THE ALLYN & BACON COMMUNICATION SCIENCES AND DISORDERS SERIES

Language Disorders in Children

Fundamental Concepts of Assessment and Intervention

Second Edition

Joan N. Kaderavek

SECOND EDITION

Language Disorders in Children

Fundamental Concepts of Assessment and Intervention

Joan N. Kaderavek
University of Toledo

PEARSON

Boston Columbus Indianapolis New York San Francisco Upper Saddle River
Amsterdam Cape Town Dubai London Madrid Milan Munich Paris Montreal Toronto
Delhi Mexico City Sao Paulo Sydney Hong Kong Seoul Singapore Taipei Tokyo

Vice President, Editor in Chief: Jeffery W. Johnston
Acquisitions Editor: Ann Davis
Project Manager: Annette Joseph
Program Manager: Joseph Sweeney
Editorial Production Service: Jouve North America
Operations Specialist: Linda Sager
Electronic Composition: Jouve North America
Interior Design: Jouve North America
Cover Design: Bruce Kenselaar
Cover Image: © Monkey Business Images / Shutterstock

Credits and acknowledgments borrowed from other sources and reproduced, with permission, in this textbook appear here and on the appropriate page within text. Chapter opener image: By Adr/Fotolia

10 9 8 7 6 5 4 3 2 1

PEARSON

ISBN 10: 0-13-335202-1
ISBN 13: 978-0-13-335202-3

With love and gratitude to my husband, Dave

This page intentionally left blank

About the Author

Joan Kaderavek, Ph.D., began her professional life as a clinical speech-language pathologist; she worked with children with language disorders in a community nonprofit clinic and Head Start early childhood programs. In recent years, she has been named a Distinguished University Professor at the University of Toledo for her work teaching speech-language pathologists, early childhood educators, and special educators about children's language development and language disorders. Dr. Kaderavek is a Fellow of the American Speech-Language Pathology Association and has been awarded Honors of the Ohio Speech-Language-Hearing Association.

Dr. Kaderavek is a frequent presenter and author in the area of language development, early literacy, and teacher–child classroom interactions. She has had more than 50 peer-reviewed articles in leading journals. Her research considers the effects of educational interventions on children's language development and educational achievement. She has examined the effects of a teacher-provided book-reading intervention on children's literacy development and currently is conducting research on the impact of classroom science instruction on the language development of young children. She is a co-investigator on a large-scale, 5-year grant to support this work, funded by the National Science Foundation.

This page intentionally left blank

Preface

This book considers issues of assessment and intervention for children with language impairments. It is written for undergraduate students who are just beginning to think about how to work with children who are language impaired. The assumption is that a student who uses this book will have already completed a course on normal language development.

I have developed the principles used in this book over a number of years of teaching undergraduate speech-language pathology and special education students. Many undergraduate books provide an overview of terminology and describe a broad range of assessment and intervention approaches. As a teacher, I discovered a problem with using such books. The books (and the way I was teaching—primarily with lectures) allowed students to stay in a passive learning mode. Students were able to successfully pass tests at the undergraduate level; but these "good students" were not prepared to begin the analytic thought and problem solving that I expected (and they needed) in graduate-level training. I decided the problem was not with the students but with the way I was teaching! My efforts to become a better teacher are reflected in the first overarching theme of this book.

I decided that rather than just expect students to memorize terms and answer short-answer questions (e.g., *List three communication characteristics associated with autism spectrum disorder*), I wanted to begin to train students to "think like a clinician." I wanted to change my focus to an emphasis on the processes that highly skilled speech-language pathologists (SLPs) and educators use to make assessment and intervention decisions. I realized that I couldn't give students all the facts they needed to know at the beginning level of training. However, I could provide multiple activities that would motivate students to think deeply, ask questions, and solve problems. I also realized that students need to "talk through" a particular problem or process. If I described a problem (and the solution), students nodded wisely and wrote down what I said. When I asked if anyone had any questions, no one raised a hand. But when I asked the students to explain to a small group or a peer what they had just learned, they could not verbalize the issue that had seemed so clear just a moment before.

I began a different kind of teaching. I started each day with a mini-lecture that I tried to keep under a half hour. Then I had students work in groups. I varied the activities. I found that this approach worked very well in face-to-face classes and also when I taught courses via distance learning. Rather than having the students only demonstrate knowledge with objective tests, I set up weekly activities during class time. I asked students in a distance learning class to complete the activities individually, with a partner, or in a small group (depending on the weekly project). I began to include activities such as these:

- I gave the students a decision tree and asked them to put a few descriptive words in each of the decision tree boxes, capturing the communication behaviors they might expect to see at each point in the decision-making process. Students explained the decision tree to a partner. I provide decision trees throughout this book.
- I gave the students simplified versions of assessment tools (trying to capture the essential elements of the decision-making process) and asked students to view videotapes

and begin to classify behaviors using the assessment tools. I realized that students' administration might not be highly accurate! However, the emphasis was on having students verbalize *why* they choose to classify behaviors in a particular way. I provide simplified versions of assessment tools in this book.

