

Fitting and Dispensing Hearing Aids

Second Edition

Editor-in-Chief for Audiology
Brad A. Stach, PhD

Fitting and Dispensing Hearing Aids

Second Edition

**Brian Taylor
H. Gustav Mueller**





5521 Ruffin Road
San Diego, CA 92123

e-mail: info@pluralpublishing.com
Website: <http://www.pluralpublishing.com>

Copyright © 2017 by Plural Publishing, Inc.

Typeset in 10½/13 Palatino by Flanagan's Publishing Services, Inc.
Printed in the United States of America by McNaughton & Gunn.

All rights, including that of translation, reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, recording, or otherwise, including photocopying, recording, taping, Web distribution, or information storage and retrieval systems without the prior written consent of the publisher.

For permission to use material from this text, contact us by
Telephone: (866) 758-7251
Fax: (888) 758-7255
e-mail: permissions@pluralpublishing.com

Every attempt has been made to contact the copyright holders for material originally printed in another source. If any have been inadvertently overlooked, the publishers will gladly make the necessary arrangements at the first opportunity.

Library of Congress Cataloging-in-Publication Data

Names: Taylor, Brian, 1966- , author. | Mueller, H. Gustav, author.
Title: Fitting and dispensing hearing aids / Brian Taylor, H. Gustav Mueller.
Description: Second edition. | San Diego, CA : Plural Publishing, [2017] | Includes bibliographical references and index.
Identifiers: LCCN 2016013436 | ISBN 9781597566506 (alk. paper) | ISBN 1597566500 (alk. paper)
Subjects: | MESH: Hearing Aids | Correction of Hearing Impairment—instrumentation
Classification: LCC RF300 | NLM WV 274 | DDC 617.8/9—dc23
LC record available at <http://lcn.loc.gov/2016013436>

Contents

| | |
|---|------------|
| <i>Preface</i> | <i>vii</i> |
| 1 Basic Psychology of Hearing Loss in Adults | 1 |
| 2 Acoustics at the Speed of Sound | 23 |
| 3 Basic Anatomy and Physiology of the Ear | 57 |
| 4 Measurement of Hearing | 87 |
| 5 Hearing Disorders and Audiogram Interpretation | 129 |
| 6 The Hearing Aid Selection Process | 159 |
| 7 All About Style: Hearing Aids and Earmolds | 195 |
| 8 Hearing Aids: How They Work! | 229 |
| 9 Advanced Hearing Aid Features | 263 |
| 10 Hearing Aid Fitting Procedures | 315 |
| 11 Outcome Assessments and Postfitting Issues | 369 |
| 12 “Selling” Hearing Aids: It’s Not a Bad Thing! | 419 |
| <i>Appendix</i> | 465 |
| <i>References</i> | 471 |
| <i>Index</i> | 473 |

Preface

Second editions of textbooks are a little like driving an old sports car with a rebuilt engine. While it looks the same on the outside, open the hood and closely inspect the engine; you are likely to see it's comprised of many modern parts that weren't available when the original car was constructed. With the modern parts, the now-classic car runs even smoother. You can think of our second edition as this sports car. Although reading this book is not as much fun as tootling around in your Mustang, we think, like the aforementioned sports car, the second edition outperforms the original. Regardless of the origins of this text, the writing of it, which is now in its second edition, has been a memorable journey with many twists and turns. Whenever you decide to pick it up and begin reading it—regardless of your background—we hope you find the content both helpful and engaging.

