

THE AFFECTIVE QUALITY OF AUDITORY RHYTHM IN ITS RELATION TO OB- JECTIVE FORMS.

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It is difficult, in any appreciation of concrete rhythm, to determine that part of the total pleasure received which is due to the rhythmical form in which the material is cast; for the æsthetic delight which is connected with such an experience is the resultant of a variety of factors, not all of which are purely rhythmical. To make this analysis is, indeed, commonly impossible. The mood is unanalyzable, the object of enjoyment simple. It is the whole experience which is agreeable; and though we are able to say that several sources must combine, since there is present a variety of factors, each of which is a known source of pleasurable stimulation, it does not lie within our power to refer each increment to its separate cause; for the contribution of each factor varies with the aptitude of the individual æsthetic subject, and with the mood and direction of attention at the moment.

The phenomena proper to rhythm are identical in music and verse. The characteristic differences between the two lie solely in the nature of their secondary factors. The rhythms of music are expressed in forms which have rich and pleasing qualities—*tones*; those of verse are supported by forms which arouse varied and beautiful images—*articulate speech*. In the former the immediate sensuous quality of the sound predominates, the ideas suggested are secondary, obscure or lacking; in the latter the images which the words call to mind absorb attention, while the musical qualities of the voice are usually meager or unheeded. It is, therefore, a natural result that in music the formal conditions of rhythm are faithfully observed, while in verse they are transgressed constantly and with freedom.

The description of auditory rhythm as an experience affectively toned involves (a) a determination of its purely psychological factors — the modes of feeling which rhythm produces; (b) the relation of such modes to types of physical change in the bodily organism, by which the expression of rhythm is characterized; (c) the external conditions of pleasurable and painful feeling in rhythm, namely, the elements and relations of the objective rhythm forms which give rise to æsthetic satisfaction and dissatisfaction.

This paper deals with the third of these topics. In regard to the first, a few brief observations. Two factors are unquestionably present in our enjoyment of rhythm. There is what has been called the organic sensation of rhythm, the feeling of response, of pleasurable activity, which is not confined to rhythms actively expressed, but permeates also the appreciation of rhythms which are simply apprehended. There is also the form of the rhythm, which is an ideal content. It is impossible to give expression to the full æsthetic meaning of rhythm in a statement which excludes either of these factors.

The pleasure which such forms of experience afford us is not dependent solely upon an intellectual perception of rhythmical relations, else the peculiar temporal limits imposed upon the forms of succession which support this impression would be irrational; for the formal similarity of sequences which pass in a flash or drag out through hours, to those which we call rhythmical, may intellectually be very readily apprehended, but it is impossible for such measures to give rise in our consciousness to the effect which we call an impression of rhythm. If this were so, in the second place, the impression of rhythm should arise from the apprehension of those visual symbols which represent to the eye musical phrases and metrical speech. But such is not the case; the rhythm is felt by us only when, in some form, we translate those symbols into tones, words or representative movements. The rhythm may be uttered, or sub-vocalized, or the auditory sensations indicated may be called up in imagination as inner speech or song; but in some way, primary or secondary, a sensuous content must be added to the intellectual apprehension of the relations which the audi-

tory sequence presents before any realization of its immediate rhythmical quality can arise in us. And thirdly, under such a conception, the expression in vocal or other motor terms by one who attends to a sequence objectively given should add nothing to the æsthetic effect which that rhythm produces; since it contributes in no way to the formal perfection of the rhythm. Only in the case of one whose auditory or visual perception, or capacity for ideal representation, was undeveloped, could such accessory activities be conceived to add to the pleasure derived from the rhythm; and this solely in virtue of the clearer comprehension of the rhythmical form derived from the kinæsthetic feelings involved in beating out or singing it. Such an hypothesis is self-contradictory, since, if the ideational content be in question and not the feeling of pleasure in the activity itself, the process cannot be conceived to clarify the rhythmical structure, because an apprehension of that ideal form must have been the prerequisite for giving expression to the rhythm.

Nor, on the other hand, can we refer the pleasure of rhythmical apperception or activity wholly to the sensuous feeling and organic reverberation aroused. In some way, clearly or dimly, the form of the rhythm is always felt. The pleasure derives not from the quality of the individual elements and the contrast of weak and strong stimulation or motor discharge alone, but involves also the fact that the rhythm is characterized by formal unity, that it possesses a beginning, a climax, an end, as individual and definite as the quality of the single beat or the constitution of the unit group which enters into it; and this sense of the complete formal sequence is present from the beginning and pervades the whole experience of rhythm. Curtail the series, and its fragmentariness is immediately felt as an imperfection of the rhythmic form; add redundant elements, and the overstepping of the natural rhythmic close is felt in the same immediate way; introduce incongruous forms of temporal or intensive relation, and the discrepancy jars upon the æsthetic consciousness as a violation of the sequence which the rhythmical formation demands. A rhythmical series uncompleted or wrongly executed may haunt the mind for hours or days, until satisfaction is obtained at last by striking the final note or singing the phrase in correct time.