- I realized that students needed to "put words into their own mouths." I used activities in which students had to role-play an explanation to a teacher or parent. (A student could write out a script if the course was taught via distance learning.) Information that seemed easy to students during a lecture suddenly presented challenges when the students were asked to teach someone else! I include many suggestions for role-playing in the chapter activities.
- I began to iteratively come back to major points and have students explain to each other (or to the class as a whole, or write down and submit to me) how the fundamental principle applied to the current issue. So, instead of only teaching information on the theories of language development at the beginning of the course, I wanted students to retain old information and apply it to their new learning. For example, in a discussion on intellectual disability, I said, "Working with the person next to you, write down how social interaction theory, behaviorism, and systems theory might apply to our work with an individual with an intellectual impairment." As I walked around the classroom, students asked many questions and actively engaged in solving "the problem." I mirror this technique in many of the "Focus" boxes and "Discussion and In-Class Activities" assignments that occur in each chapter. I also iteratively present information on language theory, form–content–use, and typical development throughout this book and link theoretical information to assessment and intervention decision making.
- I developed a "numbered" system for talking about language subdomains. Previously, I had typically presented the concepts of form, content, and use in the parallel form (as it was taught to me). However, I was frustrated that during case example problem-solving activities, students didn't know where to start; they appeared to "randomly" focus on a domain (e.g., syntax for a child who was at the beginning language learning stage). I wanted students to move sequentially through a thought process that first considered an individual's beginning pragmatic skills and then single words and word combinations, then syntax, and so forth. I created subdomain numbering (introduced in Chapter 2 of this book) to provide a scaffold for this problem-solving task. The communication subdomains and information about four theories of language development are now introduced in Chapter 2 in this second edition of the textbook.
- I began talking to students about *connections* when I introduced new topics. I linked new information to previous information and also discussed how the information might apply more broadly across disorder types. I used the educational principle of helping students move from the known to the unknown. I mirror this approach in this book by including a section called *Connections* in many of the chapters. The *Connections* sections are linkages to previously learned concepts (e.g., applying the form–content–use model to children with autism spectrum disorder) or include discussions of information that can be applied broadly across disorder types (e.g., counseling families).
- Finally, and most importantly, I began to explicitly teach "meta" problem-solving skills. I tried to always explain why an SLP or educator might choose one approach over another or clarify the underlying analytic process fundamental to the task. I gave examples and then asked students to discuss possible solutions to the problem *and* provide a rationale for their decision. I told students: "Right now it is not important if you are wrong or right with your clinical decisions. I might make a different clinical

decision than you. But what I want from you right now is to give me a *reason* (based on language theory or researched evidence or family concerns) to support your decision. That is your task at this early stage in professional training." With this approach, students started to take chances and hypothesize about a particular assessment or intervention strategy for a specific child. At the end of a discussion, I typically shared my thoughts and explained why I might make a different clinical decision than a student. But, before giving my opinion, I wanted students to begin to make decisions about intervention approaches that might work, based on their current knowledge. Throughout this book, I provide examples, case studies, and ideas for class discussion to stimulate this process. Chapter 4, which is about clinical decision making, grew out of my efforts to teach "meta" processes.

In sum, I began to be a better and more effective teacher for undergraduate students. This book is the result.

I am pleased that other instructors find that using these techniques helps students learn. After publication of the first edition, I was gratified to receive enthusiastic endorsement from instructors who had adopted the textbook for their courses on language disorders. Instructors wrote and shared that students "read this textbook closely" and that "the communication subdomain model is referred to throughout the academic semester."

A second overarching theme of this book is current issues central to speech-language pathology and special education. This includes discussions of evidence-based practice (EBP), response to intervention RTI, classroom-based assessment and intervention, use of iPads and apps during treatment for communication disorders, and connection building between oral language and literacy learning.

To this end, I give specific attention to each issue in one section of the book but come back to each topic in other chapters. My intent is not to be redundant but to make it clear that certain topics affect broad aspects of service delivery and decision making. My emphasis on EBP is also represented in my decision to present only two or three intervention approaches for each of the disorder groups. Rather than present a full range of possible intervention approaches (without a detailed discussion), I wanted to discuss relevant research for select exemplary approaches and explain how they represented "levels of evidence" within EBP.

I used to wait until graduate-level training to expose students to primary research. I now believe, with the emphasis on EBP, that students need exposure to primary research at the beginning training level. I hope instructors will supplement my discussions of intervention by providing examples of primary intervention research. Students need to begin to evaluate the quality of primary research.