This textbook is *primarily* intended for non-audiologists or undergraduate audiology students who have yet to fit their first pair of hearing aids. Prospective hearing instrument specialists, audiology assistants, speech pathologists and other professionals aspiring to fit hearing aids, or who simply want a better understanding of hearing aids, will find the content especially helpful. This book is also perfectly suited for the individual who has just joined the hearing aid industry workforce, and does not have an audiology background. And given the growth of Costco as well as other large retailers within the industry, there continues to be a demand for hearing care professionals that provide

a high level of patient care. It is not a happy coincidence that *U.S. News & World Report* names Audiology one of the top professions each year. With all that said, in the second half of the book, we included considerable practical information about hearing aid features, selection, and fitting procedures that is not so basic; even the savvy, seasoned dispenser will find these chapters useful. From soup to nuts, we have included a broad range of subject matter that you need to know related to the process of actually selecting and fitting hearing aids (and selling them too!). Portions of the book contain the information that you need to know for obtaining your hearing instrument dispensing license.

Because we used a “dog’s breakfast” approach when thinking of our target audience, you’ll see that we struggled with deciding what to call you, the reader. You’ll see terms such as audiologist, clinician, professional, dispenser and even hearing instrument specialist. As much as we’re not fond of the term “hearing health care provider,” that probably slipped in a few times too. Regardless, you know who you are, and hopefully there is something here for everyone. When it comes to the actual art and science of fitting hearing aids, there probably are more similarities among groups than differences. We fairly consistently called patients “patients,” although some of you may think of them as clients, or maybe even customers.

You’ll notice that the twelve chapters of this book are sequenced to match

the necessary steps that you need to complete when dispensing hearing aids, including conducting basic audiometry, determining hearing aid candidacy, understanding hearing aid features, selecting and fitting hearing aids, and finally, verifying and validating your recommendation. The first three chapters provide the reader with some essential prerequisite information about the psychology of hearing loss, anatomy and physiology of the ear and basic acoustics. Beginning with Chapter 4, even if you're a beginner, we provide you with the information that will give you the skills to actually perform all the necessary tasks and procedures needed for selecting and fitting hearing aids on adults—with, of course, some guidance and supervision from an experienced audiologist or hearing instrument specialist.

Although we provide a lot of essential information, this book, of course, is not intended to replace university-level coursework or direct supervision from an experienced clinician. Rather, we provide you with just enough information to get you started on your career journey. It's our hope that the style and content of this book may inspire some of you to obtain your hearing aid dispensing license or doctorate in audiology. Although many of the basic subjects you need to learn to practice have not changed for generations, we have updated the chapters devoted to fitting modern hearing aids. In the second edition of this book, you'll see we have included some newer outcome measures and updated approaches to counseling your patients. We have even added a few pages on devices that are not even considered hearing aids that

you might be fitting and adjusting in a few short years: hearables and personal sound amplification products (PSAPs).

Budweiser likes to say that their beer has a "drinkability" advantage, and we like to think our book has a lot of "readability." Introductory textbooks devoted to basic concepts and core knowledge are sometimes known by students to be mundane, tedious, boring and somewhat unreadable. In order to overcome the effects of dullness, we have "themed" each chapter to add some entertainment value and make the material a little more fun and perhaps more readable. If you happen to be a person who is not enthralled by rudimentary coursework devoted to ear anatomy, physics of sound or audiogram interpretation, you may find our themes entertaining enough to help you get through the chapter. For example, you may find the psychology of hearing loss uninteresting, but when country music vignettes are interwoven throughout this chapter, it just might inspire you to more readily absorb the material (We're not quite sure what will happen if you don't enjoy country music). Sports fans, pop culture enthusiasts, lovers of old movies and wine aficionados—who also happen to want to learn a little something about hearing aids—might find entertainment value in our themed approach. After all, hearing aid fitting is fun, so reading about it should be too.

Although the book might have shreds of entertainment value, we also believe it provides timely, accurate and cutting edge information on many of the "best practices" needed to fit modern hearing aids. Included in the book are several prefitting, day-of-the-fitting

and follow-up procedures that must be properly completed in order to optimize patient satisfaction and ensure your business is successful. For these reasons, we think this book is a valuable addition to any professional library, as you are likely to find an informative tidbit or two on the use of speech-in-noise testing during the prefitting appointment, a succinct review of cutting-edge advanced hearing aid features, or how to administer self-reports of hearing aid outcomes. Since most readers of this book are likely to be just getting started, it's important to instill the importance of conducting tests and completing clinical procedures that are supported by scientific principles. This book aims to provide that information in an easy-to-read format.

