SECOND EDITION

Listening and Spoken Language Therapy for Children With Hearing Loss

A Practical Auditory-Based Guide

Sylvia Rotfleisch, MSc(A), CCC-A, BSc(OT), LSLS Cert, AVT

Maura Martindale, EdD, LSL Cert, AVEd

Plural Publishing Inc.

PLURAL PUBLISHING
INC.

9177 Aero Drive, Suite B
San Diego, CA 92123

email: information@pluralpublishing.com
website: https://www.pluralpublishing.com

Typeset in 10/13 Stone Serif by Flanagan's Publishing Services, Inc.
Printed in Canada by Friesens.

Library of Congress Cataloging-in-Publication Data:

Names: Rotfleisch, Sylvia author | Martindale, Maura author
Title: Listening and spoken language therapy for children with hearing loss : a practical auditory-based guide / Sylvia Rotfleisch, MSc(A), CCC-A, BSc(OT), LSLS Cert, AVT, Maura Martindale, EdD, LSL Cert, AVEd.
Description: Second edition. | San Diego, CA : Plural Publishing, [2027] | Includes bibliographical references and index.
Identifiers: LCCN 2025048802 (print) | LCCN 2025048803 (ebook) | ISBN 9781635507836 paperback | ISBN 1635507839 print | ISBN 9781635503883 ebook
Subjects: LCSH: Deafness in children--Treatment | Hard of hearing children--Rehabilitation | Hard of hearing children--Language | Hard of hearing children--Means of communication | LCGFT: Textbooks
Classification: LCC RF291.5.C45 R68 2027 (print) | LCC RF291.5.C45 (ebook)
LC record available at https://lccn.loc.gov/2025048802
LC ebook record available at https://lccn.loc.gov/2025048803

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Introduction

Sylvia Rotfleisch and Maura Martindale

What Is the Vision and Intended Audience for This Book?

Our vision for this book is to create a highly practical guide for professionals who are providing auditory-based Listening and Spoken Language (LSL) therapy for children with hearing loss. The textbook provides professionals with a specific model of language, speech, and listening, viewed through the theoretical lens of social interaction theory (Vygotsky, 1962). The approach presented here assumes that children's language is acquired through meaningful social interactions with language models in their environment coupled with their natural innate potential to communicate via a language system. We present a stages approach, as opposed to the more traditional approach using children's ages. It is designed for new, beginning, or experienced professionals as well as instructors of college-level courses.

Our vision also follows the research that supports auditory-based acquisition of spoken language for children with hearing loss, similar to children with typical hearing (Dettman et al., 2013). Natural conversational eye contact can be utilized, but we know overemphasis on the visual for speech teaching can result in multiple errors.

Why Are We Creating a Second Edition of This Book?

There are **six reasons** for augmenting our first edition, published in 2021.

- First, new and updated research studies and clinical instruments, specifically focused on children with hearing loss, have been developed in the field of listening and spoken language. To better inform professionals and parents, we wanted to add these studies and provide users with the most up-to-date content possible.
- Second, we received constructive feedback from users of our first edition, prompting us to add supportive information, such as new videos, tables, and figures, which would make it easier for readers to achieve their goals. For course instructors, there are now suggested in-class activities for face-to-face, online, and hybrid class sessions. These can be found in the companion website.
- Third, we learned that our companion website may have been underutilized. We want to improve user access to existing support services and introduce resources to help users succeed. Suggested connections to the website are now included within the chapters.

- Fourth, in response to readers, particularly experienced professionals, we have added a fourth section to Chapter 1, Speech Acoustics. More complex audiological and acoustic information are included for all readers who are seeking more in-depth explanations and tables on topics beyond the scope of the three other sections within the chapter. It is entirely up to the reader/user of our book to decide how and if to venture into these advanced topics. **Professional understanding of speech acoustics forms the essential basis for spoken language acquisition for children with hearing loss, regardless of new research, such as gene therapies and/or new hearing technologies.**
- Fifth, we have included information on creating child-centered goals in Chapter 4 (Assessment of English Language, Speech, and Listening) as well as in the remaining chapters for each stage. These are embedded in the case studies at the end of the chapters.
- Sixth, and finally, new parent-oriented explanations on specific topics are included in the companion website. They are formatted as handouts to be shared with parents and designed to assist parents and professionals with useful, easy to read descriptions of various topics.

