ADULT AUDIOLOGIC REHABILITATION

Second Edition

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PLURAL PUBLISHING INC.
SAN DIEGO
OXFORD
MELBOURNE

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FOREWORD TO THE SECOND EDITION

Audiologic rehabilitation involves several stages: Identification and evaluation of hearing loss, treatment, and post-treatment care, emphasizing the point that audiologic rehabilitation involves more than just the final stage. It is unfortunate that the term "audiologic rehabilitation" is often misinterpreted as referring only to this final stage. It is important to bear in mind the broad scope of audiologic rehabilitation and that the goal of each stage in the process is in fact improved communication. The benefits of audiologic rehabilitation can be maximized by means of early identification, accurate evaluation, effective treatment, and efficient post-treatment rehabilitation.

Whereas identification, evaluation and treatment are important stages in audiologic rehabilitation, they are only part of the process. Many audiologists have focused their efforts on the early stages of audiologic rehabilitation with the result that the post-treatment stage is neglected to a large extent. The neglect is significantly greater for adults than for children. This may be because of the difficulty and effort required for effective post-treatment rehabilitation, or because the early stages of the rehabilitation process show improvements more rapidly with less effort; that is, more bangs for the buck, or simply more bucks. Whatever the reason, the post-treatment stage of the rehabilitation process has not received the attention it deserves. Rehabilitation that ends at the conclusion of the treatment stage is rehabilitation incomplete.

The previous foreword by my esteemed colleague, Mark Ross, describes the importance of and commitment to post-treatment rehabilitation in a previous, well-funded era. In the years that followed, the inevitable competition for diminishing resources resulted in the post-treatment stage of audiologic rehabilitation receiving less attention and less effort than it deserves. Fortunately, there is a cadre of dedicated researchers and clinicians who have maintained the emphasis on rehabilitation in all stages of the rehabilitation process and have carried the field forward, even with limited resources. This volume by Dr. Joseph Montano and Dr. Jaclyn Spitzer, now in its second edition, stands out as a beacon in a rough sea of competing and often misguided priorities. The contributors to the volume are leading authorities who have pioneered new approaches in the field. Many of the contributors are from countries other than the United States thereby providing an international perspective to the volume.

The breadth of coverage is substantial, as reflected by the large number of chapters on the various topics relevant to adult audiologic rehabilitation. The first section of the volume begins, sensibly, with a brief outline of the book's goals and scope followed by an historical review that places adult audiologic rehabilitation in perspective. The next several chapters provide important background material on the nature of adult audiologic rehabilitation, the classification of functioning and its relevance to the rehabilitation process, and the psychological effects of social stigma in the target population. The last-mentioned chapter is particularly important in order to understand the multidimensional nature of the rehabilitation process. It is not merely hearing loss. It is hearing loss compounded by the sequelae of hearing loss.

Assessment and verification are particularly important issues and are dealt with in the second section of the volume. Self assessment is a critical aspect of the evaluation process and this section contains several chapters on different aspects of this broad area. Although self assessment is inherently subjective, the client's perception of the efficacy of the rehabilitation program is a major factor affecting the success or failure of the program. In this context, perception is the ultimate reality. The last chapter in this section deals with the particularly important issue of verification.

The third section of the volume, The Rehabilitative Toolbox: Therapeutic Management, is by far the largest and provides excellent coverage of the substantial armamentarium of tools available to the rehabilitative audiologist. The chapters in this section provide valuable information on the merits of the various rehabilitative techniques and the considerations that need to be taken into account in their implementation. There is no single best technique. An understanding of the capabilities and shortcomings of each

technique is needed in order to select a technique, or combination of techniques, that is most appropriate for each client. It is thus valuable to have broad coverage of the large array of rehabilitative techniques in a single volume. This is not a cookbook. Each chapter deserves careful reading in order to appreciate the capabilities of each technique and its potential value for each client.