NEW TO THIS EDITION

- **EBP is introduced in a newly organized Chapter 1**; the concepts of EBP are then referenced in discussions of high-quality interventions throughout the book.
- **Elimination of a separate chapter on multicultural issues**; multicultural issues are now is integrated throughout the textbook. The connections to multicultural issues are clinically relevant and practice oriented. Instructors can use this information to help students become more sensitive to nonmajority students and their families.
- **Updated information and research throughout the text** ensures that students are learning the most current information about language disorders.

  - Information and implications of DSM-5 is included throughout the text, specifically as it relates to children who are on the autism spectrum.
- **A revised approach to teaching students about language theories** (Chapter 2) consolidates language theories into four basic theoretical approaches: social interactionist, behaviorist, cognitive constructivist, and emergentist. This streamlined presentation allows students to focus on the underlying theoretical principles impacting language intervention and assessment.
- **Two new appendices** provide step-by-step tutorials to T-unit analysis and language analysis of children who demonstrate African American English.
  - The new appendices add to the clinically practical and instructor-friendly appendices from the First Edition (i.e., standardized scoring tutorial, form for language analysis of children with early developing language, example of a language assessment report).
  - The appendices allow instructors to easily incorporate practical hands-on activities into their distance-learning or face-to-face course on language disorders.
- **Chapter 7 provides a balanced description of challenges and opportunities for children with hearing loss** who are learning to speak and listen as well as rationale for introduction of sign language for some children with hearing loss.
  - Research and interventions for children with hearing loss has been updated with the most current data.
- **Chapter 10 focuses on reading, writing, and spelling interventions** for young emergent readers as well as for older school-age students.
  - A model of literacy intervention also is described for students with significant levels of language disability.
- **Chapter 11 on Augmentative Communication has been updated** to include information on iPads and software "applications" (i.e., apps) and their use for students with complex communication needs.

I have enjoyed my years as a practicing SLP, and I am committed to teaching students to "think like a clinician." My greatest hope is that this textbook helps that occur for the students who use it!

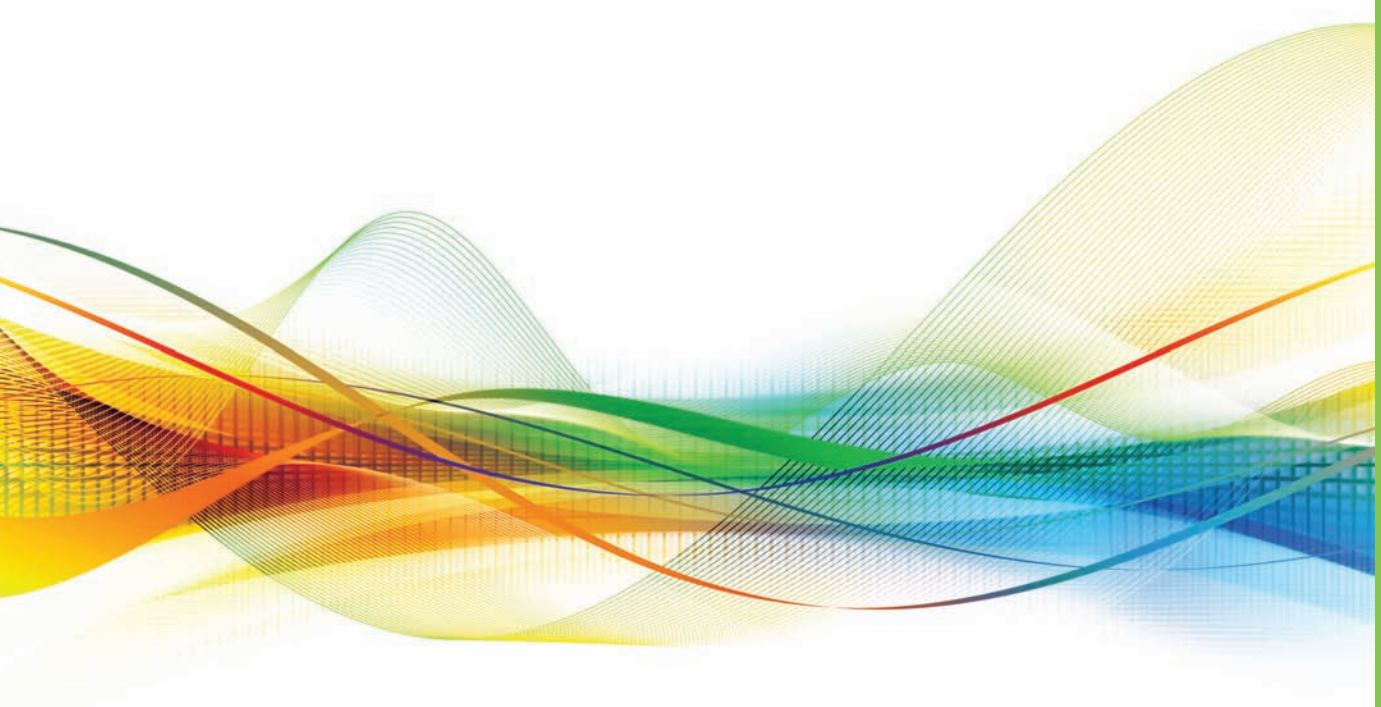
ACKNOWLEDGMENTS

Thank you to my husband, Dave (who helped prepare the permission requests for the second edition of this book); to my children, Megan Kaderavek Tsai and Brian Kaderavek; and to my granddaughter, Natalie, who keeps me optimistic about the future!

