

THE PSYCHOLOGY OF MUSICAL TALENT

BY

CARL EMIL SEASHORE

PROFESSOR OF PSYCHOLOGY AND
DEAN OF THE GRADUATE
COLLEGE IN THE STATE
UNIVERSITY OF IOWA



SILVER, BURDETT AND COMPANY

BOSTON

NEW YORK

CHICAGO

SAN FRANCISCO

EDITOR'S PREFACE

THE published material on methods of teaching music is of all the major subjects of instruction the scantiest. But that man is ignorant indeed who rests satisfied with the written descriptions of musical methods. Only a small fraction of this baffling field gets into print, because, of all the subjects of instruction, none has more individual "systems" of instruction and in none is there so much of the atmosphere of trade secrecy. Master teachers develop methods which are more or less original and the students of the masters come to form groups between whom there is the keenest rivalry. But, unfortunately, the methods of deciding between rival claims are too frequently argument and hostile criticism of each other.

The cause of this does not, of course, lie entirely within the personal idiosyncrasies of teachers of music, vocal and instrumental; rather is it due in great part to the imponderability of the æsthetic element in music. Interpretation and expression are not easily measured in any exact way: taste and individual differences are constituent factors in any verdict about the relative superiority of rival methods, and these have not yet been, and in all probability can never completely be, subjected to definite measurement. As a result of these conditions musical methods are in a chaotic condition without a means of separating excellence from mediocrity.

But into this unsatisfactory situation in methods of

EDITOR'S PREFACE

artistry, teachers of public school music have injected into their allied field four movements which have materially benefited the subject of methods in the public schools. Three of these are the application of the aims of English composition to musical composition as a school project, the application of the methods of primary reading to the teaching of elementary music, and the introduction of the idea of the relative importance of musical appreciation in comparison with musical performance for the great majority of school children.

The fourth movement is that described and demonstrated in this volume. The author has assigned to himself during the last several years the scientific study of the psychology of musical abilities. He has seen, as we all have felt, that music may use science for its own benefit in the understanding and mastery of technique. By definite tests scientifically determined, it is possible to determine which children possess musical ability of a high order and may therefore be given the opportunity to become artists, and which possess it in less degree and should be given an opportunity to develop themselves along other musical lines. This is a difficult task, to be sure, because of the complexity of the factors which constitute ability in music, but, as this volume demonstrates, a task by no means impossible of accomplishment.

Fortunately for teachers of music, the author has constantly had a keen realization of the practical outcomes of investigations during all the years of his researches in the laboratory, and the editor is delighted to be able to include this volume in the Beverley Series.

AUTHOR'S PREFACE

THIS monograph is addressed to students of applied psychology. By content, it appeals directly to those who are interested in music; by method and treatment, it may serve as a somewhat intensive presentation of a specific subject for the student of educational psychology, child-study, vocational and industrial selection, or vocational and avocational guidance.

The scientific study of the artistic mind is a somewhat baffling undertaking. There are no substantial precedents; the available scientific data are extremely meager; by nature the artist himself is but little interested in the process of his mental dissection; and, after all, the varieties of artistic minds are legion. But the time is ripe for a vigorous application of the technique of psychological inventory to practical affairs, and the discovery and fostering of human talents is indeed both practical and practicable. The stress of war forced our army to adopt psychological methods for the selection and rating of the human energies of men for assignment to service and for promotion. When the best results are demanded in any occupation, haphazard procedure must give way to procedure on the basis of ascertained facts. When Music shall come to her own she will come to the musically gifted: to that end musical talent must be revealed and encouraged.

The system of evaluation of musical talents to be reviewed in this book will find a large field of usefulness in the ele-

AUTHOR'S PREFACE

mentary schools. A set of exercises is being worked out for the introduction of some of the most important tests in this series as a part of the regular instruction in certain grades of the elementary schools. This will secure a sort of "dragnet" survey of musical talents, as all the children in the community will be reached when they pass through these grades. It will stimulate an interest in the search for talent and efforts in the conservation of talent on the part of all concerned, particularly the teachers. Among the pupils it will cause a wholesome awakening to a recognition of their particular talents. For teachers of music it will stimulate the recognition of responsibility for the talented children of the community. It will be a part of the coming system of vocational and avocational advice, and should be a potent instrument in the development of community interest in music. The tests themselves constitute very profitable musical exercises.

If the great musicians can live before us in the wonderful reproduction of the modern phonograph, tone-producing instruments employed in the measurement of musical talent might equally well be made to perform for popular presentation through this medium. To test this assumption we made accurate measurements of the reliability of the reproduction in phonograph records and found that, for most purposes, such a record is as good as the original instruments and that in some respects the record has an advantage over the original instrument in that it makes it possible to standardize the test material with accuracy.

