

# VOICE · SPEECH · LANGUAGE

Clinical Communicology: Its Physiology and Pathology

Richard Luchsinger MD and Godfrey E. Arnold MD



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# VOICE - SPEECH - LANGUAGE

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To our teachers  
who have done so much for us  
that it will be hard for our generation  
to do as much  
for those who will follow

VOICE—SPEECH—LANGUAGE

*Clinical Communicology: Its Physiology and Pathology*  
by Richard Luchsinger and Godfrey E. Arnold

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# *Clinical Communicology : Its Physiology and Pathology*

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*translated from the German by*

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## Foreword

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In their laboratories in Zurich and Vienna, respectively, at Christmas time in 1948, Doctors Luchsinger and Arnold signed the preface to the *Lehrbuch der Stimm- und Sprachheilkunde* (Textbook of Voice and Speech Habilitation). In the following year, 1949, this book was published by Springer-Verlag of Vienna. For subject area covered, it was the most detailed of any book issued in any language up to the middle of the twentieth century. The *Lehrbuch* was the fruition of two generations of European scholarship on the part of German-trained and -inspired scholars and clinicians. The influence of this movement had spread to the English-speaking world, particularly to the United States. Many Americans had gone to Europe to study in the field we now call *speech and hearing*. In addition to this movement, there was also a parallel and independent development of considerable strength in the United States.

In 1959, Luchsinger and Arnold brought out a second edition of the *Lehrbuch*. This one was fifty per cent larger and more complete than the first. One of the reviewers of this book suggested that the work be translated into English, a goal that the authors had already contemplated.

The present volume is an extension and further development of the second edition of the *Lehrbuch*, consisting in part of translation into English of the text of the *Lehrbuch* and in part of many additions and rearrangements. For the

redoing of the book the authors sought the services of one who could render the textual material into the idiom of the English writer of speech pathology and audiology, and one who could also style the book for the needs of the new audience. They were fortunate indeed in securing the linguistic and scientific talents of the brilliant American scholar Dr. Evelyn Robe Finkbeiner, who together with Dr. Arnold completed the work of translation. Since the present work is by no means a chapter-by-chapter translation of the *Lehrbuch*, it bears a new title, which reflects the present scope of the work.

In the *Vorwort* to the first edition of the *Lehrbuch*, the authors quoted Claude Bernard, the famous French physiologist of the nineteenth century, as declaring that he who follows the scientific method is free in mind and motive, not bound by theological precedents and ideological tenets. The present work demonstrates this freedom of scholarship. It shows that the world of science, at least so far as speech and hearing are concerned, is becoming more unified. Nationalistic boundaries are fast disappearing, and proprietary schools of thought are losing their disciples. Eclecticism is gaining, and tolerance of divergence in point of view is increasing.

This book exemplifies the Bernardian philosophy. Its authorship is Swiss, Austrian, German, and American; the stylist and translator, now resident in Germany, is a native American,

whose Ph.D. degree was granted by an American university; the author of this foreword is a citizen of the United States; and the book is issued by American and British publishers.

As I see it, this book has various uses. (1) As a manual for researchers, both pre- and postdoctoral: here are described the tests to be used and the principles to be followed. (2) As a textbook in a series of advanced courses: although this book may be broader in scope than any single course, the student of speech and

*Los Angeles, California*

This most authoritative and comprehensive volume on the disorders of voice and speech becomes available in English with the translated edition of this monumental work. The second German edition has been radically revised, updated, and augmented by a vast amount of information that has emerged since its publication. The dire need for such a compilation has been recognized in recent years by otolaryngologists and by the rapidly increasing number of associated specialists engaged in the management of problems of voice, speech, and hearing. This practical and encyclopedic volume fully meets the requirements of those interested in these areas.