Here are some other questions that readers may have about the book.

What Is the Best Way to Use This Book?

- The book's sequence of chapters is designed and arranged for supporting children's success in learning spoken language through listening. It is recommended that the reader use the chapters in sequence as the chapters build on previously covered materials.
- We begin with a chapter on speech acoustics. It is essential for professionals to have a thorough understanding of it for an auditory-based therapy approach to be successful and to ensure that children with hearing loss have access to and use all the sounds of spoken language. It is the first order of business.
- Use the table of contents and the lists of tables and figures to help find relevant sections. Do flip back and forth to locate information that is relevant to your work or caseload.
- The model is presented using a color-coding system of stages, a consistent presentation of content and tables, and a comprehensive case study for each stage.
- **Discussion questions** can be found at the end of each chapter and are most useful for course instructors or study groups of professionals. There are no "right answers" to these questions. Rather, they are intended to promote open-ended and thought-provoking conversations among new and experienced professionals on the chapter's content. For close-ended review questions, use the "quizzes" found on the companion website to check for overall knowledge.

What Resources Accompany This Book?

- There is a companion website that includes supports for instructors (e.g., quizzes, lecture slides). On the website,

all readers will also find printable handouts from the numerous tables.
- Videos of the different stages that are presented in the model are available and captioned. A video of experienced parents' advice accompanies Chapter 2's web materials.
- There is an abundance of tables and figures throughout the book. These should be used as resources for establishing goals and planning sessions. For ease of use, tables for the different stages (Chapters 6–11) are consistently organized.
- There are case histories, intervention sessions with scripts, and session analyses. **Case studies** provide readers with an opportunity to identify children's strengths and weaknesses, based on the assessment data, and to understand what typical **learning goals** flow from and align with these data. Suggested child goals are now included as part of the case studies.
- A discussion on supporting and guiding parents is presented for readers in Chapter 2 because the approach is based on the premise that parents will be included in every session. Parents will be taking on the majority of the therapy at home and in sessions over time.

Why Are the Terms for Strategies Used Here Not Universal in the Field?

- We realize that some strategy terms (Chapter 5) do not have consistent names within the LSL field.
- In reading the therapy-specific chapters (6–11), you may need to refer back to earlier chapters for terms and definitions. The index will assist you.

Why the International Phonetic Alphabet?

We use the *International Phonetic Alphabet* (IPA) to indicate when we are referring to specific speech sounds or phonemes. The lists in Tables X–1 and X–2 (p. xxxvii) present English consonants, vowels, and diphthongs in IPA with corresponding English words. There are three reasons for using IPA throughout this textbook.

- First, there are more sounds in English than there are letters of the alphabet—just 26 letters but many more speech sounds.
- Second, in many cases, printed English letters in words do not present a one-to-one correspondence with speech sounds in the words we speak, such as the letter /f/ as in fish, which can also be written as "ph" as in phone or elephant.
- Finally, IPA is commonly used by professionals in documents and reports to communicate with one another and with parents about children's speech production, individually or in words. Many professionals learn to use IPA as part of their preparation program, whereas others do not. We are including these tables for easy reference for readers who may need to learn IPA or review the IPA symbols used in spoken English.

What Is the Scope of This Book?

- The first chapter on speech acoustics is a "must read" and should be read—and not omitted—prior to reading

the remainder of the chapters. The topics covered here emerged with heightened significance as cochlear-implant use increased over time. Any new devices developed in the years ahead that provide increased access to the sounds of speech must begin with professional knowledge of speech acoustics in order to optimize the new technology.

- This therapy model is applicable for professionals who teach children with hearing loss, regardless of the type or degree of loss, and their parents.
- Professionals working with children with additional disabilities would benefit by using the model, with adaptations, in collaboration with the child's multidisciplinary team.
- This model of spoken language acquisition can be used with children who are English learners, who are from diverse cultures, and who are late starters. Use the model in collaboration with the child's multidisciplinary team.
- Professionals currently providing LSL therapy will also find this model very useful in setting goals and planning for individualized lessons for children in their caseloads.
- Typical language milestones presented here are just that—milestones. Numerous tables, figures, and case histories are located within the chapters that incorporate these milestones and beyond. There are many other textbooks on language development that are more comprehensive and include an in-depth coverage of typical language development.

