GREENE & MATHIESON'S

THE VOICE & ITS DISORDERS

SIXTH EDITION

LESLEY MATHIESON

Greene and Mathieson's The Voice and Its Disorders

6th Edition

Greene and Mathieson's

The Voice and Its Disorders

6th Edition

LESLEY MATHIESON DIPCST, FRCSLT

Visiting Lecturer in Voice Pathology, University of Reading

U.S. CONSULTANT: R.J. BAKEN PHD

The New York Eye & Ear Infirmary, New York

W

WHURR PUBLISHERS

LONDON AND PHILADELPHIA

Fifth edition published 1989 by
Whurr Publishers Ltd
19b Compton Terrace, London N1 2UN, England and
325 Chestnut Street, Philadelphia PA 19106, USA

Reprinted 2002, 2003, 2005, 2006, 2007, 2009, 2010

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library.

ISBN-13: 978-1861-56196-1 p/b

Therapeutic procedures are constantly developing in the field of voice pathology. Every effort has been made in this book to describe voice therapy intervention strategies clearly, to draw the reader's attention to some of the main contraindications for their use and to highlight some of the unsatisfactory methods of carrying out procedures. It is the responsibility of those who carry out treatments for voice disorders, however, to ensure that they are appropriately qualified to carry out such treatment, that they are fully aware of information which contraindicates certain types of intervention in each case and that they make their own assessment of the appropriateness of any intervention for a particular patient.

Contents

Preface to 6th edition

The first edition of *The Voice and Its Disorders* was published in 1957. There were very few books on this subject at that time and Margaret C.L. Greene OBE, FRCSLT made a major contribution to the literature by writing a book which encapsulated her knowledge and experience. It became a standard text on the subject and the success of the first edition led her to write three more editions, all well received. In the 1980s she invited me to be her co-author for the 5th edition, which was published twelve years ago. The 6th edition has been extensively re-written and my perspective, like Margaret Greene's, is that of a speech-language pathologist specialising in the treatment of individuals with voice disorders who also lectures to undergraduates, postgraduates and to my peers.

When the last edition was published, the use of sophisticated instrumentation for visualising the larynx was steadily becoming more widespread and was presaging a change in the clinical practice of many laryngologists and speech-language pathologists. Enlightened clinicians of both disciplines became aware of the importance of working together in order to determine causative factors and to decide upon the most suitable treatments. They realised that collaboration enabled more soundly based clinical decisions to be made and that by learning from each other their own skills developed. Throughout the 1990s, more readily available computer software for acoustic analysis contributed to objective voice measurement. Although limited equipment budgets may restrict the amount and type of instrumentation which can be purchased, the concept of working collaboratively is fundamental to good clinical practice in this area and it is regrettable that this is still not the case in some centres. During the last decade, the potential for definitive diagnoses and successful treatment of clinical

voice disorders has increased considerably in many clinics throughout the world as a result of the developments in laryngoscopic examination and working practices. It is now incumbent upon those of us working in the field of clinical voice disorders, as in other specialities, to provide the evidence of the efficacy of our intervention.

Although these developments are welcome and to be encouraged, the development of a significant clinical tool – the voice pathologist's own vocal skills – has taken a retrograde step during the last decade. In the UK, most university courses have eliminated practical voice work for speech pathologists, although in other countries, such as Sweden, it is recognised as essential. The voice pathologist's vocal skills should provide a model for modifying vocal behaviour during treatment. It is also by experiencing an extensive range of vocal behaviours and how to adapt and control them, that the clinician gains insight into the processes through which he or she is trying to guide the patient. The acquisition of these vocal skills by the voice pathologist is beyond the remit of this book but is an essential foundation for successful voice therapy. How can we expect to elicit changes in vocal behaviour from others that we cannot produce ourselves? If such experiential learning needs to be made academically respectable, it can be closely linked to the study of vocal tract biomechanics and to acoustic and aerodynamic measurement.

I have received support, generosity and kindness from numerous sources while I have been writing this edition and I acknowledge the continued contribution of those who provided input to the 5th edition. Formal acknowledgments are made throughout the text but my personal thanks are due to many people. I am extremely grateful for the wisdom, guidance, sensitivity and humour of Dr Ron Baken who agreed to take on the task of U.S. Consultant to this edition. His meticulous review of the draft manuscript was invaluable and his encouraging e-mails helped me to persevere. I am also indebted to Mr Julian McGlashan for generously providing many of the laryngeal images and for inviting me to spend a day with him to dissect larynges. My thanks are also due to Professor Adrian Fourcin for his enthusiastic involvement in producing laryngograph images derived from his collaboration with Julian McGlashan.

