, and effort, he prefers low tones because he experiences greater strain (feeling a tendency to look upwards and to the right on hearing high notes), and he alludes to feelings of vastness when hearing tones of low pitch, which he associates with blueness and darkness. And *Y* speaks of sounds as warm, satisfying, or penetrating; and characterizes them as pretty, graceful, jolly, or sad. Subject *M* is strongly of the character type; he describes sounds as sympathetic, unsympathetic, congenial, unfortunate, gentle, etc. Subject *N* is also strongly of the character type; he characterizes sounds as trivial, grim, mysterious, stupid, silly, bony, bare. So too, *W* characterizes sounds as pretty, peaceful, etc. It is noteworthy that *O, T, W,* and *Y* all declare themselves to be specially impressed by the 'colour' of orchestral music.

(c) The Age of associations. In several cases the sounds awaken memories of childhood. For example:

a. $\frac{400}{500}$. "It reminded me of the opening notes of a musical box which I had when a boy."

J. 500. "I felt the buzz of a fork which I held in the fingers of my right hand, which took me back to an event in my childhood—something connected with playing in the life-time of my mother, who died when I was quite young."

J. $\frac{400}{500}$. "I felt a Jew's harp in my teeth and still have the taste of the steel in my mouth. I have not seen a Jew's harp for forty-five years."

R. $\frac{800}{1200}$. "Reminded me of the horrible sound we used to make as boys sticking nibs into our desks at school. I felt myself back in the schoolroom and I felt the prefect behind me."

T. 700. "Like the twang of the teeth of a musical box. I could see an old musical box with several teeth missing, which I played with 30 years ago¹."

VI. COMPARISON OF THE ATTITUDES TOWARDS COLOURS AND SOUNDS.

A general comparison of the results of these experiments with those conducted by Bullough with colours shows that the former differ from the latter in two important particulars, namely (a) in the (even) greater rarity of 'pure types' and (b) in the greater frequency of the 'objective' type, pure and mixed with other types². These differences are partly to be explained by differences of procedure. Bullough was occupied solely with the determination of that aspect or attitude which evoked acceptance or rejection. His object was to find out why a colour was liked; and the replies he obtained could be classified under four heads according as the colour was liked; (a) because it conformed with a subject's notion of what a good colour should be ('objective' type), (b) because of the sensory and other effects which the colour produced on the subject ('physiological' type), (c) because of the human characters with which the subject endowed the colour ('character' type), or (d) because of the associations which were suggested to the subject by the colour ('association' type). On the other hand, the purpose of the experiments described in this paper was to investigate the entire and spontaneous attitude of the subject towards musical sounds, and not merely to ascertain the attitude which he would adopt in order to pronounce an *aesthetic* judgment upon them. Consequently, the attitudes became at once more natural and more varied. Associations, for example, were

¹ F stated that when playing on the pianoforte he has often had vivid visual images of places which he has long forgotten but others have been able to explain to him. In listening to music, however, he has no visual imagery.

² The objective type is the most numerous. 41% of judgments belonged to it. See later, Section X. [C. W. V.]

apt to arise which would tend to be suppressed in Bullough's method of procedure, but which in these experiments may actually have affected the aesthetic judgment given.

The differences obtained by Bullough's and the present methods of procedure are exemplified by the following illustrations from four subjects who were each investigated in these experiments with sounds, first by the one and later by the other method (in either order). The data obtained by Bullough's method (the subject being asked whether he liked it or not, and why) are given in the first column; those obtained by the method used generally in these experiments (the subject being asked to describe what came into his mind, how he was affected etc. by the sound) are given in the second column.

Subject V.

- | | | |
|-------|--|--|
| 1200. | "Pleasant. I see no reason to dislike such a sound." | "Associated with one of Brahms's <i>Intermezzi</i> ; it has a ring of that kind. I saw the page of music on which it was written. Pleasant." |
| 300. | "Very pleasant. A richer sound." | "I wondered if it would be a low tone and suggest the C— chapel bell. Pleasant." |

Subject B.

- | | | |
|-------|--|--|
| 400. | "Pleasant for its softness and roundness." | "Strained feeling in trying to follow it from right to left upwards; I felt my entire self being raised. Indifferent." |
| 1100. | "Unpleasant. Wailing." | "I saw myself going up a mountain pass, with distinct whistle of the train in which I sat. I heard the sound of the train first and then the visual image came. Pleasant because soft and far away." |

Subject W.

- | | | |
|---------------------|---|--|
| $\frac{400}{700}$. | "Slightly pleasant. A blurred oriental feeling about it." | "I saw someone (not myself) knocking against a jar. Pleasant." |
| $\frac{500}{800}$. | "Pleasant. A pretty note, rather agreeable." | "Rather like a clock. Indifferent." |

Subject X.

- | | | |
|---------------------|--------------------------------------|---|
| $\frac{500}{600}$. | "Unpleasant. An element of discord." | "Mystic. Vague thoughts of the sound coming from a cavern, whence arose a definite visual image of the rock-work in B— Aquarium. Pleasant." |
| $\frac{400}{700}$. | "Pleasant. Purely sensuous." | "The idea of a lyre came into my mind, then the idea of a woman, without imagery. Pleasant." |

$\frac{1100}{1200}$. "Unpleasant. Not full, "Something of a failure. Irritating, yet did something abortive, a not last long enough to cause actual irritation. failure." Unpleasant."

These examples show how the effects of the objective and character aspects, obtainable in a state of relative purity by Bullough's method, are complicated by the intrusion of associative and intra-subjective aspects when the subject is allowed greater freedom of attitude.

Another reason for the rare occurrence of pure types in these experiments lies in the difference of material. A given tone or a bichord affects the average person more than a given field of colour or combination of colours,—perhaps partly because the former depends on vibrations of the air, the latter on vibrations of the ether. The emotions aroused by a painted picture are, as a rule, dynamically feeble compared with those aroused by a piece of music,—perhaps partly because the components in the former are presented simultaneously, in the latter successively, and hence with greater dynamic potency. It is in consequence not surprising that the physiological sub-aspects should intrude and commingle with the other aspects; indeed the only wonder is that such simple, relatively empty, material as isolated tones or bichords, should resemble music so closely in their actions.

The conative sub-aspect *b* also becomes more prominent in the case of sounds,—from a wish to discover their source and use. Here again sounds differ considerably from colours. No sooner do we hear a sound than we are prompted to determine whence it has come, what value or meaning it has or can have for us, whereas we are free to gaze on a field of colour without troubling ourselves appreciably about such matters. A sound of which we do not know the meaning is apt to torment us; hence, no doubt, the mystery attaching to curious sounds among primitive societies, and the survival of secret pass-words in more advanced secret societies of to-day¹. In the case of colours, on the other hand, we do not so immediately seek to determine the meaning of the colour or the object to which it belongs. We are content to regard the colour as colour *per se* and to submit ourselves merely to its physiological or suggestive influence, or we may forthwith endow it with human characters.

