

**RESEARCH in COMMUNICATION
SCIENCES and DISORDERS
METHODS FOR SYSTEMATIC INQUIRY**

Fourth Edition

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PREFACE

When Dr. Lauren Nelson finished the first edition of this textbook in 2010, evidence-based practice, the use of research to inform clinical decision making, was an emerging concept in the field of communication sciences and disorders. Currently the situation is much different with widespread recognition of the importance of evidence to support clinical practice. Students and professionals benefit from consistent discussion of research evidence throughout the fields of audiology and speech-language pathology. If you browse current books on nearly any communication disorders topic—such as child language disorders, articulation and phonological disorders, adult neurogenic disorders, aural rehabilitation, and hearing aids—you will find a major section or chapter on research evidence. The topic of research evidence has become pervasive throughout our field of study and is a subject in many courses.

For the first time, this textbook has a coauthor. The fourth edition benefits from Dr. Jaimie Gilbert's background in audiology and hearing science. Dr. Gilbert's areas of specialization complement Dr. Nelson's background in speech-language pathology and child language. We both have experience teaching a research course for graduate students in communication sciences and disorders. Only a small number of these students plan to pursue a career in research and/or higher education and the majority anticipate working in a clinical setting as an audiologist or speech-language patholo-

gist; yet, they nearly all express an appreciation of the role of research in the field of communication sciences and disorders. Occasionally students still worry about their motivation, expecting the topics of a research course to be less than exciting. But more often, they have already discovered that research is essential for high-quality clinical practice, and that audiologists and speech-language pathologists need skills to investigate the existing research base and even to conduct their own original research. Our goal in writing this textbook is to help students and professionals develop knowledge and skills in research that will serve them throughout their professional careers.

Students frequently express concerns about the topics they expect to cover in a research methods course. Many of their concerns are similar from year to year and may be concerns you share. Students worry that they would have difficulty understanding the content of research articles, particularly the statistical information. Others describe prior frustration with their attempts to read research reports because they spent considerable time rereading material that was difficult to understand. They think that time management could be an issue, both in “keeping up” with their assigned readings and working on their own research projects. Many students are uneasy about finding a “good” topic for their own graduate research project.

If you have similar concerns, ideally this textbook will offer you some strategies

for tackling those concerns. Recognizing that the way one approaches scientific inquiry is similar to the way audiologists and speech-language pathologists think about assessment and treatment of persons with communication disorders is an important first step. Our students have identified ideas for research projects by understanding that high-quality research stems from genuine curiosity and interest about a topic, and that research in the field of communication sciences and disorders takes many forms. In their personal reflections, students report that repeated practice in reading research articles and a better understanding of the content and structure of those articles helped them use their study time more efficiently and effectively.

The concerns our students express about research and the strategies we developed to address those concerns are the basis for this text. This fourth edition adds a full chapter on writing a literature review. The fourth edition also updates the resources and tools available to assist us in finding and evaluating research evidence. The knowledge and skills needed to engage in empirical research and to use research in clinical practice are comparable, and that is how these topics are presented in this text. Rather than treating empirical research and searching for clinical evidence as separate topics, this text presents both as different applications of a process of scientific inquiry. The order of the chapters reflects the steps a researcher or clinician might complete when conducting an investigation. We recognize, however, that research is not a linear process and sometimes requires revisiting or revising your prior work.

Chapter 1 introduces the topic of scientific inquiry and its different applications in the field of communication sciences and disorders. Because ethical practice is

a primary concern for both clinicians and researchers, Chapter 2 covers responsible conduct of research and ethical issues that affect the design and utilization of research, as well as the challenges associated with securing and using electronic records. Chapter 3 describes how researchers and clinicians might formulate questions as the starting point for their investigations. Some of these questions might be answered in the existing literature and others might be refined based on that literature. Thus, Chapter 4 addresses the information you might need to conduct a good quality literature search using traditional Web-based search engines as well as some new tools that became available in recent years. Chapter 5 is the new chapter on writing a literature review. This chapter incorporates information on citations and references previously covered at the end of Chapter 4. Chapter 5 also provides expanded coverage of organizing and writing a literature review as well as different types of literature reviews. Chapter 6 and Chapter 7 cover the different types of research that are common in the field of communication sciences and disorders and the relationship between these types of research and the evidence audiologists and speech-language pathologists need to support their clinical endeavors. Chapter 8 reviews how researchers select persons to participate in research and issues associated with that process. Chapter 9 and Chapter 10 describe the analysis of research data using various statistical procedures. The final chapter, Chapter 11, covers how researchers and clinicians use the information gathered through their investigations. For researchers this often involves preparation of a research report to disseminate to other professionals, and for clinicians it usually leads to a decision about the most appropriate assessment and treatment approaches for their clients. For both clini-

cians and researchers, criteria for evaluating the quality of evidence are important.