The last section of the volume deals with special issues and expanding the scope of audiologic rehabilitation. The opening chapter in this section deals with evidence-based research. This is a rapidly growing area of research with important implications for funding and the allotment of resources. Evidence-based research with positive results will do much to secure the viability of audiologic rehabilitation in a future of increased competition for limited resources. The next chapter in this section reflects the remarkable advances in the field in that audiologic rehabilitation has expanded to include appreciation of music in addition to speech understanding for adults with cochlear prostheses. The field has also expanded to include a broader view of vocational issues as discussed in the chapter dealing with this topic. The chapters on older adults and on auditory and cognitive processing reflect the growing recognition of the importance of age-related issues in audiologic rehabilitation and the importance of cognitive processing in addressing age-related auditory deficits. Tinnitus is a major problem with no simple solution. Progress is being made in dealing with tinnitus and the chapter on this topic provides insightful coverage of this problem and current rehabilitative techniques. The last chapter, logically, deals with current and future research needs.

This is an impressive volume containing a wealth of information. The range of topics and their relevance to practical issues in adult audiologic rehabilitation is impressive. The chapters deserve to be read and reread in order to gain an in-depth appreciation of the multi-dimensional considerations to be taken into account in order to maximize the efficacy of adult audiologic rehabilitation. Read, understand, and make good use of the valuable information contained in this substantive volume.

Harry Levitt

Part I

Developing a Knowledge Base: Introduction and Background

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The International Classification of Functioning: Implications and Applications to Audiologic Rehabilitation

Jean-Pierre Gagné
Mary Beth Jennings
Kenneth Southall

The main goal of this chapter is to describe conceptual frameworks for healthcare delivery that can be used to conceive, describe, apply/conduct, and analyze audiologic rehabilitation (AR) services. First, we make the case that adopting and applying a conceptual framework are natural and essential components of AR. Second, we discuss some shortcomings of applying a medical (curative) model of health as a conceptual framework for rehabilitation. Third, we describe two conceptual frameworks that have been effectively applied to the rehabilitation sciences. In both cases the models are based on classification systems adopted by the World Health Organization (WHO): the International Classification of Impairment, Disabilities and Handicaps (ICIDH; WHO, 1980) and the International Classification of Functioning, Disability and Health (commonly referred to as the ICF; WHO, 2001). Fourth, we illustrate how the ICF (WHO, 2001) can be used to guide clinical intervention services and evaluative research in AR.

What Are Conceptual Frameworks? Why Are They Useful?

An individual's knowledge is usually organized and understood according to the relevant practices of a given society. Stated in another way, the relevant practices of a given society are used to describe and explain phenomena that exist or are thought to exist. Depending on their robustness and accuracy, those practices are considered to constitute and align with theories and models; in some cases they may be referred to as a conceptual framework.

In academia, most disciplines are driven by concepts, theories, or models. For example, many physicists use the Big Bang Theory to explain how our universe was created and how it is evolving. Acousticians choose to describe and analyze sounds based on three different parameters: duration, intensity, and frequency. There exist models of communication that

describe and explain the rules that people intuitively use when they interact with one another.

Theories, models, and frameworks constitute the underlying bases on which science is organized and upon which science will progress. They are used to organize, describe, and investigate elements of knowledge and the constituents of a concept of interest. For example, Gagné, Southall, and Jennings (2009) proposed a theoretical model (Major & O'Brien, 2005) that can be used to describe and explain how the phenomenon of stigma may operate in people who have a hearing loss. Conceptual models provide precise and comprehensive definitions of concepts. Hyde and Riko (1994, p. 347) argued that "terminology is more than labels; it reflects and affects its underlying constructs and it provides a vehicle for debate and research." Moreover, conceptual models provide the basis on which people from different backgrounds can have common understanding and perspective. Conceptual models provide the foundation on which a phenomenon is conceived, described, analyzed, understood, and explained. They constitute the starting point from which research questions are identified and hypotheses are tested. In rehabilitative audiology (as in all other health disciplines), conceptual models guide the way clinical services are organized, designed, and dispensed. Furthermore, these frameworks influence the type of research that takes place within a discipline, as well as how that research is organized and conducted.

From a clinical perspective, the conceptual framework adopted will determine how AR is conceived and perceived. This framework will influence how we define AR, and will govern rehabilitation services selected and delivered. Moreover, it will influence how we evaluate the effects and benefits of the services provided.

From a research perspective, the conceptual framework chosen will determine the research issues to be addressed. In turn, the research question addressed or the hypothesis tested will influence the experimental paradigm used, the type of data collected, and the analyses performed to test the hypotheses formulated. Moreover, that conceptual framework will influence the conclusions that are drawn from research investigations.