Of these two factors — sensuous feeling and ideal form — the emotional effect of rhythm is due chiefly to the former. Its fervor varies directly with the richness of the sensuous impression and the predominance of the organic reverberation which is aroused. The rhythm which does not move one leaves one cold. Its most intense emotional effects are characterized by violent and widespread rhythmical movement. The ideational content does not in such cases manifest any appreciable development; on the contrary, it may suffer a distinct decline. The apprehension of rhythmic form is an abstract conception, as in that of other formal or mathematical relations. The beauty or dignity of its proportions may arouse our delight, as may a geometrical solution, but this feeling of pleasure is distinct in its origin and nature from that which is characteristically aroused by the reception of a rhythmical impression.

The objective factors upon which the character and intensity of the pleasure in a rhythmical sequence depend may be summed up under the following heads :

1. The absolute rate of succession among the elements of the rhythmical sequence.
2. The absolute intensity of these constituent elements (whether auditory or reactionary).
3. The relation of the absolute rate of succession to the prevailing emotional mood of the moment.
4. The number of elements of which the elementary rhythmical unit is composed.
5. The structural complexity of such units as dependent upon the differentiation of their components.
6. The proportions of the various temporal and intensive values within the rhythmical unit.
7. The form of succession which the elements of the unit group present.
8. The temporal and intensive differentiation of successive rhythm groups.
9. The combination of successive groups into higher rhythmical unities.

To these must be added as sources of gratification in every actual experience of rhythm the following two extraneous factors :

10. The musical quality of the sounds which support the rhythm.

11. The secondary associations which the tones or words of the rhythmical sequence arouse.

1. The absolute rate of succession.

As the very appearance of the rhythmical impression depends upon conditions of absolute rate of succession among the elements which support it, so within the range of temporal relations capable of giving rise to that peculiar experience, the character of the pleasurable impression varies with every change of rate. It is impossible without qualification to say that a progressive variation in one direction is characterized by a continuous increase of pleasure, while that in the opposite direction is marked by a decrease; but it can be said that the varying rates at which the elements of the rhythmical sequence succeed one another have each its peculiar affective overtone, qualitatively unlike those of slower or more rapid rates.

Certain factors which, in a general sense, are elements of the æsthetically agreeable impression do thus increase and decrease as the speed rises and falls. With increased rapidity the definition of the rhythmical sequence, both as regards the segregation of the groups from one another and the differentiation of accented and unaccented elements within the group, becomes more adequate. Secondly, as the rate increases, the limits of the individual group and of higher rhythmical syntheses include a larger and larger number of elements. And finally, in connection with the latter set of changes the differentiation of successive rhythm groups, temporally and intensively, grows more marked. Nevertheless it cannot be said that as the speed rises the pleasure in the rhythmical impression increases. Rhythms of slow tempo and simple phrase may, at any given moment, be vastly preferred to rapid and complexly coördinated forms. The element of absolute rate does not stand alone; its influence can be interpreted only in connection with other simultaneous variants.

Upon conditions of rate depend finally those characteristic qualities by which we describe the various types of familiar

rhythm as gay, sprightly, restful, solemn. These qualities are not attributed to the rhythmical sequence in virtue of secondary associations; they are immediate affections of consciousness due to the pure rhythmical form of the sensuous impression. The rhythm *is* lively or restful; it does not remind us of exciting or quieting things. The quality in virtue of which such terms are applied to rhythmical sequences is describable only in terms of the whole constitution of the rhythmical impression; it is not the rate alone, but the forms of the unit-groups and their succession as well, which produce this peculiar effect; but it is due to the rate, since the whole latter group of changes, except rhythmical melody, varies in dependence upon the rate at which the elements succeed one another. Every rhythmical sequence has such a characteristic quality of gracefulness, dignity, lightness, decision, and the like. The slow are solemn, noble, decided; the rapid are gay, light, graceful. These characters will be mentioned in connection with the number and form of the rhythm group; here it is necessary only to point out that they are fundamentally connected with the factor of absolute rate among the elements of the sequence.

2. The absolute intensity of the rhythmical elements.

The changes in affective overtone due to variations in intensity are much less striking than those which follow upon changes in absolute rate of succession. The same rhythm endures through all degrees of intensive change, while with relatively slight variations in rapidity the affective impression is altered completely. The two phases are comparable with those aspects of sensation indicated by the technical terms 'quality' and 'intensity.' Intensive variations, therefore, are less significantly related to the æsthetic impression produced by the rhythm than are changes in absolute rate. The subordination of this factor has been noted by both Meumann and Ettliger.