Lastly, this book has "accessibility." We have written the second edition of this book knowing students and clinicians have nearly instant access to the World Wide Web. You might even be reading this edition on your tablet computer. Today, you can be reading a book in one hand, surf the Internet with the other and still drink your favorite morning beverage. We take advantage of this reality by listing many websites throughout this book. In every chapter there are several sidebars that refer to websites where more detailed information, animations or videos may be downloaded to further enhance learning. Regardless of your background or training, we hope you enjoy reading our twelve-chapter journey as much as we enjoyed writing it.

—Brian Taylor, AuD
Holcombe, WI

—H. Gustav Mueller, PhD
Ryder, ND

1

Basic Psychology of Hearing Loss in Adults

How country music and working with hearing-impaired adults are alike.

Nearly every patient seeking your services exhibits some of the qualities outlined in this chapter. In order to provide the best care and service to your patients it is critical for you to understand, from the patient's perspective, why they are acting in such a way. This chapter will help you do this. Once you have read it, you will be more familiar with some of the behaviors associated with acquired hearing loss in adults. You also will have a better understanding of why hearing-impaired people have many of these behaviors and personality traits. We also hope that this discussion will help you develop insight as to how you can interact with your patients in an understanding and upbeat manner—and of course, your hearing aid fittings will go more smoothly.

The Honky-Tonk Message

Many of you have probably been in Nashville, and if you're like us, it's hard not to stop by Tootsies, one of the top

honky-tonks in the United States. Most all country and western ballads have a message, and here's a line from one of our favorites:

What drives you insane about me is the very thing keeping me from losing my mind.

This phrase, taken from the perspective of a hearing care professional, simply means that our adult hearing-impaired patients sometimes have behaviors that are hard for us to understand. These often challenging behaviors and personality traits, when put in the context of a lifelong hearing impairment, are normal. The good news is that you don't have to own a guitar, carry a tune, or even appreciate country and western music to understand the attitudes and behaviors of the typical hearing-impaired adult.

For the person who experiences hearing difficulties, hearing loss is usually just the beginning of a series of social obstacles. In most cases, hearing loss is a communication disorder of gradual onset. This means that the hearing loss occurs slowly over many

years. Typically, the hearing loss comes on so slowly that the individual is not even aware of the change as it occurs. In fact, there are some data to suggest that it takes the average person with hearing loss 7 to 10 years after they first notice the problem to come to an office for a hearing test. Unlike many other health problems, hearing loss is not physically noticeable, and it does not hurt. Usually, it is a workplace associate, spouse, friend, or other loved one who notices the hearing loss first. All of us know someone who has trouble with hearing conversations, especially when background noise is present. Many times we notice that they are having difficulties before they even admit they have a problem. As you will learn later in this chapter, this is completely normal behavior.

Developing a relationship with your hearing-impaired patient ultimately will increase your chance to successfully help this person do something about his communication deficit. In addition, his or her ability to adapt to using hearing aids may be enhanced as a result of your ability to diagnose the hearing loss and understand the personality traits associated with it. As a hearing care professional, you have an opportunity to have a profound and lasting influence on their life that goes beyond simply fitting them with hearing aids. We know that people successfully fitted with hearing aids have improved socialization, family life, and even increased income—more on all this later.

Understanding the Problem

As Waylon Jennings said in his 1993 song "Dirt," "Dirt is quiet, it don't make noise, it's fun to play in, especially for boys."