One reason for the greater prominence of the objective attitude in hearing sounds than in seeing colours is that people are more often

¹ Cf. the bull-roarer throughout a great part of the uncivilised world, and the great secret of the Melanesian secret societies which consists in learning how to emit a certain sound from a mysterious instrument.

familiar with the technical or professional use of sounds than they are with that of colours. Not only may the subject be impelled actively to use the sounds, but he may also regard them objectively as suitable or unsuitable for a certain function. It is not surprising, then, that the objective aspect should influence the aesthetic judgment so much more in regard to sounds than in regard to colours.

A second, and very different, reason for the objective aspect consists in the absence of any personal relation of the subject to the sound. An insensitive, unmusical subject cannot regard it from the intra-subjective, character or associative aspects. He is forced, as a *pis aller*, to adopt the objective aspect.

On the whole, however, despite these various differences, there are well-marked similarities in the attitude to sounds and colours. Fortunately, fourteen of the subjects of Bullough's experiments were available for these experiments with sounds. As a rule, a general agreement is to be found in the type to which the subject belonged in the two classes of experiment. There are, however, several (five) cases of partial disagreement which deserve brief consideration.

One subject, *K*, who, for colours, is strictly of the character type and showed no associations, proves very strongly of the associative type for tones. To this subject a colour is almost a human being and is endowed with such personal attributes as morose, cheerful, insincere, serious, playful, etc. Tones, on the other hand, more often tend to suggest the instruments producing them, and vivid images of the scenes in which these instruments are sounding; as is shown by the following excerpts from her record:

500. "Deep, mellow, like a church note. I think I saw the inside of a church, it seemed to awake the feeling and dimness of a church interior. Pleasant."

300. "Like a foghorn, suggesting the sea...I at once saw the sea at F— with a haze over it. I felt (but did not see) myself standing on a certain spot on the parade. Pleasant in tone, but sad and discomforting for the association."

900. "A toy piano appeared. I saw it and particularly an end-note at the extreme right. Quite pleasant, but thin."

$\frac{500}{800}$. "I saw a certain room with F— at the instrument just starting to play with his right hand. Very pleasant."

$\frac{800}{1200}$. "I saw a woman in evening dress as if she were singing. Pleasant."

$\frac{400}{700}$. "It does not seem to harmonize; crude. Very unpleasant."

$\frac{600}{1200}$. "It recalls something, but I cannot say what. I felt something opening, something big coming out, of which I could not get hold. Then came a motor car, and finally the sea. Very pleasant."

$\frac{600}{800}$. "I vaguely saw an organ in church. Deep and full tone. Pleasant."

$\frac{800}{900}$. "It goes through the head; 'tinkettley.' Unpleasant."

It will be noted that although traces of the character aspect, which in the colour experiments was so predominant, are still evident, other aspects, especially the associative, have almost wholly replaced it.

Another subject, who differs considerably in his attitude towards colours and sounds, is unquestionably more sensitive to the effects of the former than to those of the latter. Consequently he proves to be markedly of the physiological type for colours and to be strongly of the objective type for sounds. Three other cases of partial disagreement are doubtless due to the already mentioned greater prominence of the objective aspect in the sound experiments. Two of these three subjects are not very musical, and there is good reason to believe that the third is less sensitive to sounds than to colours. They all therefore tend, *faute de mieux*, to regard the tones as independent objects rather than as affecting their 'feeling' or will.

VII. COMPARISON OF THE ATTITUDES TOWARDS SINGLE TONES AND SINGLE BICHORDS.

In order to compare the respective influences of single tones and bichords on the attitudes adopted by the subjects, the replies have been classified under the four aspects and the percentage frequency has been calculated for each aspect in the case of the two different kinds of material. Not infrequently, of course, a given sound evoked in a subject two (or occasionally even three) aspects, in which case all three are reckoned in the calculation. The following table gives the results :

	Intra-subjective	Objective	Character	Associative
Single tones	24	35	13	28 per cent.
„ bichords ¹	17	47	8	28 „

It is clear that in the case of bichords the objective aspect tends to increase in frequency at the expense of the intra-subjective and character aspects, whereas the associative aspect is as often evoked by bichords as by tones.

The percentage figures given above are here analysed in order to compare the results for the highly musical with those for the less musical. The seven most musical subjects have been separated from

¹ The figures given by Dr Valentine for judgments on bichords (table, p. 105) yield the following percentage frequencies, which are remarkably close to the above :

Intra-subjective	Objective	Character	Associative
23	41	10	26

the rest, four of the seven being professional musicians; these constitute the 'highly musical' group, the remainder the 'less musical' group.

		Intra-subjective	Objective	Character	Associative
Single tones	{ highly musical	28	39	15	18 per cent.
	{ less musical	22	32	13	33 "
,, bichords	{ highly musical	26	49	4	21 "
	{ less musical	12	46	10	32 "

The above differences deserve examination, in the first place for each aspect taken separately.

(a) Intra-subjective aspect. This occurs more frequently among the highly musical, especially in the case of bichords. Now it will be remembered that the intra-subjective aspect involves not only (i) the physiological sub-aspects, evoking from the subject such replies as strident, piercing, going through the head, or causing repose, laziness, surprise, etc., but also (ii) the conative sub-aspect, which includes impulses to motion, efforts to determine the meaning, suggestion, use, pitch or interval of the sound. In only one subject (the only subject of the experiments who approaches very closely to a condition of absolute amusia) are these sub-aspects absent. Among the rest, there is not any appreciable difference between the highly and less musical subjects as regards the physiological sub-aspects. The most striking difference concerns the conative sub-aspect *b*, the highly musical subjects endeavouring to fix the pitch or the interval of the sound. As the ability to determine absolute pitch is less common than the ability to determine intervals, this difference in behaviour becomes much more marked for bichords than for single tones. The highly musical subjects declare themselves "worried to get the interval," "trying hard to get the interval," etc. In both groups, as has been already pointed out, the intra-subjective aspect is less evident for bichords than for single tones, especially among the less musical, there being a greater tendency for them to regard the bichords as objectively harmonious, discordant, complete, etc., or as having an objective quality of niceness, nastiness, etc.