Nevertheless, such intensive changes have specific effects upon the quality of the æsthetic impression, and from moment to moment in our experience may affect it to the extent of determining its sign as positive or negative in a scale of æsthetic values. In extreme ranges of intensity this divergence is most

striking; the quality of a rhythm given in faint, subdued tones is almost incomparably different from that of one of the same structure and tempo expressed in loud and ringing sounds. But within its middle ranges variation in the intensity of the elements is much less readily noticeable, and affects the æsthetic character of the impression in a far weaker degree, than does that of absolute rate. The typical effect of slight intensive changes is to produce a differentiation of phases between the louder and fainter groups of sounds as factors in a higher rhythmical unity. The variation in intensity brings about a new æsthetic construction of material, but is not apprehended in its proper quality at all. This effect is analogous to the disappearance of perceptual differences in the elements of a repeated iambic sequence to which Mach has called attention.

3. The relation of absolute rate to the prevailing emotional mood of the moment.

There is no tempo which can be called pleasing, none which can be characterized as displeasing, apart from the prevailing mood of the moment.¹ It must be congruous with the feeling of the subject in whose consciousness the rhythm appears, if it is to awaken pleasure. In virtue of changes in the subjective attitude, the affective character of a rhythm may be entirely transformed, and that which at one occurrence gave peculiar delight may later become intolerable.²

¹ With the exception of such rates as directly interfere with the distinction or force of the rhythmical impression. Such rates are those which lie near to the upper and lower limits of the series which is capable at all of supporting the rhythm experience. These are always less pleasing than rates in the middle of the scale.

² James notes this connection between varying moods and specific rhythmical tempos in the following remark: "There is a certain emotional *feeling* accompanying the intervals of time, as is well known in music. *The sense of haste goes with one measure of rapidity, that of delay with another*; and these two feelings harmonize with different mental moods."

But in so harmonizing, the impressions of slowness and haste themselves disappear, and they do so because in each case the periods of objective and of natural organic rhythm have approached each other. The interval of 0.62 second which Vierordt found 'adequate' in the production of an agreeable effect can be interpreted only as the resultant of a plurality of essentially different rates, or as characteristic of a single mood which prevailed during his experiments.

This dependence of particular rhythm forms upon the mood of the moment

These changes in æsthetic quality are not attributable to secondary associations which connect the rhythm in question with former scenes and experiences, the memories of which are incongruous with the present mood of feeling, though the intensity of emotion may be greatly increased by such factors. It is the naked quality of the rhythm which is momentarily displeasing, not that of the associations which it brings to mind. The explanation which I have to offer is speculative. The rhythms which we prefer when fresh, gay, lively, hopeful, when energy is abundant and the amount of movement large, are those which are characterized by rapid tempo and complex integration; they are, in correspondence with the description of our moods, light, graceful, vivacious measures. When we are fatigued, depressed, weak or melancholy, the rhythms we choose are slow of tempo and simple in their construction and sequences; they, analogously, are called restful, solemn, dignified, and the like. In the one case we are attracted by, and spontaneously give expression to, rhythms which involve rapid motor discharges having a wide range of differing intensities and complexly integrated into groups and sequences. In the other case we prefer such as require only slowly repeated discharges which have a narrow range of intensive variations, and present the simplest types of sequence and combination. The conditions of the rhythmical impression are so related to these general subjective conditions that it pleases or fails to do so according as its tempo (together with such other factors as depend upon this) is congruous or incongruous with the normal rate and intensity of motor discharge at the time; and according as the comprehension of the rhythmical form makes or does not make too great demand upon the fatigued or enfeebled attention process. The capacity of any rhythm to please is dependent

for the appeal which they make to the æsthetic sensibility is constantly commented upon by those who take part in such investigations as the present. Comparing two simple forms, one subject says: "These are about equally attractive. In a quiet mood I should enjoy the first; if I were nervous I should enjoy the second." Another says of a certain rhythm: "It indicates hurry to my mind, and would probably, under conditions of mental excitement or great stimulation, be very agreeable. The agreeableness of various rhythms seems to depend upon my state of mind as influenced by other causes."

upon the relation of the attention necessary to apprehend and reproduce it, to our own stock of vigor and mental control at the moment. We dislike those to which we cannot adapt ourselves with success and ease. Dr. M. K. Smith has commented in an interesting way upon the results of such enforced rhythmical adjustment by suggesting that certain forms of social discontent may possibly be attributed to the constant subordination of movements on the part of workmen in various industries to periods imposed by the mechanisms which they operate, which contradict the natural rhythms of the human organism and thereby produce irritable and inharmonious discharges.