I received prompt and unfailingly generous responses from Dr Charles N Ford and Dr Marc Bouchayer allowing me to reproduce their photographs of vocal fold sulci as well as from Dr Barbara Jacobson who kindly agreed to reproduction of the Voice Handicap Index, for which I am most grateful. I would also like to thank Professor Martin J Ball and Professor David M Howard for giving permission to reproduce their material.

My clinical experience has been developed immeasurably by working with Mr Ram Dhillon for many years and, more recently, with Mr John Rubin. I am grateful to them both for sharing their knowledge and insights so readily. My thanks are also due to Ram Dhillon for allowing me to reproduce figures from his book.

I have valued enormously the encouragement of my friends and colleagues Dr Eva Carlson and Christina Shewell, who have always been so positive about the work in hand, and Annette Fernholz and Claire Holmes for so willingly reviewing early drafts of the manuscript. I am greatly indebted to Marion Finney for her meticulous production of the many tables in the manuscript and for the maintenance of my sanity throughout the entire process.

Finally, my gratitude is due to my husband, Ian, for his support of a wife who has been welded to a computer late at night for so long, and to our sons, Mark and John, whose humour and encouragement have helped to keep the task in perspective.

Lesley Mathieson
Chalfont St Giles
Buckinghamshire
England
February 2001

Preface to 5th edition

After the publication of the fourth edition in 1980 the last thing that was envisaged was another edition of *The Voice and Its Disorders*. However, as a decade progressed, far from falling into oblivion, requests for the book increased. These requests came mainly from qualified speech therapists confronted with the problems of planning and executing treatment for dysphonia.

Undergraduate speech therapists are given theoretical understanding of voice production and voice pathology in addition to important clinical experience. This alone is not sufficient preparation for their therapeutic role. They have little practical instruction in the production of their own voices which is an essential requirement for real insight into the perception and clinical treatment of dysphonic patients. Whilst we have explored theories and the latest research and instruments which can be used in objective assessment, we have been at pains to emphasise the practical approach to the rehabilitation of the dysphonic patient. We have asked ourselves, 'What do we do with this patient?'. The answers can often be found in the case histories we have quoted which endeavour to explain the problem and the measures which helped.

In the first edition (1957) the preface began thus: 'The chief motive in writing this book was the desire to provide a guide to treatment of voice disorders, simple yet comprehensive enough to serve not only speech therapists but doctors and laryngologists, and, more especially, those in many countries of the world where speech therapy is unknown and unpractised.' We have included therefore some pathologies not encountered in the Western World but still endemic in the less developed countries where such conditions as diphtheria and syphilis of the larynx still occur.

At risk of being over-repetitive we would like to comment here on a point frequently made in the text. No machine can replace the expertise

and empathy of the experienced speech therapist. Increasingly sophisticated instrumentation for the analysis of vocal function and for monitoring response to treatment gives us interesting new insights but it is only one aspect of intervention. Effective therapy is soundly based upon clinical experience and is comprised of an amalgam of watching and of listening to the voice and the complaints of the dysphonic patient. It is linked into a network of anatomical, physiological, neurological, cultural and pathological cues, and presents a holistic picture against which particular acoustic measurement falls into proper perspective. To speech therapists without the instrumentation we describe we wish to extend the consolation that we have also worked extensively in situations where it has been unavailable. This lack has not prevented us from providing successful voice therapy to a large number of patients.

We must acknowledge our appreciation of all those who have helped us over some of our worries with advice and discussion. Not least we must thank all those writers of excellent books and papers encapsulating their research and the wisdom of their experience which we acknowledge in our references throughout the text. Particular thanks must be made to Eva Carlson who has been most generous in providing laryngograph waveforms and analyses.

We are greatly indebted to Mr D. Garfield Davies, FRCS, Director of the Ferens Institute of Otolarynology, The University College and Middlesex Hospital School of Medicine, London who provided many photographs and diagrams of the larynx to illustrate pathological conditions of the vocal folds. He helped in their selection and gave invaluable advice and encouragement.

We also wish to thank Dr Frances MacCurtain for giving permission to reproduce the xeroradiographs of our patients.

We are indebted to Brüel and Kjaer Ltd in Denmark and the UK and to Kay Elemetrics Corporation in the USA for providing an excellent selection of slides and photographs from which we were able to choose suitable illustrations.

Finally, we must thank Mark Mathieson who organised our disk filing system and wrote appropriate computer programs for producing flow charts, waveforms and index lists, while convincing us that sanity could prevail.