Unfortunately, much of the surroundings where we work and play are not as quiet as dirt. It is not easy to communicate and function comfortably in many of today's noisy listening environments, even for people with normal hearing. Take a moment and think about the last time you were in a popular, crowded restaurant on a Saturday night. It takes a lot of concentration to follow the conversation of the person sitting next to you. It is even more difficult, sometimes impossible, to hear in these important situations when you have a hearing loss. It's no wonder people with hearing loss are withdrawn, embarrassed, or agitated about this "hidden handicap."

Over 36 million Americans, adults as well as children, suffer some degree of hearing loss. The most common type is sensory/neural hearing loss (predominantly cochlear etiology—more on this in Chapter 3). The encouraging fact is that people with this type of hearing loss can be helped with hearing aids. Given these facts, it might seem logical that adults with hearing loss readily seek treatment for it. Unfortunately, this is seldom the case as there is a strong stigma associated with adult hearing loss. Because hearing loss is so strongly related to old age, and aging is often not a positive attribute in Western culture, the stigma can be quite powerful. This stigma has been called the "Hearing Aid Effect" and it is present among both professionals and patients of all ages and all walks of life. Studies have shown that a substantial number of hearing-impaired patients refuse to wear hearing aids—even those with the latest modern digital technology—because they believe that hearing aids appear to make them look old or hand-

icapped. As a professional you will encounter this stigma often.

Mueller, Ricketts, and Bentler (2014) review how stigma related to hearing loss and hearing aid use can put a person at risk for identity threat. Identity threat, often referred to as stereotype threat, refers to situations in which individuals feel they might be judged negatively because of a stereotype. The threat refers to being at risk of confirming, as self-characteristic, a negative stereotype about one's group. Identity threat can lead to self-handicapping strategies and a reduced sense of belonging to the stereotyped domain, or their value of the domain in question.

Studies in this area often have been focused toward minority or gender issues, but identity threat is also something that needs to be considered with hearing aid candidates. For example, consider that hearing aid use rate is over 60% for individuals with moderate hearing loss who are over 75 years of age, but the hearing aid use rate is only 20% for the very same hearing loss group in the 55 to 64 age range. It is reasonable to assume that the use of hearing aids is an identity threat to the younger group.

Gagné, Southhall, and Jennings (2009) provide a set of guidelines to help us counsel the patient with identity threat:

1. Describe and discuss the stigma-induced identity threat, and explain to the patient the cause, consequences and potential costs of the stress related to identity threat.
2. Establish a hierarchy of situations in which identity threat occurs.
3. Discuss the effectiveness of the patient's typical coping strategies.

Introduce new adaptive strategies when necessary.

4. Implement a problem-solving approach to address a situation of stigma-inducing identity threat identified by the patient.
5. Train and encourage the patient to apply the selected coping strategies in a secure environment (may be practiced during the counseling session).
6. Meet with the patient to discuss the process of implementing and the consequences of applying the strategies discussed.
7. Attempt a similar experience in a slightly more threatening situation.
8. Increase the number of situations in which the patient discloses his or her hearing loss and applies appropriate coping strategies.

When you are interested in learning more about the detrimental effects of acquired, untreated hearing loss and the stigma commonly associated with it, check out this website: <http://www.betterhearing.org>

Audiologic Variables

There are some common ways to categorize the adult hearing-impaired population. Knowing something about these classifications will help you appreciate some of the differences in behavior you may observe. It stands to reason that the more you know about these variables, and some of their associated behaviors, the more you will understand the behavior of your patients.

Late Versus Early Onset

Hearing loss can occur before or during the development of language, or after language has already developed. The dividing line between hearing loss of late and early onset is considered to be adolescence. Adults who have early onset hearing loss usually have come to incorporate the hearing loss into their personalities. Because the loss occurred at a younger age, the hearing loss becomes part of their identity. As a result, they have developed ways to cope with and manage hearing loss in their daily lives. The situation can be very different for adults who acquire hearing loss later in life. These individuals have developed a personality that does not include coping with a hearing loss. They have jobs, families, and hobbies that have nothing to do with dealing with a hearing loss. When a hearing loss does occur, it is therefore normal for it to be a disorienting, even traumatic, experience.