The physiology, pathology, and therapy of voice, speech, and language, based on the broad aspects of human communication, are discussed from the diverse viewpoints of psychology, neuropsychiatry, otolaryngology, pediatrics, oral surgery, dentistry, internal medicine, and endocrinology, as well as the basic sciences, including genetics, constitutional fac-

*Philadelphia, Pennsylvania*

hearing, as well as in related fields, should have this volume on his shelf for use throughout his career. (3) As a reference work: no university library should be without this work.

This book should serve as a principal source of information for professionals in the fields of speech pathology and audiology, voice training, special education, reading disability, pediatrics, otorhinolaryngology, prosthodontia, orthodontia, plastic surgery, neurology, psychiatry, clinical psychology, and physical medicine and rehabilitation.

*Robert W. West, Ph.D.*

tors, acoustics, musicology, anthropology, and singing.

The amazing breadth of detail forms a definitive background in the specialty of communication disorders and leads to a better understanding and appreciation of the services of the nonmedical speech and hearing specialists upon whom the general practitioner or medical specialist may call for cooperation in the management of such disorders. Among other notable features of the book are the emphasis upon and the meticulous directions for accurate diagnosis, as well as the thorough discussions of every acceptable mode of treatment.

The wide scope of this volume is not to be found in any other publication dealing with these subjects. Moreover, as in the previous German edition, there is a coalition of American and European thought, research and practice, and a union of authors and scholarship not achieved by any other work devoted to these related problems.

*Harry P. Schenck, M.D.*



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# Prefaces

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## TO THE FIRST ENGLISH EDITION

Soon after the second author (Arnold) had decided to make his permanent home in the United States, colleagues and friends began to urge him to translate *Lehrbuch der Stimm- und Sprachheilkunde* for the benefit of interested American readers. It was not easy to realize this hopeful plan, because a transatlantic move of professional activity creates problems and obstacles. Dr. Evelyn Y. Robe Finkbeiner deserves chief credit for presenting the idea to an interested publishing house. Even after her marriage and residency in Germany, she vigorously promoted the preparation of the translation. Under the skillful guidance of our editor, Miss Rebecca Hayden, a radical revision of the German text was found necessary in the interest of best serving readers in the English-speaking world.

Voice, speech, and language are truly anthropological subject matters that cannot be approached with the methods of any single science or specialty. Influenced by cultural, national, regional, and other psychological peculiarities, the behavior of human communication is subject to many more variables than is the pathology and symptomatology of strictly organic disease, for example. This was one of the reasons why it would have been impossible to attempt a literal translation. Certain speech disorders that are greatly disturbing in the German language are insignificant in the Anglo-Saxon countries, and vice versa. One example is the pathology of the

“r” sounds. Hence, it took several years of intensive collaboration among the two translators and many critical consultants to complete the translation, which turned out to be a vastly revised edition of the German original. With the exception of numerical data, specific experimental results, and documented case histories, practically every section in each chapter was greatly changed in organization, coverage, and documentation. After some material of less interest for the present audience had been removed, descriptions were added of recent studies presenting significant findings or with challenging new viewpoints. The greatest change concerned the arrangement of the concepts, theories, and experimental results that form the base for this book—that is, a global orientation toward a uniform interpretation of all modes of human expression and the inclusion of several sciences that are considered basic to communication. Much previously scattered material was brought together into two completely new chapters on laterality and musicality. The problems relating to human lateral dominance reflect the neurological orientation of this book. Musical factors are closely related to psychoacoustics and its application in audiology and speech pathology. The second part of the book, dealing with speech and language, has been reoriented according to a new concept, the LLMM theory of individual language development.

The translation proceeded in continuous

collaboration with the original co-authors. The revised version of each contribution was submitted to the author for his critical scrutiny and final approval. Every requested change was carried out until the final manuscript reflected the agreement of all parties concerned. This process was not always easy and occasionally painful. While the chief translator (Arnold) assumes the responsibility for factual correctness of the translation and for all deviations from the original text which were eventually found necessary, he gladly gives the credit for all good aspects of the new revision to the various collaborators and consultants, who donated untold hours of work in order to make the translation a published reality.