Imagine two audiologists who adhere to different conceptual frameworks of AR. The conceptual framework adopted by one audiologist may lead to design of a program that aims to eliminate a client's hearing loss. Based on a different conceptual framework, the goal of the other professional may be to reduce or eliminate the deleterious effects of hearing loss on the client's everyday life activities. Under such circumstances it is likely that, for the same client, the treatment program selected by one audiologist will be different from the program selected by the other professional. Furthermore, it is very likely that the research methodology used, as well as the method and criteria employed to evaluate the success of their respective intervention programs, will differ across the two professionals. As unlikely as it may seem, in AR (as in other rehabilitation sciences), dramatically different conceptual frameworks have been used to guide the types of rehabilitation services provided to people with hearing loss and to describe (quantitatively and qualitatively) the outcomes of those services. Needless to say, for a discipline to progress and improve, the conceptual frameworks underlying that discipline must be appropriate, realistic, and valid. Over the years there has been an evolution in the types of conceptual frameworks used to characterize AR.

A Medical Model of Health

Given its long history, its importance, and the overwhelming presence of medicine in Western societies, the medical model has been the predominant conceptual framework of health used in all health-related disciplines. The medical model is grounded in causal logic. Health care professionals aim to identify and explain a patient's symptoms based on what causes them. Stated simplistically, in a medical model of health patients have symptoms that are caused by diseases or impairments. Based on the symptoms, a remedy or treatment is selected and applied (e.g., the prescription of medication, surgery, a program of exercises, dietary regime, etc.). A treatment is considered successful if, after its administration, the symptoms, the disease, or the impairment disappears. As a result of the treatment the patient is cured and the person re-establishes the condition of health held before the need to consult the health care professional appeared (Duchan, 2004). This conceptualization of health is very body oriented. This model is effective when the treatment program is at the level of the cell, organ, or body structure. For example, health problems often require the elimination of a virus (e.g., an organism that causes a cold, the flu, or a childhood disease), the removal of a body part (e.g., tonsils, gallstones, tumors), or the repair of a body structure (e.g., fractured leg or arm) to restore normal function. In a med-

ical model of health the goal of a treatment program is to cure the patient, that is, to restore normal biological functioning or to minimize the impact of the patient's symptoms (Duchan, 2004). This conception of health promotes a view of pathology as an entity in isolation from the affected individual. Such a view of health has limited relevance for chronic, progressive, and irreversible diseases, such as sensorineural hearing loss (Hyde & Riko, 1994).

The health issues addressed by professionals who provide rehabilitation services are very different from the acute health care issues that can be successfully conceptualized within a medical model. In the domain of rehabilitation, the health problems of the people seeking help are usually chronic. Often, the health problem is irreversible and cannot be resolved in a short period of time. Consequently, people with chronic health problems have to learn to cope with the effects of their health condition and modify their lifestyle. Often, the chronic nature of the health condition will have deleterious effects on non-body-related dimensions of the individual's personal life (e.g., with respect to psychological, social, economic, and recreational or leisure activities) and the social integration of that person into society.

It may not be appropriate to use a medical model to conceptualize the health and treatment needs of people who have chronic disorders such as a permanent sensorineural hearing loss. At the present time, there is not much that can be done medically to restore the person's hearing abilities beyond the services that might initially be provided to the person with a permanent hearing loss (e.g., injection of cortisone). Although a number of helpful rehabilitation services may be provided, none of those treatments are likely to cure the hearing loss. Thus, viewed from the perspective of the medical model of health, it is difficult to imagine treatment programs that would be shown to be effective. At the present time, the availability of treatment programs designed to eliminate sensorineural hearing loss are limited, although some progress is being made with respect to treatments that regenerate hair cells at the level of the cochlea. The person has a hearing loss before the rehabilitation services are provided and will continue to have a hearing loss after having completed the rehabilitation program. Hence, if the criterion used to evaluate the benefits provided by a rehabilitation program consists of evaluating aspects of hearing impairment, it is unlikely that the program will be shown to be successful (Gagné, 1998, 2000; Gagné, McDuff, & Getty, 1999).