I'd also like to thank the reviewers of this edition: Valerie Boyer, Southern Illinois University; Deborah C. Cook, Springfield College; and Stephen D. Oller, Texas A&M University—Kingsville.

Contents

This page intentionally left blank



1 The Foundations of Language and Clinical Practice

Chapter Overview Questions

1. What are the differences between a language disorder, a language difference, and a language delay?
2. What are the three levels of communication described in the speech chain? Which level is the focus of this book?
3. What are examples of communication behaviors that represent form, content, and use?
4. What differentiates Level I, Level II, Level III, and Level IV research in evidence-based practice (EBP)? How does an interventionist use EBP to guide intervention?

Welcome to this book about language disorders. The language disorders course in which you are now enrolled is probably your first course focusing on children with communication deficits. Up to this point, your training has concentrated on communication development in children who are developing typically. It is an exciting professional turning point when you begin to consider how to guide assessment and interventions for individuals with language disorders.

This book's goal is to help you think like a practitioner. I focus on underlying theories and fundamental principles guiding clinical decision making. The ability to synthesize information, weigh scientific evidence, and see connections between basic principles will prepare you to work with children who have language impairments.

One book on language disorders cannot teach you everything you need to know to be a successful speech-language pathologist (SLP) or special educator. This book does not try to teach you everything! Instead, I have chosen to (a) emphasize basic principles and then (b) discuss selected assessment and intervention protocols as illustrative examples. I believe that at this early point in your professional training, it is better to provide more extensive information and examples for some exemplary assessment and intervention approaches (and clarify why they are exemplary) than to briefly describe many different approaches.

To help you become a decision maker, I include many examples, case studies, and opportunities for you to practice problem solving. By working through the examples, you will learn important analytic processes. In this chapter, I introduce four important cornerstones of the profession: (a) definitions for and background on language and language disorders; (b) a model of communication (i.e., the speech chain model); (c) the language domains of form, content, and use; and (d) a clinical decision-making model called evidence-based practice.

Definitions and Background Information: Language Disorders

Understanding the difference between definitions is an important cornerstone of the field of communication disorders; specifically, there are differences between the terms *language, speech,* and *communication*. **Language** is a complex and dynamic system of conventional symbols used for thought and expression. Language can be expressed orally, through writing or pictured symbols, or manually (e.g., sign language).

Speech is not the same thing as language. Whereas language involves a symbol system, **speech** is the articulation and the rate (i.e., fluency) of speech sounds and the quality of an individual's voice. **Communication**, in contrast, includes symbolic *and* nonsymbolic information (i.e., facial expressions, body language, gestures, etc.). As an example, if I frown and cross my arms, although I am not using symbolic communication, I am communicating! A communication disorder may be evident in the process of hearing, language, speech, or in a combination of all three processes.

In U.S. schools, children with speech and language disorders (as a specific diagnostic category) make up 2.9% of the total school population. In addition, there are other subgroups of children who are not counted in this group who also have language disorders. Practitioners serve children who have hearing loss (0.2% of schoolchildren), multiple disabilities (0.3%), intellectual disabilities (0.9%), and learning disabilities (4.9%; NCES, 2012). Each of these subgroups demonstrates language impairments. Eighty-three percent of the SLPs who work in schools report that they regularly work with students with language disorders (American Speech-Language-Hearing Association [ASHA], 2012).

A **language disorder** is impaired comprehension and/or use of spoken, written, and/or other symbol systems. A language disorder can represent a deficit in receptive language, expressive language, or a combined expressive–receptive deficit. **Receptive language** refers to an individual's ability to understand and process language; **expressive language** refers to an individual's ability to express and communicate meaning with language. Typically, an individual's receptive language abilities are better than his or her expressive language abilities.

Sometimes a young child (2 to 3 years old) who exhibits a developmental lag in language is said to have a **language delay**, be a **late talker**, or have **late language emergence**. This terminology is used because experts state that a language disorder cannot be reliably diagnosed in young children in the absence of a primary disorder (e.g., intellectual disability, autism; Bishop, Price, Dale, & Plomin, 2003; Rescorla, 2009).