What Topics Are Included in Previously Published Books or Materials?

- There are numerous books that have been published on pediatric audiology, cochlear implants, auditory management, general theory of auditory-verbal practice, anatomy and physiology of speech mechanisms, and literacy. This book is therapy centered for children.
- It is **not possible** to cover all related topics on listening and spoken language within a single resource. Additional works will be needed to augment the readers' knowledge. Fortunately, many websites, studies, and textbooks are listed in our reference sections.
- There are other resources, organizations, texts, and published materials for professionals and parents who are providing language instruction in sign language(s). We **are not** covering information regarding Deaf culture and sign language(s). We recommend that readers research relevant resources, as it is outside the scope of this book.
- It is assumed that the reader or instructor has a basic understanding of audiology and has some knowledge of IPA (English).
- Literacy is promoted by increasing the child's listening and spoken language level to one commensurate with hearing peers (Geers et al., 2017). Achieving literacy for children is primarily based on their spoken language development, abilities, vocabulary development, fluency, access to and discrimination of the

sounds of speech, and comprehension of spoken language (Adams, 1994; Robertson, 2009). See these works for research-based strategies on literacy.

What Terms Are Used for Consistency?

- "Professionals" will be used to refer to teachers; therapists; speech language pathologists; clinicians; interventionists; and any practitioner and/or educators who teach, or will teach, children with hearing loss in homes, schools, centers, and therapy settings.
- "Children" or "child" will be used to refer to young people who have hearing loss and are infants, preschoolers, elementary and secondary schoolers in need of therapy and intervention to learn spoken language via audition.
- "Hearing loss" will be used to refer to any and all degrees and types of loss, including those with unilateral, conductive, sensory, and neural losses.
- The terms "parents" and "caregivers" are used to refer to mothers, fathers, grandparents, guardians, adult siblings, or other adults who assume primary responsibility for raising the child.
- There are numerous audiology textbooks that cover topics such as the anatomy of the ear, hearing aids, cochlear implants, and types of **hearing assistive technologies** (HAT), so these topics are not included here. HAT covers all hearing technologies, including FM systems, remote microphones, and so on.
- We employ both formal and informal language depending on the chapter's topics. For example, the chapter on speech acoustics contains information that requires formal, scientific language, whereas the chapter that addresses working with parents lends itself to a more informal discussion.

What Is the Sequence of the Chapters?

- Chapter 1 begins with a comprehensive discussion on speech acoustics, which is broken down into four sections. This allows the instructor to check for understanding via activities, quizzes, discussion questions, videos, and so on before moving on to the next section. We know there are challenging concepts and content. Within each section the reader will find helpful tables and figures that assist in the comprehension of the material. It is written so that even new professionals will understand how knowledge of this content can be directly related to the child's learning of spoken language via audition using today's hearing technology.
- Chapter 2 discusses how to support and guide parents through the important role of naturally incorporating listening into daily living. Suggestions and ideas on talking to parents about their feelings are discussed, as they are an essential aspect of sessions.
- Chapter 3 includes an explanation of the "stages not ages" model, which serves as a guidepost to the rest of the book. It outlines the typical sequence and developmental milestones. In the succeeding chapters, each stage is delineated with an abundance of

strategies. The model represents a developmental approach with expectations that children will progress from one stage to the other, following the same trajectory as their typically hearing peers.