(b) Objective aspect. Clearly, the just-mentioned tendency of the less musical to treat bichords from the objective aspect together with the tendency of the musical to give names to (*i.e.* to adopt a professional attitude towards) the intervals is responsible for the greater frequency of the objective aspect in bichords as compared with single tones.

(c) Character aspect. Alike among the highly musical and among the less musical sub-groups of subjects, the character aspect occurs less frequently for bichords than for single tones. This difference, however, is much more marked among the former than among the latter group; that is to say, it is especially from the highly musical subjects that the character aspect is evoked with much greater rarity by bichords than by tones. Probably the tendency of such subjects (to which attention has been drawn above) to regard bichords as musically useful objects suppresses the character aspect which is freer to develop in the case of single tones.

(d) Associative aspect. The number of associations evoked by the single tones and by bichords is not appreciably different in either group of subjects. But for both kinds of sound (and especially for the single tones), the less musical show a considerably greater number of associations than the highly musical. The associative aspect would naturally be encouraged among the less musical owing to their relative weakness in regard to the other three aspects. The highly musical tend more readily to act on a sound, to strive to determine its use, pitch or interval; to regard it as having use, or as being a certain note or interval. It is not surprising that among the less musical these tendencies should not be so well-marked, and that the suggestions roused through association should be freer and readier than among the highly musical.

VIII. COMPARISON OF THE ATTITUDES TOWARDS SINGLE BICHORDS AND PAIRS OF BICHORDS.

There remains for consideration the series of experiments in which the subjects were asked to describe their attitude towards two successive bichords, to decide which of the two (if either) they preferred, and to give their reasons for such preference. The reasons for their preferences will be discussed later. Here account will only be taken of their general attitude towards the tones and of the different aspects which the several subjects reported. The percentage frequencies of these aspects are:

	Intra-subjective	Objective	Character	Associative
Pairs of bichords	23	56	7	14
[Single bichords]	17	47	8	28]

The most striking feature of the effect of giving a pair of bichords and asking for a judgment of preference,—as compared with the effect

of giving a single bichord and asking for an absolute aesthetic judgment,—is seen to consist in (i) a large reduction in the frequency of associations, (ii) an increase of the objective aspect, and (iii) an increase of the intra-subjective aspect.

The following extracts from the reports of subjects allude to the paucity of association in preference judgments:

K. "There is not half so much imagery in comparing, because the mind is waiting for the second sound and is not given full play."

P. "I am not getting in the pairs the associations or the imagery which I had when the sounds were given singly."

Z. "The imagery I had previously is now fading, as I am now trying to discriminate between pairs of sounds."

If now the subjects be divided, as before, into a smaller 'highly musical' and a larger 'less musical' group, differences between the two groups are again revealed. The percentage frequencies for the various aspects are:

	Intra-subjective	Objective	Character	Associative
Highly musical	19	74	1	6
Less musical	25	48	17	10

The percentage frequencies of aspects among the highly musical for single tones, single bichords, and for pairs of bichords, are therefore:

	Intra-subjective	Objective	Character	Associative
Single tones	28	39	15	18
" bichords	26	49	4	21
Pairs of bichords	19	74	1	6

That is to say, the same differences in the first three aspects, revealed by comparing their behaviour to isolated tones with that to single bichords, are carried still further when, in place of single bichords, pairs of bichords are substituted; there is a still further reduction in the frequency of the intra-subjective and character aspects, and a still further, indeed an enormous, increase in the preponderance of the objective aspect¹. Nor is this surprising. The highly musical subject, when asked which of the two bichords he prefers, may be expected at once to revert predominantly to the objective aspect. When he has to give a judgment of preference, sounds lose their suggestive, physiological, and conative potency; they are regarded merely as independent objects, one bichord being preferred to the other "because it fuses better," "because it is less dissonant," etc.

In the less musical group, on the other hand, as might be expected, while there is the same enormous reduction in the frequency of the

¹ Cf. Bullough's results with colours, *This Journal*, II. 411, 412.

associative aspect, the frequency of the objective aspect does not materially increase :

	Intra-subjective	Objective	Character	Associative
Single tones	22	32	13	33
„ bichords	12	46	10	32
Pairs of bichords	25	48	17	10

Compared with the absolute judgments for single tones, the preference judgments towards pairs of bichords show, of course, a considerably greater frequency of the objective aspect, but this increase is hardly different for single bichords than for pairs of bichords. On the other hand, preference judgments tend to provoke from the less musical an increase in the frequency of the intra-subjective and character aspects. When asked which of the two bichords he prefers, he has not the same technical knowledge as the more highly musical subject. He cannot objectify the material, preferring one bichord “because it is a good harmony,” etc. The utmost aid he can derive from the objective attitude will result in such judgments as “I like this bichord because it is fuller, richer, purer, etc.” The less musical subject is consequently thrown back on the physiological aspect—preferring one of the bichords because it is “more satisfying,” “warmer,” “more soothing,” or because the other is “irritating,” “jarring,” “setting the teeth on edge”; or, if he tends to characterization, he weighs the bichords from their character aspects, conceiving one or other of the bichords as “successful,” “mystical,” “inspired,” “having ecstatic abandonment,” “alive,” “unsympathetic,” “unfortunate,” “melancholic,” “miserable,” “futile,” “nasty,” etc.

IX. RELATION BETWEEN ASPECT AND AESTHETIC APPRECIATION.

So far we have been considering the various aspects adopted by each subject in reference to their sounds, regardless of whether these aspects influenced the subject in his liking, indifference, disliking, or in his preference or equivalence. In the following table only those aspects have been taken into account which appear to have actually determined these reports. Each subject's data have been carefully scrutinized with this end in view, and the relevant aspects adopted by him have been arranged in order of frequency. If a subject's verdicts are based throughout on only one aspect, this naturally is given ‘first place.’ Generally, however, they are each based on two, or sometimes three, or even on four aspects; in this event, the most prominent aspect is given ‘first place,’ the next most important aspect is given ‘second place,’ and

so on. The total number of times in which each aspect appears among all the subjects (twenty-three in number) is then calculated (appearing under the column headed 'No. of Times'); and similarly the total number of times each aspect takes first, second, third or fourth place for all the subjects is calculated (appearing under the columns headed 'Place').