Although never explicitly stated, it can be argued that, in the past, rehabilitation services and evaluation research in AR were designed and evaluated exclusively according to a medical model of health. For example, several decades ago, the unstated goal of fitting hearing aids was to restore normal hearing acuity. The appropriateness of a hearing aid fitting was evaluated according to the results of the aided audiogram or measures of functional aided hearing. An intervention program (i.e., fitting hearing aids) was deemed to be successful if the aided auditory detection thresholds were within the audiometric limits of normal hearing (e.g., Olsen, Hawkins, & Van Tasell, 1987; Skinner, 1988). The unstated premise here was that the hearing aids would cure the hearing loss. Similarly, the efficacy of a speechreading training program was evaluated by comparing the speechreading proficiency of a participant before and after the speechreading program was administered (e.g., Binnie, 1977). The underlying assumption was that the speech-perception problems associated with hearing loss would be cured if the participant displayed improvements in speechreading or audiovisual speech perception proficiency, as measured by post-treatment speech-perception tests administered in a laboratory setting. The results of these investigations provided little information on what had changed and the direction of that change in the person's speech-perception proficiency or conversational fluency) while accomplishing his or her everyday living activities.

Based on the conceptual models of health that were available and used at the time, it is not surprising that the results of evaluative research investigations generally were not successful in demonstrating the benefits of AR. The underlying premise of the medical model and the type of outcome measures typically used to evaluate benefit, both clinically and in research projects, were not suitable to the goals of rehabilitation. It was not until the 1980s that other conceptual models of health were developed and applied to rehabilitation sciences.

The International Classification of Impairment, Disability, and Handicap (ICIDH)

According to the WHO (1948), health is a "state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity." This

view extends the conception of health beyond the level of body parts and body functions. In 1980, the WHO proposed an international classification of health that attempted to encapsulate its conception of health and well-being. A main objective of the International Classification of Impairment, Disabilities, and Handicap (ICIDH) (WHO, 1980) was to propose a generic model of health and rehabilitation that would be applicable to, and internationally accepted by, all forms of rehabilitation services, regardless of the discipline. The ICIDH (WHO, 1980) considers the effects that diseases and disorders may have at the organic level (impairments), at the level of the individual in real life settings (disabilities), as well as at the sociocultural level (handicaps). The WHO (1980) definitions of impairment, disability, and handicap are provided in Table 3–1. A visual representation of the ICIDH (WHO, 1980) conceptual framework is shown in Figure 3–1.

According to this framework, *impairments* are dysfunctions in body structures or body functions that are measurable in the laboratory or clinic. For example, an individual's audiogram may reveal the presence of elevated bone conduction detection thresholds. Or, the result of laboratory experiments may demonstrate that an individual has broader than normal auditory psychophysical tuning curves. The results of both tests are indicative of a hearing impairment attributable to some pathology in the hearing system. A *disability* is defined as a restriction or inability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being. Examples of hearing disabilities include having poor auditory localization skills and poor speech perception performances in quiet or in noise. That is, people with hearing impairment who perform less well than matched peers with normal hearing on tasks of auditory sound localization or on speech perception tests would be deemed to display specific hearing disabilities. A *handicap* is a disadvantage caused by an impairment or a disability that prevents or limits a person from fulfilling the role that would otherwise be considered normal for that individual, given the sociocultural environment in which the person lives. From an audiologic perspective, handicaps are nonauditory problems that result from hearing impairment or disability. For example, a specific job may require that workers be in regular verbal communication with each other, even though the level of noise in the work setting is very high. A person with a hearing loss may experience problems in that work setting if that individual has more difficulties than the other workers understanding speech in noise (i.e., a speech perception in noise disability). In this example, the person with hearing loss would be deemed to have an occupational handicap.

The following example illustrates how the domains of impairment, disability and handicap apply to AR. Meningitis, a *disease*, may damage the inner and outer hair cells at the level of the cochlea causing an auditory impairment (in this case, a severe bilateral sensorineural hearing loss). The impairment may cause the person to experience some hearing disabilities, including poorer performance on speech perception tasks than peers who have normal hearing. The hearing impairment and associated disabilities may cause handicaps that limit or prevent that person from fulfilling social roles that would be considered normal for that individual. That person may have work-related handicaps due to the inability to converse on the telephone, difficulties communicating with one other individual in a noisy work environment, and difficulty in taking part in meetings in

Figure 3–1. The Relationship Between the Different Components of ICIDH (WHO, 1980).