Each chapter includes examples from the field of communication sciences and disorders to illustrate important concepts. Review questions are included at the end of each chapter along with some suggestions for additional learning activities. Two research scenarios or case studies are included in Chapter 2 and Chapter 7 to illustrate a practical application of concepts and to facilitate discussion. The online resources provide opportunities to work with exam-

ples and figures in a more dynamic way. Where appropriate, the learning activities include a list of research articles from journals in communication sciences and disorders that illustrate topics covered in the chapter. The learning activities could serve as homework assignments or, in some cases, as the focus of in-class discussions. In our own courses, we use the review questions in small group activities. Students benefit from explaining difficult questions to each other and doing so in a way that illustrates their own mastery of the concepts.

1

Empirical and Nonempirical Research: An Overview

For many students, learning that they need to complete a research course is a cause of considerable anxiety. Audiologists and speech-language pathologists who are already engaged in their professional practice often recognize the importance of a strong research base in communication sciences and disorders but may view research as an activity unique to those who hold research-oriented doctoral degrees. Perhaps you are someone who views research as a requirement to endure rather than as a topic to embrace; or perhaps you acknowledge the importance of research in communication sciences and disorders but consider it something that others with unique talents undertake. One aim of this introductory chapter is to establish the fact that research encompasses many different kinds of activities, and professionals in clinical settings already engage in some of these. Furthermore, the knowledge and skills we need to be effective researchers are not necessarily unique talents but often parallel the processes and procedures employed by audiologists and speech-language pathologists.

Systematic Inquiry

One way to view research is as a process of *systematic inquiry*. Making an inquiry involves asking a question and then engaging in a process to determine the answer to that question. Asking and answering questions is at the heart of research endeavors. Research is systematic because the approach you use to find answers has predetermined procedures, and these procedures are carried out in a regular, orderly manner. Usually, the questions that researchers investigate are ones that are recognized as important to a field of study, such as communication sciences and disorders, and to persons in society, such as children and adults with communication disorders.

The *scientific method* is an approach to systematic inquiry. This method involves a series of steps that lead from identifying a problem and formulating a question to discovering possible answers to that question. The generally accepted steps include the following: (1) identify a problem and further

define that problem through background research, (2) develop a specific hypothesis or question to investigate, (3) plan a set of procedures for testing the hypothesis or answering the question, (4) collect data using those procedures, (5) analyze the data, and (6) make a decision about the viability of the hypothesis or answer to the question.

You would expect to find the steps of the scientific method in a research text. However, Haynes and Pindzola (2011) included similar steps in their diagnosis and evaluation textbook. These authors observed that clinicians engage in a way of thinking that parallels the method scientists employ in their experimental research. When faced with a clinical problem, such as a person referred for an evaluation, audiologists and speech-language pathologists gather and analyze data to test a hypothesis. In the case of a speech, language, or hearing evaluation, the hypotheses relate to whether or not someone has a disorder, the nature of that disorder, and how to best treat that disorder. Although the types of questions or hypotheses differ, both clinical practice and research involve ways of thinking and problem solving that are systematic in nature. When the process of inquiry is systematic, both clinicians and scientists have greater confidence that the information they provide is accurate and trustworthy, whether providing that information to individual clients and their families or to the scientific community.

Some Roles for Research

Scientific research has many roles in the fields of audiology and speech-language pathology. Perhaps the most basic role is to satisfy scientific curiosity. Researchers in communication sciences and disorders

regularly participate in a process of identifying unanswered questions and designing information-gathering procedures to answer those questions. Researchers focus on questions they regard as important for understanding the nature of human communication; the underlying physiology of speaking and hearing; the causes of speech, language, and hearing disorders; and so forth. Researchers who are motivated primarily by scientific curiosity might still include persons with speech, language, or hearing disorders in their studies and conduct research that has implications for assessing and treating communication disorders. For example, researchers gained new evidence about the neurological bases of speech and language by including persons with aphasia in their studies. These types of studies provided information about the effects of brain lesions on speech and language use but did not necessarily lead directly to specific assessment or treatment recommendations.