An individual with a language disorder is different from someone with a language difference. **Language difference** results from a variation of a symbol system used by a group of individuals that reflects and is determined by shared regional, social, or cultural/ethnic factors. It is essential that professionals distinguish between aspects of language production representing dialectal patterns (i.e., language difference) and true disorders in speech and language (ASHA, 2003b). For example, a teacher may say to her students, "*I've got y'all's assignments here.*" This is a form of dialect associated with the southern United States; although it may be an unfamiliar expression to some U.S. speakers, it does not represent a language disorder. Information regarding language difference associated with dialect use is presented throughout this book.

As a final important point, I want to underscore that much of what you will learn about language disorders applies across disability categories. Rather than focusing on a child's diagnostic category (e.g., autism, specific learning disability), skilled practitioners use a descriptive-developmental framework to guide intervention. A **descriptive-developmental approach** focuses on a student's language development and function in a variety of natural contexts (Zipoli & Kennedy, 2005). A practitioner who uses a descriptive-developmental approach works to understand an individual's communication strengths and limitations rather than focusing on his or her diagnostic label. This is a particularly important point, because I have organized the chapters in this book by disability category. There is, for example, a chapter on autism, a chapter on intellectual disability, and so forth. I organize chapters by disability categories because, in my teaching experience, I have found that beginning practitioners learn most easily with this organizational strategy. However, to counterbalance my organizational strategy, I continually clarify descriptive and developmental similarities between disability groups and highlight connections between intervention approaches across disability types. Read more about categorical versus descriptive approaches in Focus 1.1.

The Speech Chain

The **speech chain model** is a basic model of communication used to explain the processes of communication from the speaker's production of words, through transmission of sound, to the listener's perception of what has been said (Denes & Pinson, 2001). I present this model to point out how language fits into an individual's communication system. The speech chain model is visually presented in Figure 1.1.

The first point I want to emphasize is that the speech chain model reminds us that language has both a receptive and expressive component. The speaker/listener role is visually represented in Figure 1.1 with the left-to-right nature of the diagram. A good communicator speaks *and* listens. Within a conversation, a person alternates between listening (using receptive language) and speaking (using expressive language). A competent communicator effortlessly comprehends the listener and produces meaningful language output. Remember that language output can be represented by spoken language, writing, or manual communication (i.e., sign language).

FOCUS 1.1 *Learning More*

The categorical model organizes language disorders on the basis of an individual's syndromes of behavior; it is fundamentally a medical model. Its advantages are that it (a) is easily understandable, (b) often is necessary in qualifying a child for educational services, and (c) provides a basic explanation of how a particular child may be different from other children. The limitations of the categorical model are the following:

- There is not always a cause–effect relationship between an individual's diagnosis and his or her language impairment. Does a hearing loss mean that a child will automatically have a language delay? (You will read more about this in Chapter 7.)
- Children with different diagnostic labels may be quite similar. A child with a pragmatic disorder may be classified as having autism, intellectual disability, or specific language impairment.
- Children's degree of impairment may vary dramatically within a diagnostic category. For example, a child with autism may be very mildly impaired; the diagnostic label may unfairly prejudice teachers or communication partners with regard to the child's abilities.
- Knowing a child's diagnostic classification may not be very helpful in planning an intervention program. SLPs, instead, use a decision-making process based on an individual's communication strengths and limitations.

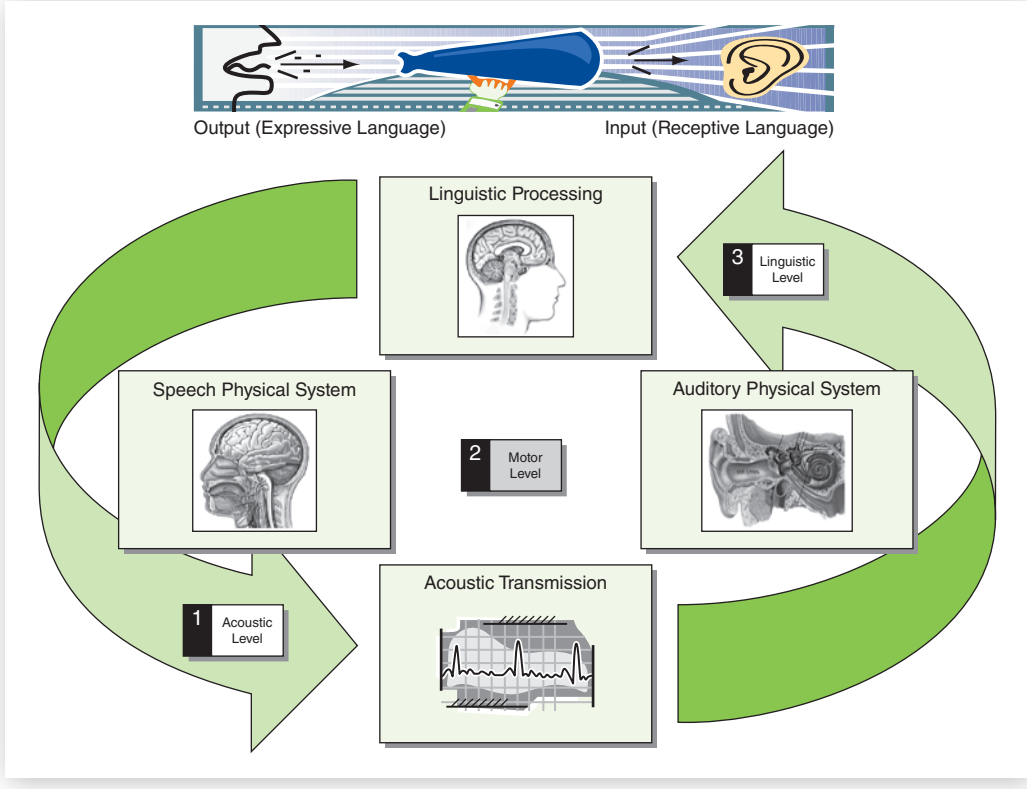
The second point about the speech chain is that the communication system requires a number of mechanisms to occur. Acoustic information must be transferred (Level 1 in Figure 1.1), motor activity must take place (Level 2), and the brain is activated at Level 3 to create meaningful symbolic (i.e., linguistic) information. All three levels of the system must be operating effectively for communication to occur. I elaborate on each of the three levels below.

