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Studies in the Psychology of Music

Volume 1

The Vibrato

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PREFACE

To the Series of University of Iowa Studies in the Psychology of Music

The series, the "University of Iowa Studies in Psychology," is now in its 15th volume and will be continued for the publication of experimental studies. The output from the department is, however, now so large and diversified that it is found necessary to divide publication in the interest of specialization. Studies in the psychology of the child are now provided for in the series, "University of Iowa Studies in Child Welfare." A separate series for psychology of speech and speech pathology is planned. The present series is intended to cover the field of psychology of music.

The plan is to issue volumes of approximately the size of the present volume as frequently as the material becomes available, probably not more than one a year nor less than one in two years. Where single articles are of a highly specialized nature, they may be issued in advance as numbers to be included in the final volume.

The pages of this series will be open for publication of experimental researches from other laboratories and field work to a limited extent and each volume will contain a section for the review of other experimental material published during the year. While the main body of the material will consist of technical studies, each volume will have an interpretative section of a more popular nature, summarizing and evaluating the contents as in the present volume.

Subscriptions may be made either for volumes in paper cover or cloth bound. As these studies are not published for financial profit, the price set will be such as to cover actual cost of publication, approximately $1.00 per hundred pages for the bound volume and fifty cents less for the paper covered. Articles serving a special constituency may be offered in reprints.

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INTRODUCTION

by

CARL E. SEASHORE

This volume is a digest up to date of the experimental studies made in the University of Iowa on the subject of the vibrato in music. A considerable amount of material appears in print here for the first time but earlier publications are reviewed and the findings are incorporated in a unified and comprehensive statement.

The subject is somewhat unique in the literature of psychology of music in that, although it is one of the central problems in music both in theory and in practice and is one of the most fascinating and profitable psychological approaches to the study of expression of emotion, the field had remained practically untouched by experiment until the problem was taken up in our laboratory. It is also a somewhat unique situation that for a decade or more we have been able to coördinate a continuous series of experiments within this field so as to cover it systematically, establishing adequate techniques for measurements, outlining a fundamental series of hypotheses, and progressively organizing data in a cumulative way.

One reason why this type of work has been held back until the present time is the fact that it really had to wait in large part for the opportunity of taking advantage of the marvelous recent developments in phonophotography and sound transmission associated with the development of electrical recording and transmission of sound. Developments in this field have come so fast that one of our special joys in the laboratory has been that of scrapping instruments; because we do not scrap fairly adequate instruments until we have better ones in sight. Within the last ten years, developments in phonophotography have gone by leaps and bounds to such an extent that at the present time we can record for scientific analysis not only the present musical performances, but what has been recorded on phonograph records and what is now recorded in sound movies on films, thus making it possible to compare musicians in all ranks and primitive music from all lands.

In the development of scientific instruments for work in this general field, we have had a three-fold goal; namely, adequate precision, time-saving, and simultaneous records for tone analysis and tone recording. Precision and time-saving have been achieved in numerous ways and we are now equipped to record simultaneously the four characteristics of sound with synchronized cameras and, at the same time, make a durable phonograph record, all from the original rendition of music or speech in a single transmitter.

The vibrato is a part of the larger program pursued in this laboratory on the plan of recording adequately the musical performance. It has lent itself particularly well to the natural history method of collecting material, in this case actual performances, from every available source and classifying them in the manner the botanist classifies his plants.

The work has two aspects, the psychological and the musical. The psychological aspect presents in itself a somewhat radically new approach to the measurement of the expression of feeling in the creation or reproduction of a thing beautiful. This method of recording all forms of utterance through sound has a wide range of applicability in the study of behavior. Other psychologists must evaluate this approach; but it seems to the present writer that it is far more promising than any of the other techniques now in use in the measurement of the expression of emotion in that it provides for the adequate recording of expression in every detail under normal conditions of action. Therefore, while this volume is directed primarily to the musical constituency, it lays claim to recognition from the point of view of pure psychology.

For psychological technique, the studies on the vibrato have clarified our analysis of tonal hearing; have developed serviceable techniques for the measurement of the four factors, pitch, intensity, time, and timbre, in life situations applicable to all forms of behavior involving the production and hearing of sound; have thrown much light on the nature and extent of normal illusions in hearing; and have shown how the feeling of expressing a great variety of emotions such as fear, love, and anger, is largely subjective and does not correspond to objective facts, as when the same form of vibrato expresses both quiet and excited emotion. Indeed, the vibrato as a discrete phenomenon of expression has proved a most resourceful medium or instrument for control in the analysis of tonal performance and experience. Therefore, while there is in

this volume a strict adherence to an aspect of applied psychology, much light is thrown on fundamental aspects of pure psychology.