Margaret Greene, Wingrave
Lesley Mathieson, Chalfont St Giles
June 1989

Phonetic symbols used in the text

Vowels

/ɪ/ as in it
/iː/ as in eat
/e/ as in bed
/æ/ as in at
/aː/ as in arm
/ɜː/ as in her
/ə/ as in supper
/ʌ/ as in cut
/ɒ/ as in not
/uː/ as in pool

Consonants

/m/ as in me
/n/ as in no
/ŋ/ as in sing
/p/ as in pea
/b/ as in bat
/t/ as in to
/d/ as in day
/k/ as in cat
/g/ as in go
/f/ as in fit
/v/ as in vim
/θ/ as in think
/ð/ as in that
/r/ as in red
/j/ as in yet
/s/ as in so
/z/ as in zoo
/ʃ/ as in shoe
/tʃ/ as in chat
/dʒ/ as in jam
/ʒ/ as in leisure
/h/ as in he

Diphthongs

/ɑu/ as in house
/ei/ as in day
/aɪ/ as in lie

In memory of my parents
Marion and Jack Glass

'I thank you for your voices, thank you.
Your most sweet voices'

Coriolanus Act 2 III
Shakespeare

Introduction

This book is about the voice, voice disorders and their remediation. It is intended for those professionals who are involved in the treatment of abnormal voices and for students who are developing their skills in this area. It is primarily directed at speech-language pathologists, but will also be of interest to laryngologists who are keen to develop insight into the processes and methods of voice therapy that can be used both as a primary treatment route and as an essential adjunct to laryngeal surgery. All professionals involved with voice-disordered individuals in a medical setting should find relevant information in this book. Some chapters will be informative for voice professionals working in non-medical settings, e.g. voice and singing teachers, who would like to expand their understanding of the anatomy and physiology of normal voice as well as to develop awareness of vocal pathologies that merit referral for laryngeal examination.

The text is divided into three parts. The five chapters of the first section are concerned with normal voice. Chapter 1 provides an overview of the role of the voice in human communication. This sociopsychological perspective might be regarded by some readers as a slightly incongruous bedfellow for the chapters on the anatomy, physiology and acoustics of phonation that follow in the same section. It is included because the appreciation of the many aspects of the voice that contribute to oral communication should enable clinicians to develop some insight into what the voice-disordered patient has lost in losing normal vocal function. By understanding the functional and psychological roles of normal voice, it is to be hoped that clinicians working in this field are able to investigate and treat the patient's condition with sensitivity and full regard for the individual's difficulties and needs. The remaining chapters in the first section describe

the vocal tract, the production of normal voice, and the ways in which both change throughout the individual's lifetime. This information about normal structure and function provides the foundation for Parts II and III, and the reader may find it helpful to return to these earlier chapters for reference when reading the later sections.

The second part of the book describes the various categories of voice disorders, each aetiological category in a separate chapter. Such clear divisions are rarely the reality in any discipline and the area of voice disorders is no exception. Voice disorders tend to overlap in the way in which they present and neatly separated chapters are used purely for organisational purposes. It has to be remembered that most individuals with a voice disorder attempt to compensate for the problem. As a result, there may be a hyperfunctional element of a voice disorder that results primarily from a structural abnormality of the vocal tract, for example. It is also important to bear in mind that having a voice disorder can be stressful and that this can affect its presentation, although the primary cause might not be psychological. This section aims to provide the reader not only with factual information about each condition, but also with some indication of the many strands of information that need to be explored in the assessment of each patient. It is a truism, but worth remembering, that voice clinicians do not deal purely with voice disorders but with people who have voice disorders.

The final part deals with the assessment and treatment options that may be employed in treating voice disorders. These chapters reflect two of the important developments over the last two decades. First, the technology that is now available for viewing the larynx and making acoustic measurements has transformed treatment by providing objective information that is fundamental to making decisions about methods of treatment and to providing feedback during treatment. It has also contributed to the fact that laryngologists, voice therapists, speech scientists and other voice professionals work together more closely now than ever before in many centres. In the best centres throughout the world, patients are assessed in multidisciplinary voice clinics. The specialist speech-language pathologist (or voice therapist) is an integral part of the medical team, working closely with the laryngologist, and is increasingly involved in the assessment, diagnostic and decision-making processes which are fundamental to planning treatment, whether medical, surgical, therapeutic or a combination of all three. A multidisciplinary approach helps to ensure that the complexities of any voice disorder are comprehensively evaluated. The different but combined perspectives of the contributing disciplines, particularly laryngology and speech-language pathology, are essential and complementary in providing good care for these patients. A coordinated team approach can help to

avoid unnecessary surgery, for example, but will also indicate when surgery is essential. The concept of close coordination between members of the team involved in treating voice disorders is implicit in this book.