Level 1 represents the acoustic level of communicative function: the external or environmental system. This level describes how physical energy is transferred between communication partners. In its simplistic form, Level 1 represents the molecular vibration forming sound waves and transferring physical energy from the speaker to the listener. It is very likely that you studied the external physical component of communication in a course called Speech Science or Physics of Sound.

Level 2 represents the internal physical/motor system required for communication. In the listener, the physical system consists of the hearing mechanism and the transfer of neural messages to the brain's language center. In the speaker, Level 2 represents the speech system, including respiration, articulation, and phonation. The physical speech systems must be coordinated to produce intelligible speech. It is likely that you studied aspects of Level 2 motor communication in a course called Anatomy and Physiology. You will learn about disorders occurring in the speech system in coursework covering articulation disorders, motor-speech disorders, and voice disorders. You will learn more about Level 2 (i.e., physical) hearing problems in your audiology coursework.

Level 3 of the speech chain model represents the linguistic component of communication. Level 3, the linguistic component, is the focus of this book. The linguistic level is the ability of the listener to receive incoming Level 2 energy (i.e., neural signals) and turn the

Figure 1.1 **The Speech Chain Model**



physical energy into meaningful information via receptive language. The speaker creates meaningful linguistic information at Level 3.

The speech chain model emphasizes the complexity of the communication system and helps you integrate what you are learning in this course with other coursework. As you progress through your professional training program, continue to frame new knowledge within this basic model of communication functioning.

Let's now move beyond the speech chain model and consider the three fundamental language domains of form, content, and use.

Form, Content, and Use: The Cornerstones of Language

To become an effective linguistic communicator, a speaker must master three language areas: the *form* of the message, the *content* of the message, and the message *use*, or function. Language form includes phonology, morphology, and syntax (i.e., the structure of language). Language content consists of semantics (i.e., meaning of language); language function consists of pragmatics (i.e., how language is used within social contexts). See Table 1.1 for formal definitions and examples of each of these terms.

Table 1.1 Language Definitions

Form

Morphology is the system that governs the structure of words and the construction of word forms.

> Example: At age 13 months a child says, "*Two birdie!*" and by 24 months says, "*Two birdies!*" The child has learned to add the *s* morpheme to indicate a plural form.

Syntax is the system governing the order and combination of words to form sentences and the relationships among the elements within a sentence.

> Example: At age 24 months a child asks a question by saying, "*Doggie outside?*" With this utterance, the child omits the copula verb *is* needed for a question form; this is a typical error at 24 months. However, by 36 months the child says, "*Is the dog outside?*" In the second instance, the child demonstrates understanding of English word order by placing the copula verb *is* at the beginning of the sentence, demonstrating the use of interrogative reversal syntax form.

Phonology is the sound system of a language and the rules that govern the sound combinations. To learn more about phonology and phonological disorders, go to the ASHA website: www.asha.org/public/speech/disorders/ChildSandL.htm.

Content

Semantics is the system that governs the meanings of words and sentences.

> Example: At age 11 months the child calls out, "*da-da*" whenever she sees a male. But by 15 months she only calls "*da-da*" or "*daddy*" for her father; she says "*man*" for unfamiliar men. In the first example, the child overgeneralizes the meaning of *daddy,* using it to refer to any male figure. This is a common early semantic pattern. As semantic knowledge develops, the child learns the meaning of the word *daddy* and uses this word only for her father.