Likewise in music, although this volume is restricted largely to the intensive treatment of one of the so-called ornaments in music, the vibrato, the acquisition and interpretation of this material makes large contribution to many other elements in musical expression, such as the fundamental issues in regard to intonation, rhythm, and tone quality, as well as the ornaments in each of these.

As to the vibrato itself, the volume deals in firm and bold strokes with musical history, theory, practice, pedagogy, and criticism in that it clears up the historical controversies as to what the vibrato is and should be by laying down objective and verifiable definitions, analyses and principles. It lays a scientific foundation for esthetic theory in regard to this element of beauty in music, makes available exact measures in current practice, develops esthetic norms, and furnishes the means of remedial and artistic training in the art of control of the vibrato. It takes the problem from the realm of the hazy, misleading lingo of cults which have prevailed in this musical field, and simplifies, clarifies, and places the phenomenon under control.

Musical esthetics falls naturally into four divisions; the musical medium, the musical form, the musical message, and the musical response. The medium is the physical sound which has musical values, the form is the structure built with the medium in the musical art of the composer and the interpreter, the message is that which the composer or the performer, in turn, feels and intends to convey, and the response is the effect that the musical medium produces in the listener. The present volume approaches the problem of musical esthetics primarily from the point of view of the musical medium, first, because that is what music, as music, in reality is; and, second, because musical form, message, and response can be treated scientifically in the best interests of the art from the point of view of this approach.

A study of this objective nature reveals the gaps in our knowledge and, in this case, the historical fallacies in musical criticism, practice, and education; but the musician cannot be blamed for not having laid these foundations before. It is a technical task which falls within the realm of psychology and could be accomplished only by psychological technique. Psychology applied to music has an opportunity to lay foundations for musical theory

and practice, and it is the duty and privilege of the psychologist to do so. The responsibility cannot be thrown upon the musician.

It is interesting to note that the real ground for the confusion which exists in the musical world and even among scientific and critical listeners lies in the fact that in the hearing of the vibrato, the normal ear is subject to a series of gross normal illusions. Among these is the astonishing under-estimation of the magnitude of the vibrato in hearing which lies in the fact that the oscillation of pitch is heard as if it were only ¼ to ½ of its actual extent, and a similar underestimate occurs for intensity. Another normal illusion consists in the persistent confusion of oscillations in pitch and intensity in listening so that a musician, or even a generation of musicians, will assert that it is oscillation in pitch, that it is oscillation in intensity, or, more frequently, that it is neither. A third normal illusion which makes the vibrato in its present gross form tolerable is the phenomenon of sonance, which lies in the fact that successive periodicities, when of sufficient rate, tend to fuse into a unified tone somewhat in the same manner that the simultaneous overtones in a violin clang fuse and are heard together as one tone. A fourth normal illusion which is a condition for making the vibrato tolerable is the fact that even with a pitch oscillation of a semi-tone the intonation is heard as of a particular tone which can easily be identified with standard pitch, the musical effect heard being that of a changing tone quality rather than specific changes in pitch, intensity, and timbre. Were it not for these four and numerous similar normal illusions which function in all musical hearing, the vibrato as it now exists would be utterly intolerable. It is this fact, that the vibrato is not heard even by the best musician as it really is, which lies at the bottom of the confusion which has prevailed on this subject.

It will be of interest to note what the effect of the established facts about the nature, rôle, and control of the vibrato herein described shall have upon musical theory and practice. To know exactly wherein a vibrato consists, how it develops, what its variants are, in what ways it is used in the present artistic performance, what may constitute improvements in present practice, how these improvements may be brought about, should be of profound interest to the musician. We are not over-sanguine about the outcome because the present line of reasoning, fact-finding, and insistence upon practical application is not in harmony with the

prevailing line of thought and action in music. Professor Ortmann says that the comments he received on his book of experimental studies in piano playing were characterized by such deliverances as, "The soul of the piano transcends all investigation," and "The records may all be true, but I do not believe them," from those who manifested interest in the subject.

In our work we have met with the most cordial coöperation and sympathetic interest on the part of leading musicians, yet we are quite prepared for responses of the type reported by Professor Ortmann. The experimenter, however, does not lose heart from such reactions, does not count on a universal and immediate acceptance, but takes comfort in the feeling that, in so far as his findings are scientifically sound, their promulgation, extension, and adoption will come in time. His life job is to discover and organize facts, not to sell things.