Gradual Versus Rapid

The vast majority of the patients that you will see will have a hearing loss that developed gradually over many years. Hearing loss that occurs rapidly due to an underlying medical condition, however, is considered the most disorienting. Rapid onset typically means that a person experiences a sudden change in hearing within a few weeks, or even within a few hours. They may go to bed with normal hearing, and wake up with a significant hearing loss. It is not unusual for adults experiencing a hearing loss of rapid onset to be in a “near panic” mode. Of course, your primary

responsibility with any patient, but particularly those presenting to you with a hearing loss of rapid onset, is to refer them to a physician, preferably an otolaryngologist (ENT) for a complete medical examination, prior to discussing any treatment options related to hearing aids. Many otolaryngologists have drug treatment protocols that need to be started immediately when a sudden hearing loss occurs. Hence, if you do encounter a patient who suffered a sudden hearing loss in the last day or two, strongly encourage them to see a physician immediately.

Common Behaviors Associated with Hearing Loss

It was Hank Williams who penned the line, “I bowed my head in grief and shame as I felt the teardrops start, but as the organ played, we stood there and prayed, just me and my broken heart.”

You certainly don’t have to be a down-on-your-luck songwriter to appreciate the fact that the grieving process can be a difficult ordeal for many patients with acquired hearing loss.

It is a commonly held belief that adults with acquired hearing loss of late onset go through Kübler-Ross’s five stages of grief: denial, anger, bargaining, depression, and acceptance (Table 1–1). As a professional, you need to try to gain an understanding of which stage each patient falls into when he or she seeks your services. It is always a good idea to involve family members and other significant others as you guide patients through these five

Table 1-1. The Elisabeth Kübler-Ross Five Psychological Stages of Grieving, Applied to Hearing Loss

| Stage | What the Patient Might Say |
|------------|--|
| Denial | "I don't have a hearing problem; other people mumble. I hear everything I need to hear." |
| Anger | To their friends: "Are you purposely talking behind my back?" To the professional: "Are you sure you did the testing correctly?" |
| Bargaining | "Okay, maybe I just wasn't listening, I'll pay more attention." "Let's see if I'm still having problems next year." |
| Depression | "Maybe my family avoids me because of my hearing loss." "There are things I'll probably never hear again." "I'm getting old." |
| Acceptance | "My quality of life will probably improve with the use of hearing aids." "A lot of people my age have worse health problems than hearing loss." |

stages. When it comes to understanding the psychology of hearing loss, your main task is to be a tolerant and nonjudgmental listener, helping each patient adjust on their own terms to their acquired hearing loss.

Denial and anger are easy to observe in many patients ("I can hear just fine, my husband mumbles"). Bargaining frequently takes the form of comparing or devaluing ("Who cares that I can't hear?" "I can't hear, but at least I still have my health."). Depression can manifest itself in sudden changes of behavior. Finally, acceptance takes many forms, but it could simply mean that the patient is more accepting of your recommendations, is wearing his hearing aids more often, or has positive comments concerning hearing aid use. Although most hearing care professionals do not need to be experts on psychological issues surrounding hearing loss, some insights into how the five

stages of grieving manifest themselves in daily practice will help you do a better job and make the task of working with some of these issues less stressful.

All of us would like to think of ourselves as leading healthy and productive lifestyles. Our self-esteem is strongly related to our health and general well-being. For example, when someone first becomes aware they are missing out on conversation it is normal behavior to deny there is a problem. Acquiring a hearing loss goes against our perception of reality. It is not part of our own self-image to have a deficit like this. Think about how you felt the last time you were at a noisy social gathering and someone told a funny story, and you missed the punch line. Did you pretend you heard what was said and laugh like everyone else? Or, did you ask the person to repeat the part you missed? Most people just laugh and go along with the group, not wanting to