Aspect (see pages 72-74)	Single Tones					Single Bichords					Pairs of Bichords				
	No. of Times	Place				No. of Times	Place				No. of Times	Place			
		1st	2nd	3rd	4th		1st	2nd	3rd	4th		1st	2nd	3rd	4th
I a i	14	11	3	0	0	11	9	1	1	0	12	8	2	2	0
I a ii	4	0	3	1	0	3	1	2	0	0	4	1	2	1	0
I b	7	2	3	1	1	9	2	6	1	0	10	3	4	2	1
I c i	1	0	0	0	1	1	1	0	0	0	3	1	1	1	0
I c ii	3	3	0	0	0	6	3	3	0	0	7	2	2	2	1
II a i	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
II a ii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
II a iii	0	0	0	0	0	2	1	1	0	0	2	0	2	0	0
II b	11	5	4	1	1	9	5	4	0	0	17	6	8	3	0
III	7	2	1	4	0	6	1	2	3	0	6	1	2	2	1
IV a	1	1	0	0	0	1	0	1	0	0	1	1	0	0	0
IV b	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
IV c	1	0	0	0	1	4	0	0	2	2	1	1	0	0	0
IV d	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0
	50	24	15	7	4	55	23	21	9	2	63	24	23	13	3

From this table we see that the average number of aspects made use of by each subject in order to arrive at an *absolute* appreciation in the case of single tones and bichords increases when he passes on to *preference* judgments in the case of pairs of bichords. The aspect which is chiefly responsible for this increase is II b, *i.e.* the aspect in which the subject considers the sounds in relation to his standard of purity, pitch, interval, etc., which a satisfactory tone or bichord should attain. It frequently appears in the preference judgments of subjects who had not employed it at all as a basis for their absolute judgments.

Both the experiments with single bichords and those with pairs of bichords show certain differences from those with single tones, which are worth noting. Aspects I a i and I a ii become less important, while aspects I b and I c ii become more important, in the former than in the latter. That is to say, in the case of single tones the subject's liking or disliking is determined more by their purely sensual effects upon him; while in the case of bichords it is determined rather by the changes

which they prompt in his feeling attitude, and by the endeavours which they evoke to elicit their use or meaning.

The following aspects play no part in determining the absolute or relative appreciations of the seven highly musical subjects;—I*a* ii, in which tactile and organic sensations are aroused, II*a* i in which the sound is regarded as expressing language, II*a* ii in which the sound is treated as behaving like other non-musical sounds, and IV, in which associations are evoked. The above-mentioned prominence of II*b* in the preference judgments and of I*c* ii in the experiments with bichords¹ (singly and paired) is relatively more marked among the highly musical than among the less musical subjects. Among the sixteen less musical subjects, II*a* iii, in which the sound is regarded as having musical meaning, only occurs once.

These subjects who for single tones and bichords make predominant or sole use of sub-aspect I*a* i or I*b* (liking or disliking single tones and bichords because of their subjective effects of softness, mellowness, rigidity, stridency, etc., or because of the feelings of satisfaction, restfulness, aggravation, etc., evoked) give the following percentages of 'pleasant,' 'indifferent' and 'unpleasant' answers:

	Pleasant	Indifferent	Unpleasant
Sub-aspect I <i>a</i> i	71	8	21
„ I <i>b</i>	68	21	11

On the other hand, those subjects who for single tones and bichords make predominant or sole use of sub-aspects I*a* ii or II*b* (liking or disliking tones and bichords because of the organic associations aroused or because the sounds attained, or failed to attain, an objective standard) give the following percentages of answers:

	Pleasant	Indifferent	Unpleasant
Sub-aspect I <i>a</i> ii	17	0	83
„ II <i>b</i>	27	9	64

That is to say, the adoption of sub-aspect I*a* i or I*b* is accompanied by a predominance of 'pleasant' answers, whereas the adoption of sub-aspect I*a* ii or II*b* is accompanied by a predominance of 'unpleasant' answers.

The same facts are shown by the converse procedure of analysing the aspects adopted (a) by those subjects who give a predominant number of 'pleasant' answers, and (b) by those subjects who give a predominant number of 'unpleasant' answers for single tones and bichords. Among

¹ The close connexion between II*b* and I*c* ii has been already noted (cf. pp. 77, 79 footnote).

the former group the sub-aspects I *a* i and I *b* (and as a 'good third' II *b*) are those who occur most frequently; while among the latter the sub-aspects I *a* ii (in the case of bichords) and II *b* (in the case of tones) occur most frequently.

When reasons are given for an 'indifferent' answer, they can generally be traced either to too weak a reaction following from the intra-subjective aspect or to the adoption of the objective aspect. Such replies as there is "no body in it," "not much quality," "a metallic quality," "it was too shrill," show that the tone or bichord has not reached the subject's standard to which a satisfactory sound should attain.

The other aspects or sub-aspects, *e.g.* the conative sub-aspects of the intra-subjective aspect (Ic), the character aspect (III), and the associative aspect (IV) appear to play no part in determining the relative frequency of 'pleasant,' 'indifferent,' or 'unpleasant' answers.

The percentage frequencies of the 'pleasant,' 'indifferent,' and 'unpleasant' answers, where the subjects can give an explanation of their verdict, are as follow:

	Pleasant	Indifferent	Unpleasant
Single tones	56	19	25
„ bichords	56	6	38

Hence the only differences as we pass from tones to bichords appear to consist in a reduction in the frequency of explicable 'indifferent' answers, and in a corresponding increase in the frequency of explicable 'unpleasant' answers. But as there seems no reason why the explicable 'indifferent' answers given to tones should not be equally divided, in reduction, between 'pleasant' and 'unpleasant' answers, we may perhaps conclude that the single tones tend, more frequently than the single bichords, to give rise to 'pleasant' answers and, less frequently, to give rise to 'unpleasant' answers. Doubtless this is easily explicable on the ground that the one great determinant of dislike of a bichord—its want of fusion, its beats, etc.—is absent in a single tone, and that the objective aspect is more frequently employed for bichords than for tones. (Cf. pages 92–94.) The greater number of 'indifferent' answers given by tones is no doubt to be explained by their relative meaninglessness.

In trying to arrive at a preference for one of a pair of bichords, several courses are open to the subject. (I) He may favour the one or the other of the bichords (*a*) because the one is liked, (*b*) because the other

is disliked, (c) because the one is liked and the other is disliked, (d) because both are liked, one more (or less) than the other, (e) because both are disliked, one more (or less) than the other. (II) He may decide that the two bichords are equally liked or disliked. (III) He may find that a comparison between them is impossible.

(I) In by far the majority of cases, the subject's preference is based on (a) the positive liking of one of the bichords. There are more than twice as many replies of this kind, compared with (b) when the preference is ascribed to a positive dislike of one of the bichords. Here, as in the absolute judgments (cf. pages 96, 97), the sub-aspects which predominate in experiences of displeasure are Ia ii and II b, whereas those which predominate in experiences of pleasure are Ia i and Ib. There seems to be little or no difference in the character and association aspects (III and IV) in the two cases. These facts are shown in the following table, where the figures are given in percentage values and the vertical columns refer respectively (A) to all the preferences calculated for all the subjects, (B) to those preferences which are based on a positive disliking of one of the bichords calculated for all the subjects, and (C) to those preferences based on a positive disliking of one of the bichords calculated for those five subjects who give the largest number of such judgments.