The work has not been completed. A series of projects are now in progress and it is hoped may continue for some years, particularly on the physiological side, determining the biological significance of the neuro-muscular principles which operate in the phenomenon of vibrato. Since we know now that it is one of the fundamental biological periodicities this should furnish a fruitful approach to a general study of the basic periodicities in animal life. Among the other immediate projects are: the establishment of an organic series of esthetic principles which determine what constitutes a beautiful vibrato, the functional relation of the vibrato to other media of musical flexibility, further studies on the illusions in the hearing of the vibrato, a more intensive study of the rôle of timbre in the vibrato, and a general reconstruction of our theory of auditory perception.

Some of the articles in this volume are fragmentary. They should not be judged by their length or the completeness of the solution of the problem, but rather by the fact that each opens up an approach to a difficult situation by the invention of instruments and the development of appropriate methods.

In preparing this volume, each contributor has been encouraged to present his findings from his own point of view in the light of the information available at the time that he writes and with such differences from the point of view of the group as he feels that he can defend. For this reason, the different articles vary in style, nomenclature, interpretation, and the aim and scope of the pre-

sentation. This giving of individuality and placing of full responsibility upon each contributor is the editor's apology for apparent editorial neglect and for presenting a series of separate articles instead of a coherent treatise.

We realize fully that the present volume makes rather heavy reading for those who are not interested in technical details. To remedy this situation, a small popular volume intended to serve as a textbook for students in music and general readers is in preparation. To supplement this student's edition, there will be phonograph records which will contain scales, by which the pupil may determine for himself the most pleasing form of vibrato in typical situations, and scales for the measurement of attainment in the control of the vibrato. This material will be prepared on the theory that in the early stages of training the student should have clear and concise knowledge of the nature of the vibrato, ready means for studying its variance, and standards in terms of which he can measure progress. This involves the psychological theory that, in the acquisition of a skill, the student should be profoundly conscious of each element involved in turn, so that in the later exercise of the skill the habituation will take care of these details automatically, unhampered by an analytical point of view and free for the artistic mood.

This psychological principle of separating the attitude at the study stage from the inspirational artistic mood in performance or in listening should give comfort to the musical reader of this volume. It is the firm conviction of all the contributors that the scientific analysis is necessary to progress in the refinement of musical skills; but there is equally strong conviction on the part of all of us to the effect that the singer may still sing without consciousness of the elements of the musical medium, and the listener may, and should, listen to the music in the artistic, rather than in the scientific mood.

Thus, the vibrato may rightly continue to be regarded as a quality of tone analogous to timbre and the general listener in music need not concern himself about its components any more than he is concerned about the relative presence and dominance of overtones. Both function musically as fusions giving character to the tone.

After all, perhaps the greatest significance of this volume lies in the demonstration that "it can be done:" music as an expression of the human mind can be analyzed objectively in the laboratory.

Each element can be studied and measured in its true functional musical situation. All factors in music as a message from the performer to the listener are now within reach of both qualitative and quantitative scientific approach so that we may take up any problem involved in this message for examination and "put questions to nature." There are hundreds of problems in music analogous to the problem involved in this message for examination now open to study by the means and methods here introduced; we adopt the natural history method of collecting all the available data on the particular problem and proceed to classify and explain.

The ultimate value of the whole procedure, of course, lies in the fact that this organization of knowledge in the field of music is and will become more and more essential to the pursuit and appreciation of the art.

A word of introduction for each of the present authors may be in place. Dr. Milton Metfessel, now Professor and Head of the Department of Psychology at the University of Southern California, took his degree in the University of Iowa and continued his post-doctorate researches in the laboratory for three years as National Research Council fellow, during which period he made several contributions to the psychology of music and speech. Dr. Joseph Tiffin, at present Assistant Professor of Psychology and Speech in the University of Iowa, took his degree here and continued in post-doctorate work for one year as a National Research Council fellow. Dr. Arnold Wagner took his Master's degree at Columbia University and wrote his Doctor's dissertation at the University of Iowa on training in the vibrato. He is Professor of Music at the University of Southern California and is continuing his studies in the vibrato both in research and in a professional way. Forrest Linder, Ray Miller, Donald Rothschild, Harold Seashore, Melvin Hattwick, and Scott Reger are now advanced graduate students in the department. The contributions of Eleanor Easley and M. T. Hollinshead were contained in their master's theses.

In conclusion, I desire to express my profound appreciation of the spirit of coöperation and continuity which has been demonstrated by the participants in this project. The work has been greatly favored by the opportunities afforded through the National Research Council fellowships and a series of fellowships maintained through the generosity of Mr. George Eastman.

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