The second, more recent, development is the emphasis on evidence-based practice. Clinicians are increasingly expected to prove that their clinical intervention is effective and to base their treatment on proven techniques. As a result, day-to-day practice is more concerned with analysing the processes of intervention and measuring treatment outcomes than in the past. Consequently, clinicians have to consider which instrumental procedures and assessment protocols can provide the most useful baselines from which progress and outcomes can be measured. Studies of the effectiveness of voice therapy and the most useful techniques are accumulating but are frequently difficult to compare because timeframes of treatment are not described in detail. Many of the most frequently used treatment approaches are described in the final section of this book. The clinical experience of voice therapists and laryngologists is that these methods can be effective, but further studies are essential if this impression is to be convincingly substantiated.

Finally, there is the dilemma about the nomenclature of the clinician who carries out voice therapy. The speech-language pathologist (or therapist) who specialises in treating clinical voice disorders may be described as a 'voice pathologist' or 'voice therapist' in some centres. The term 'voice pathologist' probably incorporates most effectively all the elements of the role (including analysis and assessment), whereas 'therapist' implies treatment alone. This title recognises the speech-language pathologist's specialisation in voice disorders and is arguably more logical for patients with voice disorders who consider their speech and language to be normal. The use of various terms in this book reflects the global reality and attempts to avoid the tedium of constant repetition of one title.

Part I
Normal voice

1 CHAPTER

Communicative functions of the voice: an overview

The human voice fulfils a number of roles in the process of oral communication, as well as contributing to the way in which individuals relate to each other. It is essential for clinicians who treat patients with voice disorders to have some understanding of the range of the communicative functions of the voice in order to comprehend the effects of vocal impairment on the individual. The multiple roles of the voice described in this chapter demonstrate the importance of its subtle, as well as its more obvious, aspects. When any aspect of vocal function is impaired, the speaker's communicative effectiveness is reduced.

It is generally recognised that the human voice makes a major contribution to the audibility of verbal communication. Most people have lost their voices at some time and remember the difficulty of trying to make themselves heard, even in quiet settings. It is also generally accepted that voices tend to be identifiable as belonging to particular individuals and can be recognised, like faces, although this is not entirely true. The functions of the voice are much more extensive than this, however, and it is through the voice that considerable information about the speaker is conveyed to the listener. The speaker is frequently unaware that the voice is potentially so revealing and that what is heard and perceived also depends on the listener's experience and sensitivity. A speech-language pathologist or linguist, for example, will be aware of nuances that may evade the non-professional. Throughout life, emotions are reflected in the voice and aspects of the personality are revealed. Infant vocalisation progresses to babbling as a preliminary to speech, and the intonation patterns of the home language are absorbed and form musical patterns which gradually incorporate words and phrases. As the social and emotional boundaries of a child's life expand, the voice absorbs characteristics of the socio-

economic groups encountered, and the peculiarities of regional dialect and social class. In adulthood, the voice eventually provides an amalgam of personal information.

Inferences from vocal behaviour

Even when it might be regarded as neutral, a voice constantly transmits information about the speaker. Even more is revealed as it changes in different social contexts and reflects responses and attitudes to situations encountered. Vocal behaviour is one aspect of the total image – a composite of dress, grooming, posture, gesture and facial expression – presented by an individual. Individuals rarely think about how to use their voices, unless the situation particularly demands care, although they frequently consider what to say. Yet everything has to be said in a certain way, in a certain tone of voice, at a certain pitch and at a certain loudness (Tannen, 1995). It is perhaps surprising, therefore, that 'the voice' has not generally been considered an element of the individual that can be 'groomed' or manipulated for everyday communication. Articulation, language structure and content, accent and dialect are all the subjects of formal instruction, but development of vocal skills has largely remained the territory of voice and singing teachers who teach actors, singers and public speakers. Although this tuition addresses many aspects of vocal function, it is related to the speaker's or singer's ability to perform the adopted role effectively. It has been known for many years by sociolinguists, however, that listeners draw inferences from the voice regarding sex, age, intelligence, regional and socioeconomic origins, education and occupation (Ryan, Giles and Sebastian, 1982). Recently, politicians, businesses and others have become aware of the importance of the inferences that listeners draw from the various aspects of the speaker's voice and this is influencing training patterns for an increasing number of people. As yet, it is probably unusual for individuals to consider trying to alter their voices aesthetically for everyday life, in the way that they would go to a gym for a more beautiful body. Attempts to achieve a more desirable accent is routine in some cultures, but it is unusual for most people to attempt to make their communication skills more effective by changing subtle aspects of vocal behaviour.