Aspect	A	B	C
I a i	23	7	5
I a ii	8	13	10
I b	20	15	5
II b	33	47	62
III	12	13	13
IV	4	5	5

(III) An analysis of the cases where the subject is unable to give a definite preference for one or other of the bichords, shows that this inability arises in the majority of cases from a conflict between the dictates of one or more attitudes. Thus, we get such replies as "I should want to use one of the sounds for one thing, the other for another," "the first is deeper, the second more buoyant, preference impossible," "I cannot decide between the pleasure of the thrill caused by the one, and the beauty due to the richness, low pitch, and fusion of the other," "I like them equally but with very different feelings."

Another obstacle to comparison, due, like the above, especially to the intra-subjective aspect, is attributable to the effect produced on the

subject by the transition from the one bichord to the other. Thus for the pair $\frac{600}{800} \frac{1000}{1200}$ *E* describes a feeling of "shifting as if toppling over a raised place between the two sounds, one placed on the left, the other slightly higher on the right, a slight thrill being felt across the shoulders in passing from one to the other." Similarly with $\frac{1000}{1300} \frac{500}{700}$, he feels one on each side of him, "the higher on the right, one clashing with the other, and breathlessly expects a new sound to arise when they meet." So, too, *X* reports of the bichords $\frac{500}{800} \frac{600}{800}$ that "only the idea of ascent from the first makes the second sound the more pleasing," and of the bichords $\frac{600}{1000} \frac{800}{1200}$ that "the idea of development and movement towards something higher, something attained, makes the second preferable," but that "apart from this, the first would be the more pleasing."

Less commonly the sole use of the objective aspect is responsible for the inability to prefer one of the bichords to the other, the subject tending to regard them as making up an objective whole. For example, "they belong together as parts of a melody, and so I cannot make a preference," "they both fit together, comparison impossible," "I cannot keep them apart";—or conversely, "they lie quite apart from one another, and have no meaning, so I have no preference," "they are not comparable, as they do not form a whole." Occasionally, neither bichord attains a satisfactory quality, and a preference becomes impossible because the qualities are not the same, as for example "the first is impure, the second though purer is too hard."

Three subjects *P*, *F*, *G* complain of the difficulty of remembering both sounds for the purpose of comparison: "The second is apt to destroy the memory of the first," "the second knocks out and upsets the first," "I forget the second because, if it comes along while the first is still sounding in my ear, I fail to hear it."

X. RELATION BETWEEN ASPECT AND AESTHETIC APPRECIATION

(continued) [by C. W. VALENTINE].

It is characteristic of the aesthetic attitude that it is essentially objective and disinterested; self is 'lost' in the beautiful object. Attention is completely concentrated upon it. From this point one must class the intra-subjective aspect¹ in these experiments as very low on the aesthetic scale, perhaps lowest (following Bullough), though in some cases the intra-subjective aspect may be adopted only when the aesthetic experience proper is over, and introspection begins.

From a similar point of view a low aesthetic value characterizes the non-musical associative judgments (where the interval suggests an object which might have given rise to a similar sound, *e.g.* a gong, a clock striking). Attention is not concentrated upon the musical interval, and the transition of thought to the associated object is obvious. Such cases may be compared to the badly fused associations in Bullough's experiments with colours.

From this same point of view a higher type of aesthetic judgment is found where there are musical associations proper, which imply some knowledge of or familiarity with music, and sometimes a memory of a definite musical composition.

So far we have taken as a criterion of the aesthetic value of a mental attitude its objectivity or 'autotelicity',² the extent to which the attention is concentrated upon the aesthetic object itself rather than upon non-fused associations or upon the self.

But another criterion is possible, namely the degree of pleasure accompanying the perception of the object presented. No implication is here made that pleasureableness and aesthetic value are synonymous. But even if there may be aesthetic value without *any* pleasure (which would seem doubtful) it is still probably true that when judgments are given upon a series of comparatively simple objects, such as musical intervals, there is likely to be a distinct correlation between the order of the degree of pleasingness of the experiences produced by the intervals, and the order of the aesthetic value of these experiences.

Accordingly in the following table the various aspects have been arranged according to the proportionate frequency with which each

¹ It is worth noting that Dr Myers's use of this aspect is not quite the same as mine. In particular, his sub-aspect Ia (i) includes a number of judgments which I classified as 'objective,' *e.g.* hard, thin, soft. The distinction is important in considering the hedonic and aesthetic value of this aspect.

² See Bullough, *op. cit.* p. 461.

aspect coincided with a high degree of pleasure (as indicated by the judgment "very pleasing"). Parallel to this is given Bullough's order of the aesthetic value of the aspects in the case of colours, based upon the 'autotelicity' of these aspects.

Judgment on Musical Intervals. Criterion—degree of pleasure	Judgments on Colours. Criterion— 'autotelicity'
I. Character (24.7%).	I. Character.
II. Musical (fused) associations (24.5%).	II. Fused Associations.
III. Objective (19.9%).	III. Objective.
IV. Intra-subjective (14.9%).	IV. Non-fused Associations.
V. Associations other than musical (non-fused) (12.5%).	V. Physiological.

In brackets are given the percentages of all judgments conforming to the aspect in question, which are also accompanied by the judgment "very pleasing". The calculations are based upon the records of over 3000 judgments given by 146 subjects.

It will be seen that the orders in the two columns are the same except that Bullough places the physiological aspects fifth while in the 'musical' column the intra-subjective aspect takes the fourth place.

In his later paper on colour combinations², Bullough seems to give a higher place on the aesthetic scale to the physiological aspect. In a personal communication, however, he explains that he there refers to transition cases from the physiological to the character aspect; he would still put the purely physiological type at the bottom of the list. Such transition cases in the present musical experiments would almost invariably be classed as subjective; and these, together with the wider significance of the term 'intra-subjective' as compared with Bullough's term 'physiological,' may account for the priority of the intra-subjective aspect in regard to the non-fused associations in the scale of aesthetic values for the musical experiments.