- Chapter 4 focuses on assessment of speech perception, speech, and spoken language. It introduces a NEW tool for screening speech perception and stresses the use of language sampling as a way to monitor a child's progress through the model. It also includes an overview of other assessments commonly used.
- Chapter 5 provides abundant strategies for professionals to include in any auditory-based session with a child with hearing loss and the parents—in other words, the basics of therapy.
- Chapter 6 contains a detailed description of the prelinguistic stage and strategies for speech, language, and listening. Well-developed goals for the prelinguistic stage in listening, receptive and expressive language, and speech are presented for use in developing therapy lessons as well as writing reports. Numerous tables support the content for practical application. An extensive dialogue among the parent, child, and professional provides an example of a typical session at this stage of development.
- Chapter 7 provides a road map of what to expect in the domains of listening, language, and speech once a child has advanced to the single-word stage. Numerous tables and figures incorporate the basic strategies from Chapter 5 into this stage of development.
- Chapter 8 discusses the emerging word combinations stage. The child is now able to understand more complex directions, to combine single words into short phrases, and to ask simple questions. Goals are presented in all relevant domains along with a description of the therapy plan moving forward. An extensive case history of the child and parent as well as a dialogue of a session at this level is included. We see the parent taking more of a leadership role in the session with continued support from the professional.
- Chapter 9 targets the language user whose expressive language contains "errors" similar to those of the typically hearing child who is learning to talk. The child's listening skills have advanced considerably, and longer conversations are possible, even with unfamiliar adults. A list of engaging games is included along with suggestions on what skills to incorporate within each game. The parent is taking the lead during the extensive intervention session. Tables of practical information and goals assist the reader in planning therapy sessions.
- Chapter 10 discusses the child who is a competent communicator. While able to hold more extensive conversations and to continue to build an expanding vocabulary, this child may experience some difficulties in larger groups and in noisy backgrounds. Auditory abilities are at a very high functional level, and the child can participate in most social situations where language is essential. The case history, with a language sample, and intervention session aim to deal with communication breakdowns and hold the child to an even higher level of linguistic knowledge. More complex

assessments have been conducted and illustrate the expectation of growth in all domains.

- Chapter 11 discusses the advanced communicator stage. The reader will be able to become familiar with a child who is at or above typical levels of language usage in social and academic settings. Easy-to-use tables assist the reader to guide children to gain linguistic independence, to acquire complex academic vocabulary, and to be comfortable in social situations with adults and peers using verbal and nonverbal clues. Goals are complex and lead the parent and child to becoming responsible for their own growth. It should be noted that most children at this stage will no longer require weekly therapy or even any therapy—just occasional "check-ins" a few times a year as needed.

We thank you for joining us in learning how to support children with hearing loss and their parents. We hope that this book will add to your professional journey.

References

Adams, M. J. (1994). *Beginning to read: Thinking and learning about print*. The MIT Press.

Brown, R. (1973). *A first language: The early stages*. George Allen & Unwin.

Dettman, S., Wall, E., Constantinescu, G., & Dowell, R. (2013). Communication outcomes for groups of children using cochlear implants enrolled in auditory-verbal, aural-oral, and bilingual-bicultural early intervention programs. *Otology and Neurotology*, *34*(3), 451–459. https://doi.org/10.1097/MAO.0b013e3182839650

Dornan, D., Hickson, L, Murdoch, B., & Houston, T. (2009). Longitudinal study of speech perception, speech, and language for children with hearing loss in an auditory-verbal therapy program. *The Volta Review*, *109*(2–3), 61–85.

Geers, A., Warner-Czyz, C., Wang, A., Nae-Yuh, & Eisenberg, L. (2017). Early sign language exposure and cochlear implantation benefits. *Pediatrics*, *140*(1), e20163489. https://doi.org/10.1542/peds.2016-3489

Robertson, L. (2009). *Literacy and deafness: Listening and spoken language*. Plural Publishing.

Vygotsky, L. (1962). *Thought and language*. The MIT Press.

About the Authors

Sylvia Rotfleisch, MSc(A), CCC/A, BSc(OT), LSLS Cert, AVT, is a certified Auditory-Verbal therapist, educator, and audiologist. She has devoted her career to providing therapy to families with children with hearing loss and teaching and mentoring other professionals. Trained at McGill University with Dr. Daniel Ling, Ms. Rotfleisch worked at Montreal Oral School for the Deaf, House Ear Institute, and Echo Horizon School before starting Hear to Talk (http://hear2talk.com), her own private practice. In addition to working with hundreds of families over more than 40 years, Ms. Rotfleisch has taught at University of Southern California, California Lutheran University, and led international master classes. She lectures, consults, and mentors for school districts, helping to update their professional staff and mentors for LSL certification. She has presented at a wide variety of workshops and conferences. Considered as a thought leader in the field, she has served on a variety of committees, including for AG Bell Academy for Listening and Spoken Language® and the task Force on Principles of Auditory Verbal Therapy.