Research is also valuable in guiding clinical practice in audiology and speech-language pathology. Sometimes audiologists and speech-language pathologists are motivated to conduct research because of unanswered questions they encounter in their clinical practice. The term *clinician-investigator* is a way to refer to health care professionals, including audiologists and speech-language pathologists, whose primary responsibility is providing clinical services but who also engage in research in their profession (Silverman, 1998). In many ways such individuals are ideally positioned to conduct research that guides the way audiologists and speech-language pathologists diagnose and treat communication disorders. Clinician-investigators have firsthand knowledge regarding information that is lacking, as well as work with clients in their professional practice who

would be most representative of children and adults with speech, language, and hearing disorders.

The notion of using research to guide clinical practice is important even for audiologists and speech-language pathologists who do not conduct their own original research. In recent years a strong movement toward use of scientific evidence to guide decisions emerged in both the fields of medicine and education. Because audiologists and speech-language pathologists are employed in medical and educational settings, this movement has encompassed those fields as well. The term *evidence-based practice* refers to an approach in which clinicians use the best available scientific evidence to guide their decisions about how to evaluate and treat persons with communication disorders. When clinicians engage in evidence-based practice, they are making decisions about how to serve their clients effectively based on three sources of information: (1) the best available evidence from systematic research, (2) their own professional experience and expertise, and (3) client and/or family considerations (American Speech-Language-Hearing Association [ASHA], 2004; Fey et al., 2014).¹

When audiologists and speech-language pathologists participate in evidence-based practice, they might do so by consulting an existing evidence review. Usually a panel of experts prepares such reviews. They are published in professional journals or perhaps published in electronic format on a website. When the authors of the reviews conduct a well-defined, qualitative critique of the existing research, the review is a

systematic review. When the authors apply both qualitative and quantitative analysis in their review, it may be a meta-analysis. Some examples include a systematic review of telehealth in hearing aid rehabilitation (Tao et al., 2018), a systematic review and meta-analysis of consonant and vowel identification for individuals with cochlear implants (Rødsvik et al., 2018), meta-analyses of word-finding treatment for persons with aphasia (Wisenburn & Mahoney, 2009), and parent-implemented intervention for children language delays (Roberts & Kaiser, 2011). The American Speech-Language-Hearing Association (ASHA) has documented many examples of evidence reviews published through 2020 (ASHA, n.d.). Recommendations for systematic reviews and/or meta-analyses, which may be useful for speech-language pathology and audiology, have been developed in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Liberati et al., 2009; Moher et al., 2009).

Sometimes audiologists and speech-language pathologists conduct individual evidence searches on behalf of a particular client (Gallagher, 2002). Such searches begin with a client-specific question and culminate with review, evaluation, and application of existing research. Clinicians might use existing research literature when answering questions such as which of two treatment approaches produced the most improvement in the shortest time, whether a particular diagnostic procedure yields results that are accurate and reliable, or what the most effective treatment for a client with a specific diagnosis is. Evidence-based practice reflects a movement away

¹The American Speech-Language-Hearing Association (2005) position statement on evidence-based practice can be found in the document *Evidence-Based Practice in Communication Disorders* [Position Statement], available from <http://www.asha.org/policy>. In this document ASHA established the position that audiologists and speech-language pathologists should engage in evidence-based practice to ensure provision of the highest quality clinical services.

from sole reliance on expert opinion and toward an approach that relies on careful consideration of research evidence in conjunction with clinical expertise and client/family considerations (Gallagher, 2002).

Another reason audiologists and speech-language pathologists engage in research is for program evaluation and support. This type of research is conducted at a local level sometimes in response to external requirements and sometimes due to local initiatives. For example, a medical center might evaluate the quality of its programs and services by comparing them to a set of nationally recognized standards. Professionals employed in educational settings are very much aware of the use of student achievement testing to evaluate school programs. Again, such evaluation involves comparisons to state and national standards purported to reflect the quality of school programs. At other times program evaluation questions emerge from local rather than state or national initiatives. For example, a medical center might conduct consumer satisfaction research with the goal of improving its programs and services and increasing the likelihood that consumers choose that medical center as their health care provider. A school district might conduct program evaluation research after making changes to curriculum or teaching practices to determine if these changes led to improvements in student learning and achievement. Although professionals such as audiologists, speech-language pathologists, nurses, physicians, and teachers often debate the best approaches for program evaluation, nearly all agree that research of this type plays an important role in their professions.

Scientific research also may influence public policy, particularly policy regarding the allocation of resources. When research evidence is particularly strong, legislators

and policy makers may consider this evidence in making decisions about spending public funds. An example of this is the growth of publicly funded early childhood education for all 3- and 4-year-olds. One reason for the increase in public funding is research that consistently demonstrated that children who attended good quality preschool programs performed better in school and were more successful in their later lives. The research actually demonstrated that the funds spent early in childhood were offset by savings that occurred later through reduced educational spending on special services and reduced need for public assistance in adulthood (Barnett, 2000).