A minor point of difference between the two orders may appear in the fact that in the list for musical intervals, the fused associations are bracketed (practically) first with the character judgments. But in reference to fused associations Bullough writes³: "If it were not for the

¹ In calculating the percentages for this table it seems much fairer to ignore the large number of displeasing objective and physiological judgments upon the four discords, with which naturally such remarks as "discord," "notes do not blend," "jars on the nerves," etc. are very frequent. The discords indeed seem to appear to many subjects as outside the sphere of aesthetic objects altogether. As one very unmusical subject said, as regards a discord, "It ought not to be in the piano."

² This *Journal*, 1910, III. 406-447.

³ *Ibid.* 1908, II. 462.

inherent instability of the fusion and for the danger of the reappearance of the old cleavage between colour and associated content, this type might almost represent the highest form of aesthetic colour-appreciation."

Now in the case of the present experiments the musical associations were, as we have seen, often so intimately fused with the presentations of the given intervals as to be inseparable from them. Subjects frequently found that they could not hear and judge a musical interval by itself; a following and completing interval was intimately bound up with it and intensified the pleasure due to the given interval, or actually made pleasing an interval which, quite alone, would have been displeasing. Hence these fused association judgments may more frequently represent the highest form of aesthetic appreciation in the case of musical intervals than the corresponding judgments do with colours. It seems as if the fundamental nature of the types is emphasized by the fact that two such different criteria as objectivity and the degree of pleasure give such similar orders of aesthetic value¹.

XI. APPENDICES.

APPENDIX A. *Other Determinants of Aesthetic Appreciation.*

1. *Pitch.* Many of the subjects spontaneously observe that their liking of the sounds is dependent on their pitch. Nine of them prefer low tones,—“discords sound pleasanter when lower” (*C*), “lower sounds are more attractive” (*E*), “I prefer lower tones” (*G*), “second pleasanter owing to its being deeper” (*I*), “I like the deeper sounds” (*J*), “I prefer deeper tones because they are more suggestive” (*K*), “I prefer low tones for their fulness and richness” (*R*), “I like deep sounds” (*T*), “I generally like low tones for their fulness” (*V*).

Among these subjects, the conative sub-aspects (*I c ii* and to a less extent *I c i*), the associative (*IV*), and the objective (*II*) aspects are particularly prominent. Two subjects, on the other hand, prefer high tones, and both these adopt especially the physiological sub-aspects *I a i* and *I a ii*.

¹ I may add that I have more recently also found this scale of aesthetic value of the aspects useful in dealing with judgments upon pictures and also upon poems. In these departments with a careful and thorough investigation it seems possible to form a fairly reliable estimate of the aesthetic development of an individual according to the extent to which he uses the higher or lower types of judgments.

In none of these eleven subjects is the character aspect predominant. It occurs in only two subjects of this group (*E* and *Z*); of whom the latter remarks "that very high sounds give me the feeling of sorrow and oppression; so do very low sounds, yet the sorrows of the latter are not so light-hearted, but are deeper and more intellectual,—like a person disappointed in love becoming a poet." We see, then, that low tones have a more powerful effect in evoking suggestion and motor and intellectual activity, and in satisfying the subject's objective standard; whereas the higher tones depend rather on their physiological effect on the subject. This is well borne out in the case of *D* in whom, throughout the sitting, there is always a conflict between the low tones which appeal to him for their rich beauty, and the higher tones which he likes for their sensual effects (cf. p. 98).

2. *Timbre*. Two subjects, both markedly of the physiological type, make mention of this criterion—"I like rich warm sounds" (*M*), "I like soft smooth sounds" (*F*). Occasionally the character aspect evokes such answers as *V*'s—"rather trifling; not a quality one would want in a musical composition."

3. *Familiarity and Strangeness*. Perhaps the most striking instance of the effects of familiarity and strangeness on appreciation is afforded by the highly musical subject *F*. It happened that he was presented with the same bichord $\frac{500}{700}$ several times in the course of the sitting. The following are the remarks which he made about it at different presentations.

"A horrid interval, not harmonic. I couldn't tell what it was meant for. Grotesque. I didn't want to estimate it."

"Unpleasant, fidgetty. I couldn't tell what it was meant for. 'What is that?' I feel impelled to ask."

"Not so bad as that horrid thing" [referring to the same bichord].

"I couldn't make it out."

"I don't mind so much now, as I see what it is—a diminished fifth."

On the other hand, an attitude of less intense strangeness (towards precisely the same bichord) may lead to a positive appreciation,—as in the case of the more physiological, less conative subject *E*, who reports of the two bichords $\frac{500}{700}$ $\frac{600}{800}$,—"I prefer the first for its odd agreeableness; it excited my curiosity to know if it were a familiar interval."

In four subjects, *B*, *C*, *M* and *P*, who make spontaneous mention of familiarity, there is present a well-marked associative tendency. This tendency is combined with the conative sub-aspect in the case

of the first two subjects, and both of them complain that familiarity tends to reduce the pleasure of the bichords. In the case of the last two, on the other hand, it is combined with a more passive physiological sub-aspect, and in them familiarity conduced to a positive appreciation.

The objective aspect, as we might expect, makes familiarity and strangeness unfavourable to a positive appreciation, the interval being rejected because it is "commonplace," or of "surprising *Klangfarbe*."

4. *Association*. In many cases it is difficult to be sure that associations are directly responsible for the pleasure or displeasure produced; yet the following examples will suffice to show the exercise of such influence.

J. $\frac{400}{700}$. "Unpleasant because I felt a Jew's harp in my teeth and still have the feel of the steel in my mouth."

K. $\frac{600}{800}$ $\frac{500}{800}$. "I preferred the first because I saw a man singing in — College Chapel."

M. $\frac{600}{1200}$ $\frac{500}{800}$. "The first preferred. The second suddenly suggested a church bell being tolled and became definitely mournful."

Q. $\frac{800}{1000}$. "Pleasant, reminding one of the opening chord in the *Dead March from Saul*; I like this piece."

W. $\frac{400}{800}$ $\frac{600}{1000}$. "The first preferred because I thought of an association with a gong."

Z. 500. "Unpleasant, because it reminded me of the sound of an instrument which I don't care for."

5. *Prejudice against interval*. The objective attitude several times led the most highly musical subjects to base their judgments on standards which previous experience had set up. Thus *N* remarked of the bichord $\frac{600}{800}$ "it sounds bony, bare, angular, unclothed, as all fourths do," and of the pair $\frac{600}{800}$ $\frac{1000}{1200}$ "I prefer the second; fourths always strike me as a strong discord. I prefer the augmented to a perfect fourth."

On the other hand, for the same pair of bichords *U* alludes to the "curiously pleasant and interesting charm of novelty" of the first; "but I cannot prefer a fourth to a minor third." Indeed he confesses with the bichords $\frac{600}{1200}$ $\frac{500}{800}$,—"I am now biassed. Octaves are pleasanter than sixths." This subject's prejudicial attitude even leads him to reject an interval because "it is not appropriate for the *Glockenspiel*" (to the tones of which instrument he likens those he is hearing in the experiment).