The first series entitled "Measures of Musical Talent" is started with five double disk records, each illustrating a basic test as follows: the sense of pitch (Chapter II), the sense of intensity (Chapter III), the sense of time (Chapter

AUTHOR'S PREFACE

IV), the sense of consonance (Chapter VII), and musical memory (Chapter XII). This series will be extended from time to time as progress is made. These records have been made by the Columbia Graphophone Company through whose agencies they may be obtained. They are inexpensive and permanent and may be played on any good phonograph.

With these records a booklet of instruction is furnished free, giving directions, norms, and interpretations, as they may be employed for class experiments in psychology; for musical surveys in the elementary schools; for the analysis of talent in the music studio, and for scientific entertainment in home circles.¹

A second series embraces the motor tests. For this there are available instruments and methods for the measurement of timed action, rhythmic action, motility, singing in pitch, and other tests as outlined in Chapters IX and X. The use of these is more limited because the test can be made only upon one individual at a time; but their application is of broader significance inasmuch as they measure basic capacities for many occupations besides music.²

While there may seem to be much in the form of specific guidance in this volume, the effort has been made throughout simply to expose the facts in specific instances and indicate their possible bearings, leaving it at every stage to the reader to take larger situations into account and to feel the

¹ A monograph on "A Survey of Musical Talent in Public Schools" will appear at an early date as a research bulletin from the Iowa Child-Welfare Research Station (Iowa City, Iowa). Another monograph on the analysis of musical talents in the music studio and the music school will appear as Volume VIII of the University of Iowa Studies in Psychology (The Psychological Review Publishing Co., Princeton, N. J.).

² The principal instruments in these two chapters may be obtained from the C. H. Stoelting Co., Chicago, Ill.

AUTHOR'S PREFACE

responsibility for working out in his own experience the applications that the facts might warrant. This is particularly true of the public school survey in which the main object is to get the facts and then leave them as a standing challenge to parents and pupils.

This volume is primarily a collective and elementary presentation of the results of investigation by the author and his pupils and associates and must, therefore, go forth essentially as a communication from our laboratory, which is devoted largely to the study of the psychology of music. Limits of space preclude a more general and historical treatment.

The author is indebted to the *Musical Quarterly*, *Science*, *The Music Supervisors' Journal*, *The Proceedings* of the National Music Teachers' Association, *The 18th Year Book* of the National Society for the Study of Education, *The Musician*, and *The Étude*, for the privilege of using parts of material originally published in those journals. For generous equipment, research personnel, and a hearty encouragement of specialization within the field, the author acknowledges his profound obligations to the State University of Iowa. The author also acknowledges the favor of The Macmillan Company for use of the illustrations from "The Science of Musical Sounds" by Dayton Clarence Miller and from "Experimental Psychology" by Edward B. Titchener. Owing to the newness of the venture, advice has been sought and received from a host of friends. To all of these and to the laboratory students in the psychology of music who have shared the joy of comradeship in research, — a lasting gratitude.

C. E. SEASHORE.

IOWA CITY, IOWA.
September, 1919.

TABLE OF CONTENTS

CHAPTER I

THE PSYCHOLOGY OF THE MUSICAL MIND

	PAGE
I. The Point of View	1
II. An Inventory	6
III. Records of Talents	15
IV. The Value of a Talent Inventory	27

CHAPTER II

THE SENSE OF PITCH

I. Introduction	30
II. The Physical Basis of Pitch	31
III. The Physiological Basis of Pitch	34
IV. The Lowest Audible Tone	35
V. The Highest Audible Tone	39
VI. The Measurement of Pitch Discrimination	42
VII. Individual Differences	50
VIII. The Physiological <i>versus</i> the Cognitive Limit	51
IX. Relation to Age	52
X. Relation to Sex	56
XI. Relation to Intelligence	56
XII. The Effect of Training	59
XIII. Capacity Elemental	65
XIV. Basic Nature of the Test	65
XV. Norms for Vocational Guidance	66
XVI. Heredity	68
XVII. Tonal Range	71
XVIII. Pitch Difference in the Two Ears	74
XIX. Illusions of Pitch	75
XX. The Sense of Pitch in Animals	77

TABLE OF CONTENTS

CHAPTER III

THE SENSE OF INTENSITY

	PAGE
I. The Physiological Basis	79
II. Tonal Gaps and Tonal Islands	83
III. Acuity of Hearing	86
IV. Acuity of Hearing throughout the Tonal Range	90
V. Periodicity in Sound	94
VI. The Measurement of Intensity Discrimination	95
VII. Relation to Age	97
VIII. Relation to Intelligence	98
IX. Effect of Training	99
X. Musical Significance	102

CHAPTER IV

THE SENSE OF TIME

I. Introduction	103
II. Nature of the Sense of Time	104
III. Measurement of the Sense of Time	108
IV. Relation to Age	110
V. Relation to Training	112
VI. Relation to Intelligence	113
VII. Relation of Sense of Time to Sense of Pitch	113
VIII. Musical Significance	113