4. The number of elements of which the rhythmical unit is composed.

With this factor the characteristic affective differences in the rhythmic impression are commonly connected. Increase in the number of such constituent elements makes the sequence gay, light, sprightly, cheerful; decrease in number renders it solemn, restful, stately, noble. While the number of elements is unquestionably one factor in the production of such impressions of quality, it is only one of a group which combines to this end. The simplicity or complexity of the rhythmic structure is coördinated with the factor of number in affording a justification for the terms stately and noble, sprightly or graceful. The characteristics of smoothness, buoyancy, insistence, boldness, weight, are dependent upon the position and intensive relations of accented and unaccented phases within the group, not upon the number of elements or the tempo directly. Of all measures the spondee is most grave, sober, dignified; the number of constituent elements is small, the proportion of these within any given series which receive emphasis is large, and the tempo, in consequence of this fact, is slow.

The differentiation of trochaic and iambic forms, or of dactylic and anapæstic, from this point of view, is difficult. In each of these pairs the number of elements is identical, and either may be uttered in slow or fast time, thereby transforming the affective quality of the experience and giving to it at will a grave or gay character. At the same time, the absolute

rate at which a rhythmic sequence is uttered stands in intimate relation to the form of structure involved. All double or all triple measures have not the same natural tempo. The rapidity with which it is felt to be appropriate that the sequence should be uttered is affected both by the distribution of intervals within the group, and by the intensive relations of its accented and unaccented phases.¹ The first of each of the above-mentioned groups has customarily been described as bold, flowing, buoyant, while the latter is grave, insistent, weighty; but these descriptive phrases have their origin rather in the position of the accented element of the foot and its proportional time-value than in the number of syllables of which the rhythmic unit is composed. This descriptive classification has been extended — and with equal justification — to prose utterances.² Not only the number and relation of elements in the simple group affect the æsthetic quality of the rhythm, but the coördination of these groups in higher unities as well. Dipodic structures are sprightlier than simple sequences, short and common meters than long meter.

5. The structural complexity of the rhythmic unit as dependent upon the differentiation of its components.

The satisfaction which any rhythmical sequence affords is dependent upon a process of individualization which penetrates every part of its structure and gives to each element a functional uniqueness. This differentiation marks the temporal as well

¹ The average duration of the trochaic measure was found in the writer's experiments to be greater than that of the iambic in the ratio 1.000:0.791. The temporal values of dactyl and anapæst were almost identical, but the difference which does appear indicates a greater rapidity in the natural tempo of the anapæst than of the dactyl. The amphibrach is marked by a still slower tempo than the dactyl. The series of proportional values is as follows: Dactyl, 1.000; anapæst, 0.997; amphibrach, 1.039.

Ettlinger had previously pointed out this relation of the trochaic and iambic forms, and of series in which the one or the other predominated. He remarks that the Greeks, in virtue of this characteristic difference, called the trochaic '*hesychiastic*' or restful, and the iambic '*diastaltic*' or stirring, and notes the fact that Bach used the former in the choral, the latter in the gavotte.

² For the application of concepts of constancy and proportion to prose writing see Schurman, 'On the Length of Prose Sentences,' Univ. of Nebraska Studies, Vol. 1.

as the intensive aspects of the series. It is a factor of which the appreciative subject is not specifically conscious, nor can it be observed by introspective analysis. Its presence imparts distinction, force and character to the rhythm; its absence is marked by monotony and insipidity in the sequence. The notations of music and the so-called poetic forms are never adhered to by the singing or speaking voice, and these departures from the written scale are not made in subservience to the expression of transient emotion, but are constant and universal. The neglect of observing these finer gradations of intensity and duration imparts an inflexible and artificial quality to the rhythm, which is the chief source of the harshness and lifelessness of mechanically produced music. There is properly no reduplication of parts in rhythm. As many temporal and intensive values exist as there are elements in the group. If three members compose it, each of these differs characteristically from both the others in its force and in its duration (or in that of the interval which follows it). Position and function give a different dynamic value to every constituent of the group, the form of which arises not from a separation of its elements into two groups, accented and unaccented, but from the integration of elements each of which is individual and unique.

6. The proportion of the various temporal and intensive values within the rhythmical unit.

These differentiations are not made at random. The unit of structure—and the whole rhythmic sequence as well—manifests definite proportions both of its intensive and temporal values, the maintenance of which is an indispensable condition for the production of an agreeable æsthetic effect. This principle of proportion involves not less than three factors: intensity, duration and position, with their inter-relations. First, the æsthetic effect depends upon the maintenance of just proportions of intensity between accented and unaccented elements. Undue disparity destroys the rhythm, inasmuch as that accented element which is too greatly differentiated from the unaccented members of the group fails to be coördinated at all, and is regarded simply as an unrelated interpolation. This is especially

true when the exaggerated element is a secondary variant from a well-established series of accents, but it holds for simple groups as well.

Of proportions among the various temporal intervals which the group presents we cannot speak absolutely, since the values of these are dependent upon factors of stress or intensity in the preceding reactions.

As regards position, in so far as we can speak of the structure of rhythmical units apart from the form of the whole sequence in which they find place, the initial and final members of the æsthetically satisfactory group are characterized by force, the median element by weakness. Almost all our poetical measures present either initial or final stress; median accentuation is practically unknown. In music the initial stress is observed without specific direction.