Maura Martindale, EdD, LSL Cert. AVEd, is a certified Auditory Verbal Educator. She received her doctorate in Educational Leadership from the University of Southern California in 1999. She is the founder and past director of the Master's Degree and Credential Program, and is an Associate Professor, at California Lutheran University in Thousand Oaks, California. She has provided guidance and support to families of children with hearing loss in listening and spoken language at No Limits for Deaf Children centers in Southern California for over 15 years. Throughout her 40 plus years teaching at numerous universities, Dr. Martindale has prepared hundreds of teachers of the deaf for schools and programs throughout the United States and internationally. She was a teacher and Director of Educational Services at the John Tracy Clinic in Los Angeles California for 26 years.

Chapter 1

Speech Acoustics: The Gold at the End of the Rainbow Audiogram

Sylvia Rotfleisch

Why Do We Need to Understand Speech Acoustics?

"Of the available senses, residual audition must be regarded as potentially the most important because it is the only one directly capable of appreciating the primary characteristics of communicative speech, which are acoustic" (Ling, 2002, p. 22).

In other words, audition is the only sense capable of appreciating all aspects of speech. As professionals focused on developing listening and spoken language with children with hearing loss, we must understand that auditory access is key. Speech acoustics provides the framework for linking phonemes to the audiogram. By analyzing what children can hear, we can gauge their sound perception and plan therapy, from initial access to more complex speech and language development. Speech acoustics is the foundation on which we consider goals and build listening and spoken language. It also serves as a reference point when progress stalls or red flags arise.

This chapter covers basic concepts that provide the foundational information for applications and explores more advanced applications in the final section.

Section I
Basics of Sound

Key Points

- The audiogram can indicate potential access or deficits related to the speech signal.
- Duration, intensity, and pitch are three dimensions of sound of significant importance in our work with children with hearing loss.
- Understanding speech acoustics principles allows us to understand factors that enhance or diminish the auditory signal for children with hearing loss.

Terms and Definitions

There are a number of terms frequently used in this section for the discussion of speech acoustics.

- 6 dB rule—an application for increasing or decreasing the distance between a sound source and a listener which can improve audibility
- audiogram—a line graph indicating what a person can detect
- coarticulation—sounds being blended together when adjacent in running speech
- decibel—a measure of loudness
- formants—clusters of energy in sounds centered at specific frequencies
- hearing assistive technology (HAT)—technology used with hearing aids or cochlear implants
- hertz—a measure of frequency
- high-frequency sounds—sounds from about 2000 hertz and above
- invariant energy—energy that, by nature of the production, does not change for the specific sound type
- low-frequency sounds—sounds below about 1000 hertz
- LTASS—the long-term average speech spectrum
- mid-frequency sounds—sounds between 1000 and 2000 Hz
- noise—ambient or background sounds interfering with the signal
- perception—the way a sound is heard or interpreted by the auditory system
- phoneme—small unit of speech sound
- signal-to-noise ratio (SNR)—the comparative level of the signal in relation to the ambient or background noise
- spectrogram—visual representation of speech sounds showing the energy of speech at specific frequencies
- thresholds—the quietest sound a person responds to about half the time
- transitions—how a sound gets or transitions from one phoneme to the next while speaking
- variant energy—the energy that can be changed and can vary

Basics of Sound

Sound perception is described by three dimensions: duration (length of the event), intensity (perceived as loudness), and frequency (perceived as pitch). Loudness is measured in decibels (dB) and is represented on an audiogram, discussed below.

Pitch is the perception of a sound as being high or low frequency and can be measured objectively in units of hertz (Hz). A low-pitch or bass sound would have a smaller measurement in hertz in comparison to a high-pitch sound. Duration of a sound, or the length of a sound, provides information that differentiates speech sounds, such as vowels versus consonants (e.g., the vowel /a/ is a long sound, and it can be made to have a longer duration, whereas the consonant /b/ is a short sound with a short duration).