Use

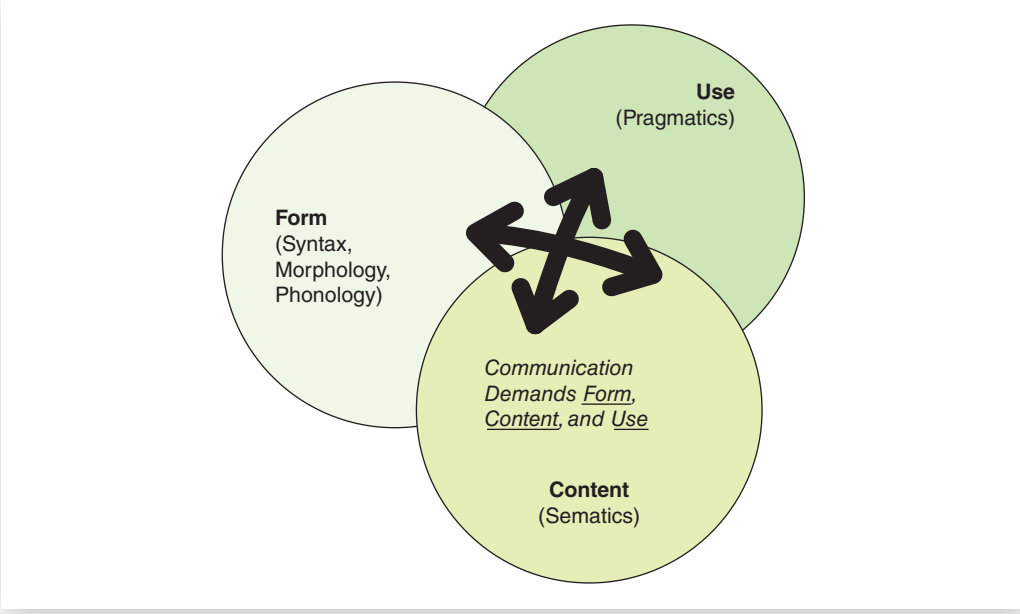
Pragmatics is the system that combines the language components described above in functional and socially appropriate communication.

> Example: A child tugs on his father's pants and points to the TV. This is an example of a nonverbal request.

Source: Based on information from *Definitions of Communication Disorders and Variations [Relevant Paper],* 1993, American Speech-Language-Hearing Association (ASHA). Available from www.asha.org/policy.

Lois Bloom and Margaret Lahey (1978) developed the form–content–use language model and demonstrated how the three language areas intersect during communication (see Figure 1.2). The interlocking circles in the diagram are a reminder that (a) vocabulary (i.e., semantics) is used to produce (b) sentences involving the use of syntax structure and morphology, and that sentences are meaningless without (c) proficiency in language use. Lahey (1988) proposed that language disorders are caused when there is a disruption in language form, content, or use or a combination of disordered components. The interlocking circles (i.e., Venn diagram) representing form, content, and use remind us that the three domains are interdependent and that an effective communicator demonstrates

Figure 1.2 **Form, Content, and Use Diagram**



Source: Lahey, Margaret, *Language Disorders and Language Development*, 1st, © 1988. Printed and Electronically reproduced by permission of Pearson Education, Inc., Upper Saddle River, New Jersey.

proficiency in all three domains. The form–content–use model is used widely in the communication disorders literature. You will learn about an elaborated version of the form–content–use chart, something I call the **communication subdomains**, in Chapter 2.

Evidence-Based Practice: A Cornerstone of Clinical Practice

Just as form, content, and use are the cornerstones of how language specialists think about language, there is another approach that has dramatically changed how practitioners think through clinical questions and make decisions about language intervention. This approach is called evidence-based practice (EBP). EBP refers to the process that practitioners use to evaluate whether a clinical practice, a strategy, a program, a curriculum, or an intervention is backed by rigorous evidence of effectiveness and whether a practice is appropriate for a particular individual.

EBP: INTERNAL AND EXTERNAL EVIDENCE

SLPs use both internal and external evidence in their EBP decision making. **Internal evidence** is provided by (a) an individual client's perspective and beliefs and (b) an SLP's clinical expertise. The contribution of internal evidence is part of ASHA's definition of EBP: "An approach in which current, high-quality research evidence is *integrated with practitioner expertise and client preferences and values, into the process of making clinical decisions*" (ASHA, 2005, p. 1).