But the æsthetic adjustment of relative intensity in initial, median and final members of a group cannot thus be considered apart from the whole rhythmic sequence of which it forms a part; for the specific differentiation of such elements depends upon their position in the verse or phrase of which they are components. The form of the dactyl, for example, may change, as the wave of movement passes along the line, from that in which the final member is the weakest of the group to that in which it is scarcely less forcible than the initial accented element. The production of the perfect æsthetic effect depends upon the maintenance of those particular intensive proportions which are characteristic of each position in the whole series.

The proportions due to inter-relation of the three factors mentioned above involve connections between duration and intensity, between duration and position, and between intensity and position. Of position and duration it can be said, as regards the internal arrangement of the group, only that the values of the intervals must be such as the relative intensity of the preceding reaction demands, and that in the course of the rhythmical sequence they must change as the relations of the reactions vary in dependence upon change of position in the whole series.

In connection with an investigation of the constitution of sim-

ple rhythm forms reported in a supplement¹ of this journal, the quantitative determination of the relative temporal values of accented and unaccented elements necessary to afford æsthetic satisfaction was taken up at a single point. Two rhythmical forms were selected for experimentation, the trochaic and the dactylic. The intensive relations of the rhythmical elements were constant throughout the experiment. The hearer listened for ten seconds to the series of sounds, when the stimulation ceased. Stoppage was always made coincident with the completion of the rhythmical unit. The duration of the single experiment was determined on the basis of reports by the subjects concerned as to the time necessary to apprehend the rhythm clearly and to appreciate its æsthetic worth.

The æsthetic valuation of the various rhythm types afforded by these changes in the durational values of accented and unaccented elements within the group was made by reference to a numerical scale, in which the line of indifference was represented by the number four, and agreeable or disagreeable impressions by departures from this point toward theoretical extremes of seven and one respectively.

Six persons in the case of the dactylic form, five in that of the trochaic, took part in this investigation. The quantitative results are given in the following tables. The figures at the

TABLE I.
(TROCHAIC FORMS.)

Acc. Elem. Unacc. El.	1.000 0.565	1.000 0.636	1.000 0.714	1.000 0.800	1.000 0.895	1.000 1.000	1.000 1.118	1.000 1.250	1.000 1.400
Subject A.	4.0	4.0	4.0	3.5	3.5	3.0	5.0	5.0	5.0
Subject F.	4.5	4.5	4.0	4.0	4.0	4.0	4.5	4.0	4.0
Subject M.	5.0	4.0	4.0	4.5	4.0	3.6	4.0	4.5	5.0
Subject N.	5.1	5.4	5.1	5.1	4.5	3.7	5.0	4.0	6.0
Average.	4.65	4.47	4.27	4.27	4.00	3.57	4.62	4.37	5.00
Subject H.	3.0	4.0	5.5	5.5	5.5	4.5	4.5	4.0	4.0
Total Average.	4.32	4.38	4.52	4.52	4.30	3.76	4.60	4.30	4.80

These quantitative results are represented in the curves given below. In the upper drawing the curve of subject H. is represented separately from the rest; in the lower the curves for all subjects are combined in one.

¹ *Monograph Supplement*, No. 17, being 'Harvard Psychological Studies,' Vol. I.

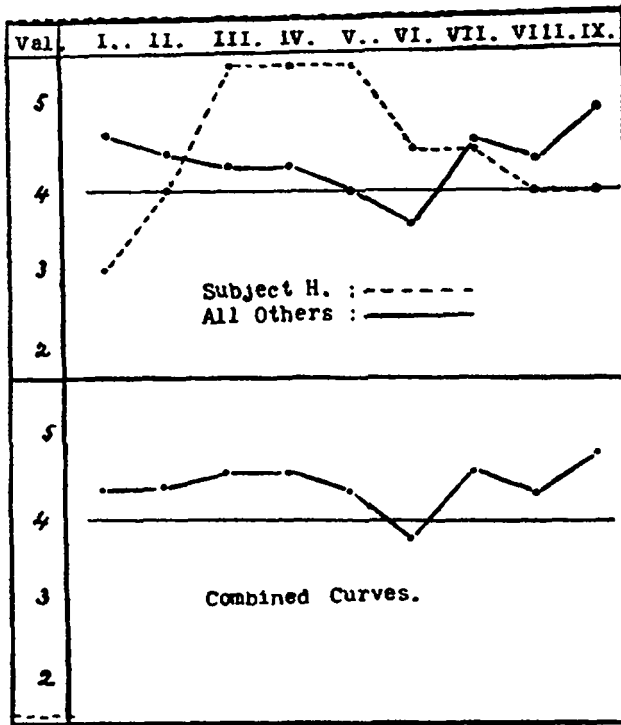


Chart I.