CHAPTER V

THE SENSE OF RHYTHM

I. The Nature of Rhythm	115
II. What Rhythm Does	117
III. Measurement of the Sense of Rhythm	124

CHAPTER VI

THE SENSE OF TIMBRE

I. Definition of Terms	127
II. Purity	128
III. Overtones	129
IV. Measurement of the Sense of Timbre	136

TABLE OF CONTENTS

CHAPTER VII

THE SENSE OF CONSONANCE

	PAGE
I. Combination Tones	139
II. Spatial Fusions	143
III. Nature of Consonance	144
IV. Measurement of the Sense of Consonance	154
V. Relation to Age, Intelligence, and Training	157

CHAPTER VIII

AUDITORY SPACE

I. The Problem	160
II. The Sense of Direction	160
III. The Sense of Extensivity	163
IV. The Sense of Volume	165

CHAPTER IX

VOLUNTARY MOTOR CONTROL

I. Introduction	168
II. A Chronograph and a Chronoscope	170
III. Motility	173
IV. Timed Action	175
V. Simple Reaction Time	177
VI. Action on Choice	179
VII. Serial Action	180
VIII. Precision in Movement	182
IX. Discrimination	184
X. Strength and Endurance	184

CHAPTER X

MUSICAL ACTION

I. Introduction	186
II. Pitch	187
III. Seeing Yourself Sing	189
IV. Intensity	200
V. Time	202

TABLE OF CONTENTS

	PAGE
VI. Rhythm	203
VII. Timbre	205
VIII. Consonance	207
IX. Volume	207
X. What Constitutes Voice?	208
XI. General Considerations	209

CHAPTER XI

MUSICAL IMAGERY AND IMAGINATION

I. Introduction	211
II. Imaginal Types	213
III. General Tests of Mental Imagery	215
IV. A Simple Test of Auditory Imagery in Children	219
V. The Development of Auditory Imagery	221
VI. The Rôle of Auditory Imagery in Music	223
VII. Actual Prevalence of Musical Imagery in Musicians	225
VIII. Motor Imagery	228
IX. Musical Imagination	230
X. Significance of Imagination as a Musical Talent	234

CHAPTER XII

MUSICAL MEMORY

I. The Plastic Limit	236
II. Auditory Memory Span for Pitch	238
III. Retention	243
IV. The Learning Curve	243
V. Absolute Pitch	248
VI. The Significance of Memory in Music	251

CHAPTER XIII

MUSICAL INTELLECT

I. Introduction	253
II. Musical Free Association	254
III. General Intelligence	256
IV. The Power of Reflection	258
V. Musical Significance	262

TABLE OF CONTENTS

CHAPTER XIV

MUSICAL FEELING

	PAGE
I. The Approaches to Feeling	264
II. Musical Taste	268
III. Emotional Expression in Music	269
IV. The Conveying of Musical Feeling	270

CHAPTER XV

THE INDIVIDUAL AND TRAINING IN THE ART

I. A Self-Examination	272
II. Use of the Measure of Musical Talent in the Schools	280
III. Organization of the Musical Schedule in the Grades on the Basis of Ability to Progress and Profit	286

THE PSYCHOLOGY OF MUSICAL TALENT

CHAPTER I

THE PSYCHOLOGY OF THE MUSICAL MIND

I. THE POINT OF VIEW

Three branches of the psychology of music. Three aspects of the psychology of music are fairly distinct: the psychology of musical talent, the psychology of art principles involved in music, and the psychology of musical training. The present volume is restricted to the presentation of the first of these three aspects — the psychology of musical talent, an account of the musical mind.

Aim, to describe and explain. This subject is treated both from the theoretical and the practical point of view, the aim being to describe and explain the musical mind in such a way as to serve in the recognition, the analysis, the rating, and the guidance of musical talent.

What constitutes description and explanation in psychology. Description and explanation of this sort involve in general for each mental process analysis of the process into its structural elements, classification, identification of purpose, tracing genetic history and physiological conditions, and statement of laws of behavior. Thus, a psychological account of musical rhythm begins with an analysis of this experience into its component psychological elements.

THE PSYCHOLOGY OF MUSICAL TALENT

These are then classified and the significance of each is discovered by tracing the purpose it serves in mental economy, its evolution in the race, its development in the individual, and its physical and physiological bases. Beyond such descriptive account the more exact knowledge may then be stated in terms of laws of behavior.

Value of the psychology of music. From an adequate study of types of mind of this sort, we should gain a systematic knowledge of the mental life involved, and the ability to interpret this life for the enlargement of our horizon in culture and for the acquisition of power in efficiency. It should lead to an appreciation of mental life for itself, and should lay a foundation for the understanding of ourselves and our pupils as musicians, our art, our methods of procedure in musical training, and the conservation and direction of artistic talent.