6. *Conflict between sadness and pleasure.* The following examples illustrate the fact that a sound may be liked despite the mournfulness or sadness connected with it.

J. 500. "I had a feeling of desolation. Then I thought of a fog signal, and finally came the image of a Flushing crossing on a foggy summer morning. I was on deck, leaning over the rails. And yet I like the sound."

K. 300. "Like a fog horn suggesting the sea, quite of its own accord. I at once saw the sea with a haze over it....Pleasant in tone, but sad and discomforting for the association."

D. $\frac{300}{700}$. "Mournful but rather pleasant."

S. 500. "Rather sad, but I like it."

B. $\frac{600}{1000}$. "Very pleasant, though sad."

X. $\frac{600}{900}$. "Pleasant for its mellowness and purity. Yet it gave me a feeling of sadness and melancholy."

In all these subjects, the objective and character aspects are combined with one another or with the intra-subjective aspect. In many cases, at least, the answers appear to be due to a balancing or wavering between different aspects, the more 'distant' aspect, for example, giving pleasure despite the feeling of sadness produced in the subject, such subjective impressions tending to yield before the independent objectivity or character of the sound.

APPENDIX B. *Indications of Sexual and Racial Differences* [by C. W. VALENTINE].

The men and women students who acted as subjects in my experiments were drawn pretty much from the same class of homes, the women, if anything, having had some advantage in the way of hearing music, and certainly more women seem to have had a considerable amount of instruction in the playing of the piano. At first it appeared that there were interesting differences between the men and women as shown by the following table.

Total number of judgments of different types.

Types of judgment	Men	Women
Character	137	79
Musical Association	140	139
Objective	512 (253)	409 (211)
Intra-subjective	256 (133)	273 (149)
Associations other than musical	119	191
	<hr/> 1164	<hr/> 1091

As the number of men was only three-quarters that of the women the totals of the men's judgments are increased proportionately in this table for the sake of easy comparison. The numbers in brackets are obtained if the judgments on the four discords are ignored.

It will be seen that the most striking differences are shown in the highest type (character) where the men surpass the women by 70 %, and in the lowest type where the women surpass the men by nearly 70 %. The women as a whole give a smaller number of reasons for their judgments, yet they give more than the men in the two types of lowest aesthetic value. Of the second highest type—that of musical associations—the women give as many judgments as the men, but this we should expect from their greater familiarity with musical compositions.

In general I have found women students much more thorough and facile than men in introspective work in other departments of aesthetics, for example with colours. Yet in these music tests fifteen women and only five men had to be classed as of neutral type, because of the poverty of their introspective remarks, and even among these the men average 1.2 character judgments and the women only 0.3. My general impression in reading over the introspective remarks of these one hundred and forty-six subjects was that there were more men than women who were deeply sensitive to the impressions of musical intervals.

So far we seem to have grounds for assuming a marked difference between men and women in the predominance of the various types of judgments. But a more careful analysis of the results suggested that the great superiority of the men in the number of character judgments may be indicative of a racial rather than a sex difference. There were nineteen English and twelve Welsh among the men students. These, taken together, give seventy-five character judgments against twenty-eight by exactly the same number of Scots¹. Unfortunately when one splits up the numbers in this way, they become too small for any wide generalisation. But if we separate the various nationalities and average the judgments of the various types we have the following results.

¹ I am informed by the Director of the Training College that there is no special selective factor at work likely to result in the English and Welsh men being in any way superior to the Scots at the College.

	Character	Musical Assoc.	Objective	Intra-subjective	Other Assoc.
For 84 Scots (women) average number of judgments given by each subject	0.9	1.6	4.9	3.2	2.4
For 31 Scots (men) average number of judgments given by each subject	0.9	2.6	6.2	3.0	1.7
For 19 English (men) average number of judgments given by each subject	2.3	1.0	5.6	3.6	1.6
For 12 Welsh (men) average number of judgments given by each subject	2.5	0.5	7.1	2.5	0.5

On the basis of the given scale of aesthetic values of the types we should probably have to award first place to the Welshmen in regard to the aesthetic appreciation of harmonious intervals, a result not surprising to one who knows the average student of the three countries fairly well¹. The Englishman would take second place. The results of the Scots men and women are more alike. But the men give more judgments of the second highest aesthetic type (Musical Association) and less of the lowest aesthetic type (Associations other than musical) than do the women.

We may conclude then that the apparent differences shown by the sexes in these experiments are probably, in part, racial differences, though not perhaps entirely so.

APPENDIX C. *Changes in Experience while Listening.*

1. *Affective Changes.* Several subjects, all employing physiological (Ia and Ib) and objective (IIb) sub-aspects, report a change in their affective experience while listening to the sounds. Thus Aa remarks of the bichord $\frac{800}{1200}$, "I didn't like it at the beginning; it seemed thin and metallic, but it improved later, got richer in quality"; and of the bichord $\frac{700}{800}$, "it seemed to change its pitch as it went on. The first

¹ I was able subsequently to test eight other Welshmen also, thus bringing the number of Welshmen to twenty. If their results are added to those of the other Welshmen we get the following average per man:

Character	Musical Associations	Objective	Intra-subjective	Other Associations
2.7	0.9	8.5	3.5	0.5

It should be noted that this last group had to be taken at the end of a hard day's teaching, when the subjects were unusually fatigued.

part I liked to some extent; the second I liked very much. I had a diagrammatic image of how it jumped,—a horizontal line running from left to right suddenly going up vertically." *B* describes the bichord $\frac{1100}{1200}$ as unpleasant at first, but becoming "pleasant as it dies away," and the bichord $\frac{800}{1000}$ as "not so pleasant later as at first, owing to its becoming confused." *O* finds the tone 1200 "pleasant at first but losing pleasure owing to its seeming to be a leading note, carrying a feeling of dissatisfaction and incompleteness"; he finds the tone 500 "very pleasant at first; the sound had body about it. Then it became unpleasant seeming to be below a note I would have liked better." *X* reports of the tone 400—"pleasant but I am disappointed at its abrupt ending"; and of the bichord $\frac{600}{1200}$ "at first unpleasant, later giving me the idea of something triumphant and stimulating me." Subject *I* thinks the tone 900 "unpleasant at first because it was thin, but later it gained in strength and confidence." *M* describes the bichord $\frac{500}{800}$ as "at first too loud for that particular quality of sound, but improving as it dies away."