TABLE II.

(DACTYLIC FORMS.)

	1.555	1.444	1.333	1.222	1.111	1.000	0.888	0.777	0.666
1st. Unacc.	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2d. Unacc.	0.444	0.555	0.666	0.777	0.888	1.000	1.111	1.222	1.333
Subj. A.	4.0	5.0	4.0	4.0	4.5	4.3	3.9	3.5	2.5
" C.	6.0	6.0		5.0	5.0	3.0	2.0	2.0	3.0
" E.	4.0	4.0	5.0	3.5	4.0	4.0	4.0	4.0	5.0
" J.	4.5	5.0	5.0	5.0	4.8	5.0	5.0	5.0	5.0
" N.	4.9	4.2	5.0	4.8	5.1	4.5	4.0	3.8	4.7
Average.	4.68	4.84	4.75	4.46	4.68	4.16	3.78	3.66	4.04
Subj. H.	3.0	2.5	3.0	5.6	5.2	5.3	1.7	2.5	2.0
" M.	3.0	2.5	3.3	3.4	4.5	4.0	3.5	2.5	3.0
Average.	3.00	2.50	3.15	4.50	4.85	4.65	2.60	2.50	2.50
Total Av.	3.84	3.67	3.95	4.48	4.76	4.40	3.19	3.08	3.27

These quantitative results are represented in the curves given below. In the upper drawing the curves of Subjects H. and M. are presented separately from the rest; in the lower the curves for all subjects are combined in one.

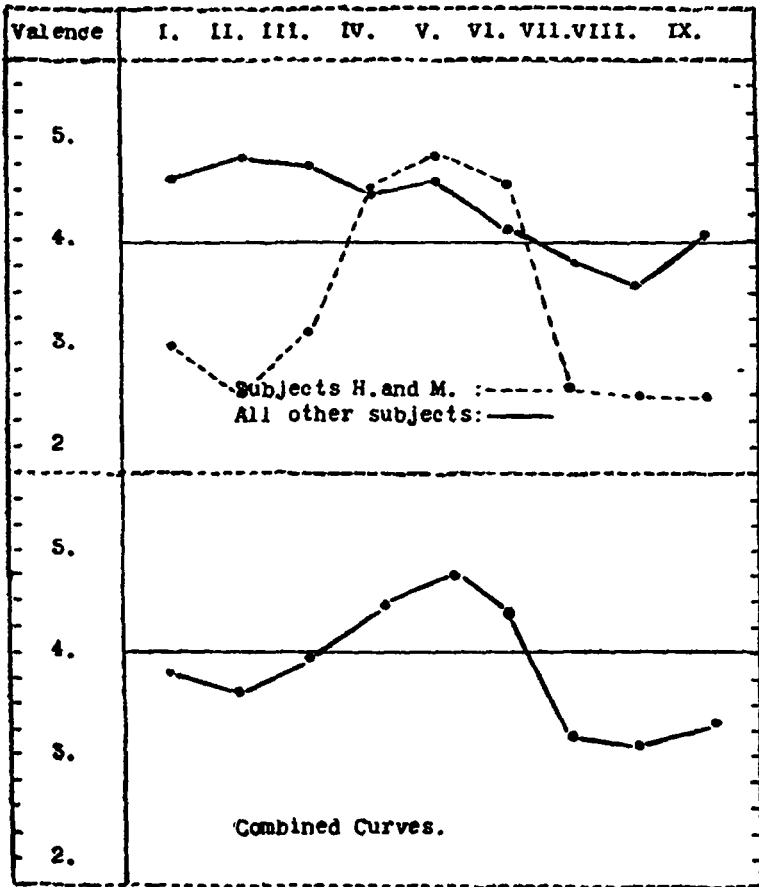


Chart II.

heads of the columns represent the relative temporal values of the intervals; those in the body of the table represent averages of five judgments upon each individual rhythm form.

In the case of each rhythmical form the reports are divided into two sub-groups on account of certain divergences, toward the extremes of the series of values, from the common type of preference which the median range exhibits. In the case of trochaic measures the divergent group consists of one member; in that of the dactylic, of two members, one of whom is that subject who showed divergence in the preceding group. In the case of these two subjects the characteristic preference for pre-

ponderating time-values in the accented over the unaccented intervals persists only within stricter limits than in that of the remaining members of the experimental-group. Further differentiation is accompanied by either the appearance of a distinct feeling of disagreeableness or an inversion of the type of rhythm by which an anapæstic form is substituted for the original dactylic.