One of the chief deviations is in the great reduction of the bibliographic material. The German edition continues to be regarded as an encyclopedic presentation of the subject as expected by the German reader, who desires as much documentation as is humanly possible, both in the broadest presentation of contemporary concepts and in a deep delving into the past with long chronological enumeration of all accessible previous studies of any topic. Our American consultants agreed that such intensive documentation would be superfluous in the English edition and thus followed the plan to restrict the references to the authors directly cited in the text. Moreover, the individual contributions of many authors were reduced to the most representative, latest, most elaborated, or otherwise most important of their publications. Still, matters of priority were respected by documenting, wherever possible, an author's original report of some new discovery. The reduction of the bibliography—a deviation from the chief translator's previous working habits—was least agreeable to him, but he had to accept it for the sake of the entire work. We sincerely hope that the authors cited will understand the reduction of their bibliographic lists.

Just as the book's first edition was written by exchanging manuscript pages between the two chief authors' residences in Zurich and Vienna, each chapter of the translation went back and forth several times between New York, Wolfs-

burg, and Jackson. A monumental task was involved in preparing, correcting, clarifying, editing, and perfecting the translation until it was considered satisfactory for final submission to the publisher. It is difficult to express how much gratitude is due Dr. Robe Finkbeiner for her share in the gigantic task except to say that she made it possible.

It was particularly fortunate that Maryjane Rees, Ph.D., joined the team at the crucial moment when it was decided to shorten the bibliographies. She undertook the huge task of matching the authors cited in the text with the correct references in the bibliographies. This task was not always easy when an author had published several papers on the same topic or had written on different subjects in one year. Dr. Rees's profound knowledge of the professional literature, as well as her experience with foreign languages, enabled her to extract the fitting documentation from the original master list of several thousand titles. Occasional difficulties were clarified by correspondence or in long sessions during meetings at conventions. Few other persons could have solved this problem at the last stage. Dr. Rees also devoted time to proofreading and to correcting some errors in the statistical sections.

Next to be thanked for her indefatigable devotion to all phases of the translation is Rebecca Hayden, M.A., Speech Series Editor at the Wadsworth Publishing Company. The list of friends, colleagues, and assistants who deserve gratitude for their help is very long. Dorothea Bradford, Ph.D., volunteered to read the growing manuscript, offering productive criticism and help, particularly with the difficult translation of psychological matters. Mrs. Lucinda Pearson Bernheimer, M.A., conducted much basic research in musicologic problems that became important to the theory of language disability and cluttering. Ruth M. Clark, Ph.D., formerly of New York, assisted with the translation of the late Dr. Baar's chapter on child psychology. Several volunteers searched for data in the records at the Speech Rehabilitation Institute in New York (formerly National Hospital for Speech Disorders). Especially help-



ful were Miss Marian Winters, who had been recommended for this purpose by the editor, and Mr. Eric Collins, Hospital Registrar.

Lynwood Heaver, M.D., the brotherly friend, helped through many a period of distress with support and encouragement. By organizing the publication of *Logos*, presently suspended, he created a forum from which many of the ideas presented in this book were discussed for the first time. George Kelemen, M.D., of Los Angeles, and James F. Bosma, M.D., at the National Institutes of Health, were prominent among those who submitted or recommended papers to *Logos*, inspiring much of what is said on the following pages. Grateful remembrance is also due Dr. Paul Fejos, the late president of the Wenner-Gren Foundation for Anthropological Research in New York, for his support through research grants of some of the basic work that prepared this translation.

Typing the thousands of drafted pages grew into a tremendous chore. At first, Mrs. Madeline Kane, executive secretary at the Institute of Radio Engineers of America, transcribed the recorded dictation with great care during her evening hours; her experience with mathematic equations was fortunate. Others engaged in typing included Mrs. Sally Goldsmith and Mrs. Charlotte Jacobs, who prepared portions of the final manuscript with great precision. In Jackson, the final typing was completed by Miss Toni Tuyt, who was similarly talented in preparing accurate manuscript copy.