The experimental method. Our approach is that of experimental study. Where there is no experiment there can be no science. Psychology is scientific just to the extent that it is based upon principles of experiment and is faithful to them. In the study of a given mental process, the experimental method demands that the process shall be specifically identified and reasonably isolated for description; that it shall be under control so that it can be kept constant, can be repeated, and can be varied in one aspect at a time; and that the results of the observation shall be recordable and verifiable. In so new a science as psychology, and particularly in the almost unexplored field of the psychology of music, such principles can be complied with only in part; but adherence to them fosters a critical attitude and chastens the treatment of those phases which have not yet been brought under experimental control. We shall,

THE PSYCHOLOGY OF THE MUSICAL MIND

therefore, not vaunt the slogan of science, but shall modestly try to maintain, in spirit, the scientific point of view.

The relation of applied to theoretical psychology. To be sound, applied psychology must involve and rest upon theoretical psychology; but the theoretical remains incidental, serving merely as a groundwork to the applied. In music the way of applied psychology is still desperately obstructed by the underbrush of primitive views of mind and the barbed-wire entanglements of the warfare of uncritical theories and self-interests. We can at best pave or point the wise way only in part; the most effective guidance comes from knowledge of the situation rather than from directions or rules of procedure. Therefore, the mere description of aspects of the musical mind will often be placed in the foreground, without effort to point the moral, particularly when the morals are countless.

Scientific vocational guidance. At the present stage a scientific vocational guidance in music must be admitted to be a vision rather than an avowed aim. Yet in no other field does vocational guidance give so great promise of becoming scientific as in music. Among the reasons are these: music requires specific talents; these talents can be identified and rated by psychological methods; to a certain extent they are essential to happiness and success in the art; musical education is expensive; misguided talent may entail a chain of grievous misfortunes; and, other things being equal, musical advantages should be conferred in proportion to the degree of talent.

Avocational guidance in music. But the pursuit of music as a vocation is limited to a very small number of those who legitimately pursue music as an art. Avocational guidance in music, therefore, becomes more important

THE PSYCHOLOGY OF MUSICAL TALENT

than vocational guidance; for avocational guidance is the systematic direction of children and youth in the selection and organization of their avocational pursuits — those pursuits which we follow, not as occupations but as diversions and merely cultural quests. The goal of vocational guidance is efficiency in the profession — a sort of business. The goal of avocational guidance is self-realization in the enjoyment and expression of the beautiful. There is no contradiction between these two, and they have many things in common, but the pursuit of art for itself is the larger aim.

The conservation of artistic energies. From this point of view the applied psychology of music leads to a conservation movement. Indeed, it is not out of place to speak of the saving of life by the discovery and encouragement of unknown genuine talent in such a way as to lead to achievement in the art. Surveys of public schools show clearly that very little correlation exists between the possession of musical talent and the selection of children for musical education; and records of the extent of children's musical education show no close relationship to the possession of talent. Thus, in recognizing the possibilities and worth of genuine talent and the futility of trying to make a precious metal out of a base one, musical guidance may be looked upon as alleviating human suffering, both of the prospective musician and of those associated with him. It should certainly enhance artistic life, both in the individual and in the community.

A pattern for scientific guidance in other fields. In so far as psychology of musical talent is a scientific basis for vocational guidance in a specific field, it may serve as an exemplification of principles which may be extended into

THE PSYCHOLOGY OF THE MUSICAL MIND

other fields. The psychology of talent in the graphic and plastic arts and the psychology of talent in dramatic art suggest themselves. But even in the study of fitness for occupations in the trades and industries we shall find many analogies.

Based upon measurement. The applied psychology of music in the interest of guidance rests upon mental measurements. We now find it quite feasible to measure certain musical talents quantitatively. Since this feature is comparatively new, it will be necessary to give considerable space to the description of methods and means of measurement, not only in order to show how it may be done, but primarily because that is the best way of isolating and describing a mental process. Not all talents lend themselves to measurement. Specific and simple talents, such as the sense of pitch or the sense of time, can be measured with precision. In general, the more complex and diffuse a talent is the less it lends itself to direct measurement. Musical reflection and musical emotion are examples of talents which are too diffuse to be measured as such, although we can weigh many of the factors which are determining components.

The experimental attitude. Measurement is a form of experiment. Therefore, as in experiment in general, the conception of measurement is helpful in the evaluation of many factors which we shall not undertake to measure. It furnishes a point of view which results in a penetrating insight, a power of analysis, a critical reserve, and accuracy. Where we cannot measure directly, we can often evaluate indirectly; for example, when an observer has several hundred records of his rating of voice registers he can gradually rank these in the order of excellence and in that way establish a fair scale for the rating of particular voices.