Æsthetically agreeable rhythmical forms are characterized by non-uniformity in the values of their constituent intervals. The most clearly marked tendency in the estimation of such temporal disparities is to prefer those types in which the interval following the accented element exceeds that which follows the unaccented. The appreciation of forms in which this relation is reversed shows more irregularity. In dactylic rhythm this arrangement of intervals produces a uniformly disagreeable impression. In the trochaic form, on the contrary, the highest positive value appears at the extreme of the descending series, with a second high node adjacent to the point of temporal uniformity. These inverted types have a strikingly different affective quality from those in which the accented interval preponderates; they produce a brilliant, staccato effect, and it is from this novel quality that their agreeableness arises. The upper and lower halves of the scale should be regarded as embodying characteristically different types of rhythm, depending upon specific relations of magnitude among the temporal values of their respective intervals. Within each half of this scale certain proportions are felt to be just and correct in the distribution of these time values; and any departure, of excess or defect, from this ideal relation appears as a mutilation of the proper æsthetic effect of the rhythm. But when one has passed, in either direction, through the zero point of temporal uniformity, and the relations of magnitude in accented and unaccented intervals are inverted, one no longer receives the impression of a distorted rhythmical form which involves a still further departure from the original type, but of one which embodies a different principle of arrangement in virtue of the novel æsthetic effect produced.

7. The form of succession which the elements of the unit group present.

Not only are certain limits prescribed to the absolute amount of variation which may be comprehended within the rhythmical group, and a law of elementary proportion thereby established among the values of its constituents, but the group as a whole must also possess definite proportions in both its intensive and temporal characters. Every unit group and every formal sequence has a characteristic rhythmical melody. The definition of elementary proportions does not describe the nature of the group as a specific rhythm type, for the series of relations cannot be read indifferently in either direction. The form of succession among the elements is of fundamental significance. The same series of intensive or temporal qualities which give a rhythmical grouping having a certain characteristic quality when read in one direction, produce a totally unlike æsthetic effect when read in reverse order. In what this difference consists, one may find it difficult to say, but the unique quality of each form is a matter which immediate experience never leaves in doubt.

The resolution of the factors of this experience is speculative. I should describe it as due to the formal succession of organic tensions involved in the representation of the various rhythmic forms—in other words, to the melodic relations of a series of strain experiences.¹ We may suppose the same simple relations to obtain always between elements of duration, between those of stress, and in the connection of the members of these parallel series with one another. In that case we shall have the conception of definite simple quantities entering unchanged into different melodic series; but such an incorporation is itself a determinant of the nature of the individual element. The æsthetic quality of the single note in music is absolutely dependent upon its formal relation to preceding and succeeding tones in the melody of which it forms a part, and there can be

¹ This view is, in general, in accord with Ettlenger's theoretical discussion, in which the experience is reduced to tendencies toward movement and rest oscillating about points of equilibration in the series. I should prefer, however, to couch the statement in less conceptual and intellectual terms.

as little doubt that the characteristic quality which a specific strain experience possesses depends in a similar way upon the form of the whole series of tensions into which it enters. The value of each (hypothetically) simple quantity in such a series of kinæsthetic impressions undergoes transformation with every incorporation into a sequence having a new form of succession. Upon such formal relations with a series of organic tensions depend the characteristic qualities of the various common rhythm types. These have already been considered in § 5 of this paper. The specific qualities of lightness and weight, of liveliness and solemnity, of buoyancy, insistency or dignity there described are due to the form of the succession of motor impulses and organic tensions severally involved.

The conception of simple, unchanged quantities entering in various orders into characteristically different rhythm types, which the preceding statement has assumed is, however, unquestionably false to the facts. One does not get a trochee by reading an iambus backward, nor an anapæst by inverting a dactyl. The formal succession affects the elements of the series not only by the establishment of laws of melodic relationship, but also by transforming the character of each individual component itself. The relations both of intensity and duration presented by the trochee are different from those which obtain in iambic rhythms, and likewise in triple rhythms the whole series of relations which each type presents is unique and not convertible into other types. This is one of the factors of difficulty in passing readily from one type of rhythmic apprehension or expression to another, which has been largely overlooked in discussions of the matter.

Further, the two series of values, intensive and temporal, influence each other at every point. Not only does the intensively higher element attract to itself a proportionately greater time value, but that factor which is temporally extended is also marked by an (unconscious) increase of stress. We come thus to the conception of groups of elements organized in definitely configured types, and sensitively responsive in every part as the basis of our æsthetic valuation in rhythmical sequences.

8 and 9. The temporal and intensive differentiation of successive groups and their combination into higher rhythmical unities.

These are discriminable aspects of a process which is concretely unitary; they may therefore be considered under a single head. The introduction into a rhythmical sequence of variations from the typical figure is primarily connected in consciousness with a feeling of monotony in the unbroken series, and a desire to avoid the æsthetically displeasing quality which it in consequence possesses. Much less frequently is the motive recorded by the reactor a striving after more definite coördination of the series by the combination of simple groups in higher synthesis. Yet there is every reason to believe that the origin of the feeling of monotony is connected with the absence of those means of grasping larger sequences of elements which the differentiation of alternate measures and the introduction of specific points of phrase-initiation and finality afford; and that the peculiar satisfaction experienced in such differentiated sequences is immediately related to the increased definiteness thereby imparted to the form of the whole sequence.