*Wolfsburg and Jackson, Columbus Day 1964*

*Evelyn Y. Robe Finkbeiner*

In an indirect way, gratitude is due all the foundations that supported the chief translator's scientific work as former Director of Research at the New York Eye and Ear Infirmary and as former Clinical Director at the National Hospital for Speech Disorders in New York. Having been able to devote part of his time to well-organized research on a large scale, he could undertake numerous experiments in psychoacoustics. In this manner, much was learned that became basic to a better understanding of the subject matter of this book, particularly in the new or enlarged chapters on musicality, auditory agnosia, and advanced testing methods of central audition. After the move to Jackson, the progressive and cosmopolitan academic climate at the University of Mississippi Medical School was even more favorable to the completion of this work. The entire faculty collaborates in revolutionary new plans for an interdepartmental Center for Communication Disorders, which is considered one of the chief aspects of otolaryngology at this medical center.

Having had the privilege of so much friendship, support, and encouragement from many quarters, the translators hope that the trust invested in this work by numerous friends will be rewarded by a wide use of the book. It is our sincere wish that it may serve as a guide to scholars interested in the many facets of human communication, to physicians dealing with communication disorders, and to the coming generation of specialists in rehabilitation.

*Godfrey E. Arnold*

## TO THE FIRST GERMAN EDITION

Voice and speech are essential to human communication. Man's ability to use symbolic language and the forms of human communication represent the basic pillars of human culture and ingenuity. It is not surprising, in view of the great importance of verbal expression to mankind, that the literature dealing with its

various aspects is enormously large. An ever increasing number of scientists base their work on the specific aspects of their professional orientation. Thus the innumerable reports are to be found in a wide variety of highly specialized professional journals. For this reason, it has become impossible for the individual worker to

keep himself informed of all the pertinent contributions. Physicians, in particular, are hard put to find time to familiarize themselves with the many facets of phonologic, phoniatic, and acoustic research.

Numerous books have been written in English and French to orient physicians, voice and speech pathologists, and representatives of related disciplines to the anatomic, physiological, physical, and psychological foundations of voice and speech science. In contrast, for more than ten years no book has appeared in German that covers recent phonologic research for the information of the phoniatic student or the otolaryngologist. During the same decade, advances of extraordinary importance have been achieved in acoustic technology. Although such advances are applied principally to solving the economic problems of communication, they have much to contribute to practical laryngology and to its phoniatic subdivision.

The chief purpose of this book is to fill the gap in the German literature by reporting recent research and by discussing old and new problems in voice and speech pathology. The book should thus be of service to several closely related specialities—otorhinolaryngology, physiology, phonetics, linguistics, speech pathology—and to the scientifically oriented teachers of the vocal arts.

Since the invention of the laryngeal mirror in 1854 by Manuel Garcia, the historical development of laryngology has revealed a mutually beneficial cooperation between medical laryngology and experimental phonetics. Heeding the admonition of the elder Hermann Gutzmann, many laryngologists have been aware of the need to broaden the scope of clinical laryngology to include more emphasis on physiology and function. An effort is made, therefore, to devote sufficient space in the following pages to the problems of experimental methods. We can offer no more fitting illustration of our intention than to repeat the courageous words spoken by Claude Bernard in 1859: "The experimental procedure is a scientific method, which proclaims the freedom of spirit and thought. While standing in opposition to philosophical and

theological limitations, it likewise refuses to tolerate individual scientific authority. This attitude does not come out of pride or boastfulness. On the contrary, the experimenter is modest, dissociates himself from personal authority, and regards domination by man as secondary to the rules of experimentation and to natural laws."