Audiogram

A detection audiogram is a line graph of the dimensions of sound that indicates what a person hears. It represents the intensity level where a threshold is measured for a designated frequency. Sounds are indicated based on the graph's horizontal and vertical axes. Sounds below or louder than the indicated line can be heard, while those above the line cannot be heard.

The frequency of the sound is represented on an audiogram graph from low to high on the horizontal axis. It is similar to a piano keyboard that has keys ranging from low on the left to high on the right. Let's continue with the analogy of a piano that has 88 keys—the note at the middle of the keyboard, middle C, is about 250 Hz—where audiograms typically begin. An octave, or octave band, is represented by eight notes on a keyboard. An octave represents a measured doubling of the Hz (e.g., 250 Hz, 500 Hz, 1000 Hz). An octave band includes frequencies lower and higher than the named center frequency. For example, the octave band for 250 Hz, with 250 Hz as the center point, ranges from 177 to 355 Hz. The next octave band of 500 Hz is from 355 to 710 Hz. The frequencies in hertz are written across the top of the audiogram. An audiogram includes the frequencies that are most critical for hearing speech sounds but represents less than half of the keys on a piano.

The intensity of sounds is indicated from quiet to loud in decibels as one goes down the vertical axis of the audiogram. A quiet sound, such as the wind rustling leaves in a tree, would be between 10 and 20 dB (Sengpiel, n.d.). A jet airplane taking off overhead would be about 140 to 150 dB, which is the threshold of pain for a listener with typical hearing. (Sengpiel, n.d.; Center for Hearing and Communication, n.d.). Conversational speech has quiet and louder components as well as low- and high-frequency components. Normal conversational speech ranges from about 30 to 60 dB and from 250 to 6000 Hz when at a distance of about 6 feet (about 2 meters). The area on the audiogram that includes the acoustic range speech elements is most commonly referred to as the *speech banana* (Northern & Downs, 1984) or the *long-term average speech spectrum* (LTASS) (Stevens et al., 1947; Niemoller et al., 1974). The goal is to achieve detection thresholds at the top of the speech banana, but perception must be assessed beyond merely detection abilities.

In audiology, noise level is compared with the signal or message being provided to the listener. The signal to noise ratio (SNR) is the comparative level of the signal in relation to ambient or background noise. If the signal is 65 dB and the noise level is 50 dB, then the signal is 15 dB louder than the noise. The SNR would be considered +15 dB. An SNR of +6 would mean the signal is 6 dB louder than the noise. A 0 SNR would be when the signal is equal to the noise. If the noise is louder than the signal, the SNR would be a negative number. For example, if the noise was 80 dB and the signal was 70 dB, we would have a –10 SNR.

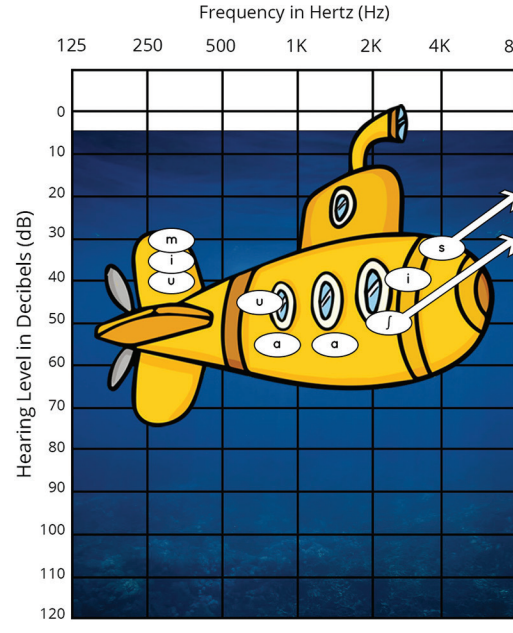

Figure 1–1. Audiogram representing normal hearing levels.