A cross-disciplinary approach and the study of various attitudes in social settings is recognised as necessary in any comprehensive evaluation of communicative behaviour (Edwards, 1982). This is the core construct of sociolinguistics that provides an integrative approach to social psychology. The aspects of voice from which inferences are drawn are known as paralinguistic features; they run parallel to the linguistic message and are important for placing it in context. This introduction to vocal function will

be directed broadly into these two areas – paralinguistic and linguistic – although in practice the two aspects are not always clearly defined, and they frequently overlap and fuse.

Voice permanence

The distinctive vocal characteristics by which each person is identifiable are dependent to some extent on anatomical features, but they are also determined by habitual settings of the vocal tract.

ANATOMICAL FEATURES

The configuration of the vocal tract of each individual is unique. It imparts the particular vocal quality that distinguishes one individual from another and that contributes to identification of the speaker. These anatomical features of the vocal tract result in the permanent voice quality over which there is little control and which cannot be completely suppressed or disguised.

VOCAL SETTINGS

Superimposed on the permanent anatomical voice features are many possible 'voice settings'. These are the muscular adjustments of the vocal tract, which are learned unconsciously in the family and, later on, in the school, social, professional or occupational group. They affect the timbre of the voice as well as determining the characteristic levels of volume and pitch. As they are habitual, there is no awareness of them in the majority of speakers, although they can be controlled by the individual. It is this aspect of the voice that impersonators manipulate when imitating the voice of a well-known personality. The settings can be assumed and imitated and are peculiar to different groups within regional and local populations. An interesting illustration of this is the evidence that suggests that many American males have learned to use a lower part of the pitch range than British males (Giles and Powesland, 1975) (see 'Contact ulcers', page 172).

The sociolinguistic implications of an individual's speech patterns are acknowledged in the literature, but these usually relate to articulatory patterns rather than to the voice itself. For example, the class-conscious British detect the background of a speaker very readily (Scherer and Giles, 1979). It is agreed that 'received pronunciation' (RP) is the most prestigious standard accent in Britain (Kramarac, 1982), with high status and competence connotations, placing speakers in a socially superior position to those with apparently less advantageous antecedents. Conversely, some speakers consciously reject RP because they do not want to be perceived as

members of an élitist and privileged group. The English are reputed to be the most class-conscious race in Europe, whereas Americans acknowledge regional differences of accent but are less likely to perceive them as important markers of social class. In Italy, a Tuscan accent is quite different from that of the north or south. It is appreciated for its beauty but does not place these Italians on a higher social plane, although it has great cultural status.

Studies of the voice and social grouping are less common, however, and appear to be less frequently considered. A study in Edinburgh (Scherer and Giles, 1979) produced results showing a correlation between social status and voice settings. Higher social status was associated with more 'creaky' phonation, whereas lower social status revealed voices with more whispering and harshness. It is suggested by some writers that future academic success can be predicted by voice pitch and range. Scherer and Giles (1979) cite a study by Freuder, Brown and Lambert in which teachers evaluating young school children judged slow speech at a low pitch to be indicative of school failure. This study was confirmed by Edwards (1982). It was found that the academically successful pupils of low socio-economic status did actually use higher pitch, less volume and more appropriate intonation than their unsuccessful peers. The judgement of an individual's abilities and intelligence from the voice is obviously highly dubious. Some teachers and many other members of society unconsciously hold stereotyped and often negative views of certain ethnic and social groups.

PARALINGUISTIC FEATURES

In contrast to the long-term nature of the anatomy and voice settings that combine to make voice permanence, there are paralinguistic features of the voice that change with emotion. These result from changes in tension in the vocal folds and the vocal tract which, in turn, affect vocal features. Shades of feeling are reflected in the voice and are inextricably linked with the verbal message and may override it. These features are recognised as timbre, tone of voice or vocal quality. Crystal (1980) refers to them as voice qualifiers. Such changing vocal settings are difficult to measure, but it is universally recognised that voices change 'colour' with changing emotion. This is reflected in the way a remark is delivered rather than how it is worded: *It wasn't what she said but the way that she said it that made me mad. I know perfectly well what he meant although he didn't say it in so many words.* An impartial judge may be totally bewildered by the feelings of bitterness and aggression that arise between the protagonists and by the way in which innocent words can be misinterpreted. Inevitably, changes in articulation are associated with vocal variation; increases in tension in the vocal tract,