Table 3–1. Definition of Impairment, Disability, and Handicap According to the International Classification of Impairments, Disorders, and Handicaps (ICIDH: WHO, 1980)

Impairment:	any loss or an abnormality of a psychological, or anatomical structure or function.
Disability:	any restriction or inability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being.
Handicap:	any disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfillment of a role that is normal (depending on age, sex, and social and cultural factors) for that individual.

which several persons are involved. The same person may have leisure-related handicaps due to the inability to communicate by telephone with friends, difficulty communicating with others in noisy environments such as restaurants, the inability to watch the evening news on the television (because it is not possible to understand the audio signal unless the volume is set very loud or unless the audio signal is amplified), and an inability to take part in bird-watching activities (because the person cannot hear the bird songs or localize where they are coming from).

It is important to recognize that there is not a direct relationship between the domains of impairment, disability, and handicap. An impairment may not always result in a disability; a disability does not necessarily result in a handicap (Hyde & Riko, 1994). Furthermore, two persons may have the same type and degree of hearing loss but experience differing type (or degree) of handicap. Consider the case of Tom and Jerry who have a similar hearing loss. Their hearing loss may make it difficult to take part in conversations that involve two or more participants. This disability (e.g., difficulty conversing in noise) may constitute a work-related handicap for Tom because his job requires that he meet regularly with coworkers to establish their weekly sales objectives. Jerry may be a postman, on the other hand, a job that does not require him to participate in group meetings. Thus, having difficulty conversing in noise may not be an occupational handicap for Jerry. Two persons with different hearing loss may have the same handicap. For example, although Charlie's hearing loss may be less severe than Tom's and Jerry's, he may have the same hearing disability (difficulty conversing in noise). Moreover, that hearing disability may constitute an occupational handicap because Charlie is a waiter in a poorly lit and loud sports bar where he must interact with his customers.

It is important to note that, according to this conceptual framework, people with hearing loss do not have a hearing handicap. They may, however, have an occupational handicap due to their hearing loss. Similarly, a person with a hearing loss is not hearing handicapped; however, in some situations, the person may experience a handicap because of the hearing loss (Stephens & Hétu, 1991). Although not stated explicitly, according to the ICIDH (WHO, 1980) framework, a handicap is the result of an interaction between impairments and disabilities on the one hand and the particular sociocultural and physical environment in which an activity or an event takes place on the other hand (Stephens & Hétu, 1991). To illustrate, Natasha, a school-guard at a crosswalk with a mild to moderate hearing loss, may have difficulty localizing sound in space. This disability constitutes a work-related handicap when she directs traffic at a busy street intersection. The same disability, however, may not constitute a handicap when she converses with children while standing on the sidewalk. In their useful reference, Stephens and Hétu (1991) described how the concepts of impairment, disability, and handicap apply to rehabilitative audiology.

At the time that it was proposed, the ICIDH (WHO, 1980) constituted a major breakthrough for all disciplines of rehabilitation. By extending the concept of health beyond the domains of disorders and impairments, the ICIDH framework provided rehabilitation sciences with an opportunity to develop a different self-conceptualization and redefine goals. Consistent with the ICIDH model (WHO, 1980), the goal of AR can be defined as the alleviation or reduction of hearing disabilities and handicaps encountered by individuals with hearing loss (Gagné & Jennings, 2008). Within this perspective, AR services could be helpful for people with a chronic hearing loss. Whereas AR cannot cure permanent hearing impairment, some programs can be designed to reduce or eliminate hearing disabilities and handicaps. For example, within a medical (curative) model of health, the stated or implicit goal of providing a client with hearing aids is to restore the client's impaired hearing abilities (e.g., restoring auditory detection thresholds to normal levels). Within the perspective of the ICIDH (WHO, 1980), however, the goal of providing the client with hearing aids may be to eliminate or reduce hearing disabilities (e.g., improving the detection of acoustic alerting signal or improving speech understanding in quiet and/or in noise, making it possible to localize voices or warning signals in space). Another goal may be to reduce situations of handicap attributable to the hearing loss (e.g., maintaining one's occupation even though it requires conversing on the telephone or continued appreciation of one's leisurely activities such as playing scrabble with friends or watching sports programs on television). By defining the goals of rehabilitation intervention according to disabilities and handicaps, the ICIDH makes it possible to evaluate the efficacy and the effectiveness of specific types of services or programs provided to people with specific impairments and specific needs as defined in terms of disabilities and handicap. One indication of success may be whether a visual alerting device alerts the client that someone is ringing the doorbell. Another may be whether the