In view of the specialized orientation of this book, detailed descriptions of the anatomy of the larynx, its muscles, nerves, and blood vessels are not included. It will suffice to review elementary form, structure, and physiological function of the organs of voice and speech. Nonetheless, numerous references are made to the standard textbooks of anatomy and laryngology so that the interested reader may find further information. Controversial subjects, dealing with unsolved problems relating to fine details of structure or function, are presented with as much objectivity as is humanly possible. In contrast to the necessary limitation in the areas of basic anatomy and physiology, emphasis is placed on the close integration of biological data and related discussion from the viewpoint of psychology. In this respect, the collaboration of Prof. Friedrich Kainz, Ph.D., and of Edeltrud Baar, Ph.D., in the chapters concerned with psychology is of great importance.

In the past few years, an effort has been made in numerous phoniatic studies to confirm or supplement the previously elaborated experimental-phonetic data through roentgenologic and electroacoustic investigations. Electric sound analysis has indeed made further clarification of the phonic laryngeal function possible. In a similar manner, modern and improved methods of stroboscopy promise further insight into the complex mechanism of the vocal organs. This broad area of scientific research has been recently augmented by biogenetics. In addition to the significant theoretical results that it offers, the laws of heredity have become important to practical application. To mention but one example, the inherited development of the voice, the form and size of the larynx, and the role of heredity in the constitution of the mucous membranes covering the upper airways may play a vital role in a singer's life.

The well-planned methodology of phoniatic procedures may appear to be exceedingly specialized. In reality, however, this specialization is based on the goals of general medicine. The inseparable interdependence of respiration and vocal disorders, the pathognomonically important or life-threatening paralytic lesions of the larynx, and the vocal disorders of endocrine origin reflect the importance of specialized phoniatic findings to the life, health, and welfare of the afflicted patient.

Without doubt many difficulties still remain in explaining the physical and emotional processes of human voice and speech. Intensive research continues to be devoted to numerous detailed problems. Physiologists and laryngologists study the movements of the participating organs. The audible result of these movements

*Zurich and Vienna, Christmas 1948*

*Richard Luchsinger*

is graphically recorded by the phonetician, who attempts to make his findings available for practical application. In his laboratories, the acoustical engineer analyzes the audible phenomena, which represent the vocal sound and noise mixtures of the speech signals. The psychologist, finally, is concerned with the philosophical definition of the brain functions associated with speaking and seeks to discover answers to questions about the essence and function of language. The progressive study of voice and speech thus requires a long series of well-coordinated studies by scientists in all countries. The essence of language is such that the revelation of its mysteries is possible only through increased mutual understanding and cooperation, ultimately fulfilling the humanistic ideals proclaimed during the Renaissance Era.

*Godfrey E. Arnold*

## TO THE SECOND GERMAN EDITION

The present book, appearing ten years after the first edition, is an enlarged second edition. The intentions set forth in the foreword to the first edition remain the same. As was expected, the great technical advances in acoustical science have brought about considerable growth not only of experimental phonetics but also in the fields of phoniatrics and audiology. It follows that the representatives of these specialists are obligated to acquire as much knowledge as possible in technical acoustics. For these reasons, we have decided to devote more space to the acoustical foundations and electronic techniques that are basic to communications research. We have been fortunate in gaining the collaboration of Prof. Fritz Winckel, D.Sc., of the Institute of Technology in Berlin. Extensive documentation dealing with recent advances of interest to the phoniatriest, otolaryngologist, phonetician,

*Zurich and New York, Christmas 1958*

*Richard Luchsinger*

voice and speech pathologist, educator of the deaf, and the scientifically interested teacher of the vocal arts has been added. Since the pertinent literature has grown tremendously during the past decade, it was necessary to limit additions to the various chapters to essential advances. Reflecting the intensive studies in all related areas, the bibliographical references have also become much longer commensurate with our efforts to achieve completeness as far as possible.

Sincere gratitude is expressed to all friends, academic teachers, practicing specialists, and the experts in voice and speech therapy or vocal rehabilitation who have aided our endeavors through constructive criticism, inspiring comments, or gracious mailing of their reprints. Gratitude is also due Springer-Verlag of Vienna for its generous consent to our requests concerning the technical preparation of this book.

*Godfrey E. Arnold*

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