But internal evidence is not enough to guide EBP: As you can see from the first part of ASHA's definition (i.e., "An approach in which *current, high-quality research evidence* . . ."), EBP also requires external evidence. **External evidence** consists of well-designed and controlled experimental studies that result in experimental data; by analyzing study results, a practitioner can determine whether a particular clinical practice is effective (Dollagen, 2007). Randomized controlled trials (RCTs) are considered the "gold standard" for evaluating the effectiveness of an intervention. RCTs are studies that randomly assign individuals to an intervention group or control group to measure intervention effects. The results of RCTs are used to guide clinical practice in medicine, education, and psychology, as well as in the field of speech-language pathology (Coalition for Evidence-Based Policy, 2003).

As an example of RCT, suppose you want to test whether a particular curriculum for English language learners (ELLs) is more or less effective than your school's existing curriculum for ELLs. You randomly assign a large number of ELLs to either an intervention group that uses the new curriculum or to a control group that uses the existing curriculum. You measure the academic achievement of both groups over time. The difference in achievement between the two groups represents the effect of the new curriculum compared to the existing curriculum.

As you can imagine from this example, completing an RCT is time-consuming and expensive. Also, SLPs and special educators typically work with individuals who have low-incidence disorders. They therefore often cannot assign large numbers of students to one intervention or another. Consequently, in the EBP decision-making process, practitioners evaluate a range of experimental designs to determine whether a particular clinical practice meets the definition of *high quality*. We call this a tiered approach to evaluating external evidence the **levels of evidence** in EBP.

EBP: EVALUATING RESEARCH QUALITY

Because not all experiments consist of an RCT, an SLP evaluates the experimental studies that are available regarding a particular clinical practice and considers the study's experimental level of evidence. The levels of evidence are on a continuum from the highest level (Level I) to the lowest level of clinical evidence (Level IV). As previously stated, the best research is produced by an RCT; **Level I** evidence resulting from randomized experimental research is considered the best research design. Level I evidence also includes meta-analyses. A **meta-analysis** is a specialized form of systematic review in which the results from several studies are summarized using a statistical technique resulting in a single weighted estimate of the results' findings. **Level II** research reflects high-quality, but nonrandomized, experiments. **Level III** evidence reflects well-designed nonexperimental studies and case studies. A nonexperimental design is typically a description of clinical results implemented with a small group of students without the use of a comparison treatment. **Level IV** represents expert opinion. (See Table 1.2 for a summary of the levels of evidence.)

EBP: FACTORS CONTRIBUTING TO RESEARCH QUALITY

Now that you know about the levels of evidence, let's consider how practitioners evaluate a study's research quality. Let's start with Level I. Remember that Level I research reflects the most rigorous investigation standard because studies assigned to Level I (a) compare performance of two or more groups of students (i.e., control group design) and (b) randomly assign students to one group or the other.

Table 1.2 Levels of Evidence for Scientific Studies

Level	Criteria
Level I	• Evidence from one well-conducted randomized clinical trial. • Systematic review or meta-analysis of high-quality randomized controlled trials.
Level II	• Similar findings demonstrated from nonrandomized experiments (with good experimental design) from several different researchers.
Level III	• Well-designed nonexperimental studies (i.e., correlational and case studies).
Level IV	• Expert committee report, consensus conference, clinical experience of respected authorities.

Source: Information from ASHA, www.asha.org/members/ebp/assessing.htm.

Comparison of the effects of different treatments is the "heart and soul" of Level I research; in the best-case scenario, two different *interventions* (also called *treatments*) are compared. The ELL curriculum study described above is an example of two comparison treatments.

Sometimes, however, instead of comparing the effects of two different treatments, researchers compare students in a treatment condition with students who receive no treatment (i.e., treatment vs. no-treatment design). In the no-treatment group, students continue with their regular school or home activities but do not receive any special intervention. Although comparison between treatment and no-treatment groups is an acceptable Level I design, it is not as strong as comparison of two different treatments. Consider that in the treatment vs. no-treatment design, students in the treatment group may improve because they receive regular, positive interaction with an attentive adult; student gains may not be directly attributable to specific characteristics of the intervention. Comparison of two different treatments solves this problem.

Subject randomization also is an important component of Level I research. In a randomized research design, a group of students consent to participate in a study. After the researchers obtain consent, they randomly assign the students to the treatment group or the comparison group. Randomization adds certainty to the interpretation of results. If randomization is not used, there is a possibility of bias. For example, imagine that I say, "I would like you to participate in a study on the effects of exercise. You can choose to be in a group in which you will exercise four times a week, or you can choose to be in a group that exercises two times a week." In this situation, it is likely that individuals with specific character traits (perhaps highly motivated individuals) will choose to be in the group that gets more frequent exercise; less motivated individuals may choose the two-times-per-week group. Study results would then potentially represent variations in motivation levels rather than compare exercise effects. Random assignment increases the validity of experimental results.

Other factors contribute to the evaluation of research quality. An overall goal of high-quality research is to (a) limit any extraneous factors that could potentially contaminate the results, (b) determine that participants in the group are similar except for treatment exposure, (c) document results with highly reliable and valid measures of performance,