The delight in such mixed measures is universal, and the tendency to transform the succession of uniform rhythm types by the creation of larger figures is strong and persistent. In the writer's experiments, whenever the subject was left free to choose the form of the sequence, he interrupted the repetition of identical groups by the introduction from time to time of a variant form. Even when required to continue an unvaried rhythm such departures were often introduced. When given a rhythm group which was to form the first half of a composite measure and asked to supply a second, metrically equivalent to it, these reactors—with one exception—differentiated the two subgroups. With the dactylic | $\overline{\text{♩}} \text{♩} \text{♩}$ | is made to alternate the syncopated form | $\overline{\text{♩}} \text{♩} \times$ |, and the like. Of such departures from the prescribed rhythm type the reactors wrote in the following manner:

“I resort to this form occasionally in order to relieve the monotony of the continuously repeated simple form.”

"I try to introduce either a time variation or a difference in pressure" (*i. e.* either a variation in the distribution of temporal relations within the group, or a differentiation into major and minor phases).

"The first measure [continuous iambics] grew tiresome very quickly and ceased to have any quality. The second [iambics with major and minor phases] was, however, distinctly pleasing."

"It seems that to break the monotony after about three [groups] is necessary."

Of four forms arranged in order of complexity one reactor says: "I liked the last combination better than any of the others, though I don't know why."

Such remarks occur in all the subjective reports upon this part of the work.

When different types of rhythmic structure were compared together in pairs, those forms preferred in every instance (with the exception of certain judgments of one reactor) were the more complex, those rejected the more uniform.

All such forms of differentiation derive æsthetic significance from their function as a mechanism of higher synthesis, a method by which unity is given to larger groups of elements as phrases in the rhythmical composition, or a definite configuration imparted to the sequence as a whole. Upon the adequacy of this process and the character of that melodic form which the total series of elements thereby receives, depends more than upon any other one factor the quality of the rhythmical sequence and the delight it affords as a psychological experience.

There remain to be pointed out only certain secondary factors of æsthetic pleasure which enter as inseparable elements into every concrete experience of rhythm, and to the existence and importance of which attention was called at the beginning of this paper. They may be summed up under two heads: *musical quality*, and *capacity for arousing secondary associations*.

The simple musical quality of the tones in which rhythm finds its expression is an immediate source of intense sensuous pleasure. Every rhythmical series of sounds, therefore, becomes a means of greatly increased delight when its component elements are characterized by purity and richness. But the term 'musical quality,' as here employed, involves much more than this. No tone in such a sequence stands alone.

Not only is it rhythmically integrated with preceding and following tones in smaller and larger groups, but it is also qualitatively related to those adjacent members of the series, and depends for its immediate sensuous effect upon the relation in which its quality stands to theirs. It is an element in a melodic as well as in a rhythmical sequence. This functional connection with other tones in a melody reinforces the pleasure-giving capacity of every tone in the series, and greatly increases the æsthetic worth of the whole experience. This melodic element penetrates not only all musical sequences, but the vast majority of utterances of the speaking voice as well; so that in every rhythmical sequence, with the exception of percussive instruments, its presence is to be reckoned with. Thirdly, the musical quality is enriched in still another way by the combinations of tones in harmonies when melodies are complicated by the union of voices or instruments.

The value of the secondary associations of rhythm is still less determinable than that of æsthetic tonal quality, the part they shall play still less predictable. Their forms are two, emotional and intellectual. The emotional associations of rhythm are voluminous and intensely moving. The emotions here in question are not hedonic qualities of the direct sensuous effects of rhythm and musical tones, which may be in the highest degree emotional. They are evoked through memories and ideas awakened by the melody or rhyme which the subject hears. This form is chiefly characteristic of music. In poetry the pleasure of the rhythm is constantly subordinated to the stream of images aroused by the articulate sounds which support the rhythm. The formal perfection of the rhythm is here so constantly broken by the demand for the fulfilment of laws of logical arrangement and expression that the pleasure arising from it is much less important than that which characterizes musical appreciation. It is only when the sense of the verse is momentarily forgotten, and one gives himself up to the music of its flow, that the factor of rhythm becomes pronounced in the æsthetic apprehension of poetical expression. The æsthetic effect of pure rhythm has nothing in common with either the significance of ideational series or the beauty of musical tones.

Its own proper qualities are intense and complex, but these can never be discriminated in the ordinary experience of music and verse. It is only when the intervals of a rhythmical series are defined by limiting stimuli of the barest sensorial quality, and varying only in regard to the intensity of the motor discharges which they originate, that it becomes possible to determine the relation of rhythmical forms to elements of æsthetic value. The attempt to do this in connection with several simple types of variation was made in the investigation reported in the present paper.