A Sound Basis: The Applications

Hearing Loss and Detection

The analogy of a submarine is effective when considering an audiogram and hearing loss (Rotfleisch, 2000). To help the reader understand hearing loss, Figure 1–1 compares an audiogram and hearing levels and speech to the water level and a submarine. The audiogram, the threshold levels of the hearing, can be indicated by the water level which represents the "X" and "O" symbols on the audiogram (Ling, 2002). Technology does not improve hearing loss—it increases the intensity or accessibility of the signal presented to the ear, cochlea, or brainstem. Although an aided audiogram may appear to show improved thresholds, what is actually happening is increased access to sound. Submarines belong below the water; in this analogy, below the audiogram line. We make the signal more accessible to compensate for the hearing loss. In the submarine analogy, the speech signal is submerged below the audiogram line, representing greater accessibility despite the underlying loss. The submarine is submerged on the audiogram, and the increasing depth represents the increase in decibels. One can conceptualize sinking the submarine by increasing the auditory intensity of the speech signal (see section on modifying auditory signal). The analogy continues in that anything under water (i.e., the thresholds) can be heard, while those sounds which are above water can't be heard. An increase in decibels of the signal means an increase in the depth at which the submarine is submerged and an increase in the signal accessible.

Thresholds can be difficult to assess in children who have hearing loss. Threshold, for an audiogram, is defined as sound that we hear 50% of the time. It requires concentration on the part of the listener. Consider the threshold line on an audio-

gram like the water of the ocean at the beach. Threshold is like your toes being in and out of the water as the waves roll in and recede. That is how fine the line is for threshold. However, we don't listen to speech and language at threshold level. We must sink the submarine, and we do that by increasing the intensity of the signal, allowing more of the sound to reach the brain. Remember, sounds above the threshold line represented by the water (Figure 1–2) are not accessible with a hearing loss.

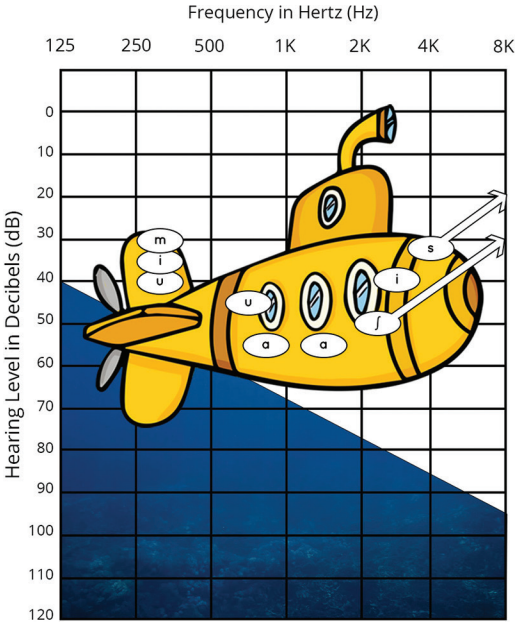

Figure 1–2. Audiogram representing a hearing loss.

Audible Versus Intelligible

An audiogram is a graph of detection of the sounds that can be heard by a person. Thus, an audiogram indicates what is audible. However, just hearing the sound is not an indication of the quality of the sound or whether it can be discriminated and identified. The sound might not be adequately loud to provide for the needed perception for intelligibility of the word. Younger children require a louder level of signal for audibility to learn and understand compared with older children and with adults. A young child of 3 years would need a 38 dB signal, whereas a 5-year-old would need 25 dB to understand 100% of the speech (Anderson, 2011).

Therefore, hearing (that is, detecting) words and discriminating them as different by number of syllables (e.g., sneak versus sneaking) might be possible. That would be an indication of audibility. We must determine if the child has enough auditory signal to allow for access to sounds that are critical to understanding the differences of sounds and words. Intelligibility means the listener can understand the important difference among *sneak*, *sneaker*, *sneaking*, *sneaky*, and *sneaks* (see the section on the 90/10 dilemma in this chapter). In therapy, we assess whether a child can move beyond mere detection to discrimination and identification of sounds and words. Parents must also grasp this distinction: hearing a sound is not the same as identifying the critical differences to understanding it. Sensation level influences intelligibility and is discussed in Section IV.

Modifying the Signal

How can we modify the signal to improve the outcomes in sessions and the long-term outcomes? With understanding of the dimensions of sounds and principles related to the audiogram, we can look at practical ways to apply this information to improve the auditory signal. Consistent use of technology is the first step toward