Several subjects, all employing the physiological sub-aspect, report that the sound if continued for long would become unpleasant. Thus *P* says of the tone 1200 that "it would make me irritable if continued" and *Y* of the bichord $\frac{1200}{1300}$ that "it is on the way to becoming excruciating." So *G* and *W* describe the tone 800 as "approaching the kind of sound that makes the fingers tingle" and as "if it lasted much longer it must set the teeth on edge," while *Z* reports of the bichord $\frac{500}{800}$ "I couldn't stand it for long; it would become too oppressive."

2. *Objective Changes.* *E* $\frac{500}{700}$ "As it continued, one of the two notes appeared to turn, the higher imaged to the right of the lower and appearing to move so that it lay virtually over the lower."

Aa 500. "A full round quality, richer than the other. While I was getting the quality I had an idea (? image) of a crescendo < the lines not starting from a common point."

APPENDIX D. *The Nature of the Interval.*

1. *Order of preference for Intervals.* Inasmuch as the attitudes assumed by the different subjects in their preference judgments have proved so various, and as these experiments were planned only to analyse these varieties, no attempt will be made here to determine the average order of preference for the different intervals¹. The only points worth noticing under this head are that the general choice is often, *inter alia*, affected (1) by the order in which the members of any pair of bichords are sounded, (2) by the pitch of the two intervals employed. For example, in regard to the latter point, whereas a lower minor third $\left(\frac{500}{600}\right)$ is always preferred to a higher octave $\left(\frac{600}{1200}\right)$, a higher minor third $\left(\frac{1000}{1200}\right)$ is often preferred to the same octave $\left(\frac{600}{1200}\right)$. On the other hand, while a minor seventh $\left(\frac{400}{700}\right)$ is generally preferred to a low major or minor third or major sixth $\left(\frac{400}{500}, \frac{500}{600}, \frac{300}{500}\right)$, the same intervals, when their tones are raised an octave, $\left(\frac{800}{1000}, \frac{1000}{1200}, \frac{600}{1000}\right)$, are more often preferred to the same minor seventh $\left(\frac{400}{700}\right)$. Again, the minor third $\left(\frac{500}{600}\right)$ is preferred to the fourth $\left(\frac{300}{400}\right)$, while the octave-higher fourth $\left(\frac{600}{800}\right)$ is more often preferred to the octave-higher minor third $\left(\frac{1000}{1200}\right)$.

Such differences are the natural outcome of the application of other criteria, in addition to that of fusion, in the formation of preferences for intervals. Thus, the bichord $\frac{400}{700}$ is by some subjects preferred to the bichord $\frac{600}{1000}$ because it is (a) richer, (b) of better quality, or (c) of lower pitch, because the other is (d) mournful or (e) unsympathetic. Others, of course, make the opposite choice, on the ground that the second bichord is (a) more musical, (b) more consonant, (c) fuses better, etc.

2. *Misjudgment of Interval.* It is curious how far even the most highly musical subjects go astray in their uncontrollable endeavours to find out what the intervals are. The tuning-fork tones are of so strange a timbre that, as one of the subjects remarks, "the recognition of these intervals is not so easy as it would be on the piano or violin." Another observed—"it is hard to tell such thin sounds. I cannot get away

¹ For recent investigation into this matter, cf. Valentine, *This Journal*, 1913, vi. 190-216.

from the trouble of these notes." In some cases the poorness of timbre makes the intervals appear flat. Thus *Ab* reports of the single bichords $\frac{800}{1200}$ and $\frac{600}{800}$ that they are not quite in tune, the former being dull and flat; and *T* complains that $\frac{300}{400}$ is flat. In other cases the subjects replace one of the tones by its higher or lower octave; thus, *N* estimates the bichord $\frac{800}{1000}$ at one time as a major tenth ($\frac{800}{2000}$ or $\frac{400}{1000}$), at another as a major sixth ($\frac{800}{500}$ or $\frac{1600}{1000}$), and *V* the bichord $\frac{600}{1000}$ as a minor third ($\frac{1200}{1000}$ or $\frac{600}{500}$)! This bichord $\frac{600}{1000}$ is called by *N* an augmented fourth! Subjects *Ab*, *V* and *N* are all first-rate professional musicians. Yet *N* calls $\frac{1000}{1200}$ at one time a major third, at another time a perfect fifth!

XII. CONCLUSIONS.

1. The aspects which are employed by subjects towards sounds may be classified (i) as intra-subjective, (ii) objective, (iii) character, and (iv) associative. With the exception of (iii) these aspects are divisible into various important sub-aspects (pp. 72-74).

2. The character aspect is not dependent on the intra-subjective or associative aspects; in nature and origin it is *sui generis* (pp. 79-81).

3. Probably a close relation exists between certain forms of synaesthesia and symbolic associations (pp. 81-85).

4. Symbolic associations are commonest among those subjects in whom either the intra-subjective or the character aspect is combined with a strong tendency to the associative (pp. 84, 85).

5. While there is a general agreement between attitudes adopted by subjects to colours and to sounds (p. 89), certain important differences are revealed and to these attention has been drawn (pp. 86-90, 100-102).

6. The objective aspect occurs more frequently and the intra-subjective and character aspects occur less frequently in the case of bichords than in the case of single tones (pp. 90-92).

7. The associative aspect occurs most frequently among less musical subjects (p. 92).

8. Preference judgments reduce the frequency of the associative aspect and yield a much higher frequency of the objective aspect and a slightly higher frequency of the intra-subjective aspect (pp. 92-94).

9. The relative frequency with which the physiological and conative sub-aspects of the intra-subjective aspect influence the subject's appreciation, varies according as the material consists of single tones or of chords (pp. 95, 96).

10. The objective aspect or too weak a result of the intra-subjective aspect is generally responsible for indifferent appreciation (p. 97).

11. Impossibility of comparison arises either from a conflict between the dictates of one or more aspects, or from reliance on the objective aspect (pp. 98, 99).

12. The physiological sub-aspects of the intra-subjective aspect more often yield positive appreciation, the conative sub-aspects and the objective aspect more often yield negative appreciation of the sounds (pp. 96, 97).

13. Low tones are more potent in evoking suggestions and intellectual activity; high tones depend rather on their physiological effect (pp. 102, 103).

14. The influence of familiarity on appreciation is most marked in subjects who make frequent use of the associative aspect, while that of strangeness is most marked in those who make frequent use of the conative sub-aspect and the objective aspect. Familiarity has a positive effect when the associative is combined with the conative sub-aspect, and a negative effect when the associative is combined with the physiological sub-aspect (pp. 103, 104).