Research that demonstrates how a service or program impacts society is sometimes referred to as cost-effectiveness or cost-benefit research. Cost-effectiveness research looks at the cost of a program or service relative to the outcomes produced (Barnett, 2000). For example, if different treatment programs or different technologies varied in cost, an audiologist or speech-language pathologist would probably want confirmation that the more expensive approach produced better outcomes for their clients. Cost-benefit research looks at the cost of a program or service relative to its impact on costs that occur later in life. For preschool education, the analysis included documentation of the cost of the educational program and long-term follow-up of the children who participated. The long-term follow-up revealed actual cost benefits to society in several different ways. For example, children who received early childhood education were less likely to need special education services during the school years, were less likely to need other public services such as juvenile detention, were less likely to participate in public assistance programs as adults, and

typically earned more income per year as adults (Barnett, 2000). Thus, individuals who advocated for public funding of early childhood education could point to a body of research that suggested such programs produced a net financial benefit to society that greatly offset the initial cost. Audiologists and speech-language pathologists would profit from a body of research demonstrating the benefits of our programs.

Types of Research

Taking some time to peruse published research in audiology and speech-language pathology, such as that found in our professional journals, reveals many forms of research. Generally, research studies share

at least one similarity: a question that needs an answer or problem that needs a solution. How researchers formulate their questions or how they plan and conduct their studies, however, can be quite different. In this section we consider some of the terminology researchers use to characterize these differences (Figure 1–1).

Most of the time when professionals in the fields of audiology and speech-language pathology use the term *research*, they are referring to *empirical* research. Empirical research involves the collection of new information or data through observation and measurement of behavior and/or physical properties (Trochim et al., 2016). Review of recent issues of professional journals in communication sciences and disorders reveals several ways that human behavior was observed and measured, such

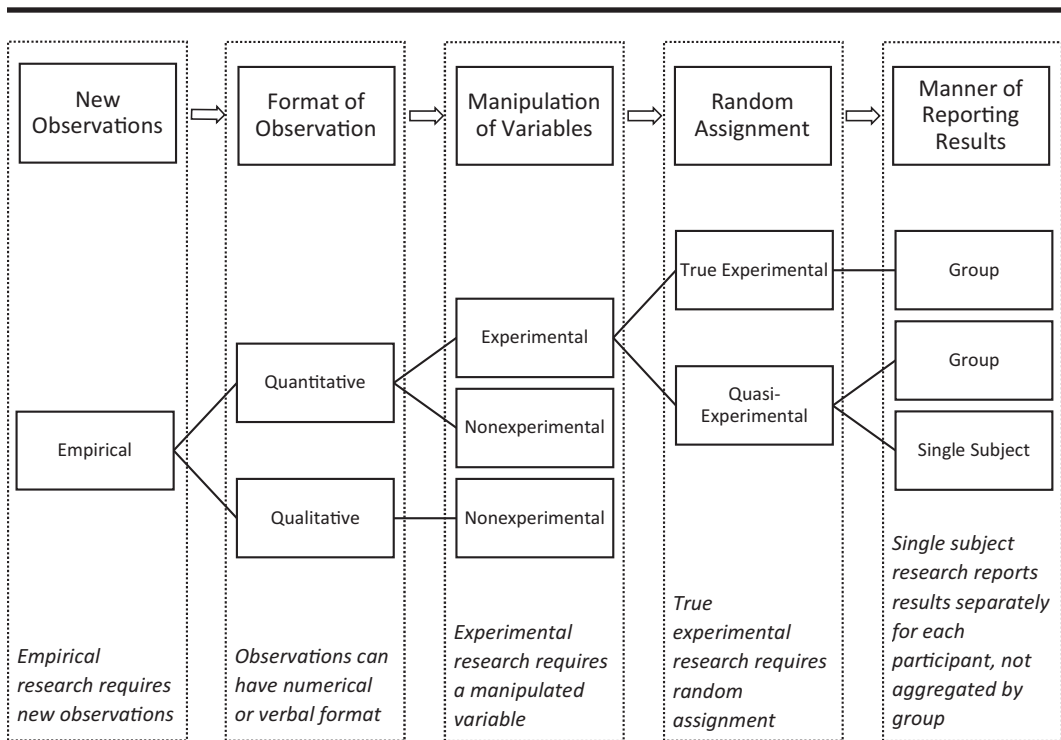


Figure 1–1. Types of research.