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**CONTRIBUTED PAPERS**

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**Towards the Development  
of Paradigms to Conduct  
Functional Evaluative Research  
in Audiological Rehabilitation**

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***Dedication . . .***

*We would like to dedicate this article to Raymond Héту, our colleague and good friend. Raymond died on September 24, 1995, following a tragic automobile accident. The fundamental principles of audiological rehabilitation presented in this article are consistent with Raymond's vision of comprehensive rehabilitation services for individuals with hearing loss. His concern and preoccupation with producing valid research findings that have direct clinical applications and implications are found in the section of the article that discuss the factors that should be incorporated into functional evaluative research paradigms.*

*Raymond's research contribution, as well as his insights into the nature of the rehabilitative process, constitute a source of inspiration for everyone interested in the advancement of the discipline of rehabilitative audiology.*

*September 29, 1995*

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In recent years there has been growing recognition of the importance of evaluative research to assess the efficacy of various aspects of rehabilitative audiology. The main tenet of the present article is that some fundamental principles of audiological rehabilitation render traditional treatment efficacy paradigms inappropriate for evaluative research in many areas of audiological rehabilitation. First, some shortcomings of traditional approaches to evaluative research are outlined. Then, some fundamental principles of audiological rehabilitation are summarized. Also, several factors that should be taken into consideration in developing conceptual paradigms for evaluative research in audiological rehabilitation are identified. Finally, examples of evaluative research paradigms that take into account some aspects of those factors are provided.

Audiologists and other allied health professionals are faced with unprecedented pressures to demonstrate the efficacy and cost-effectiveness of the services they provide. The term efficacy can be defined as the probability that individuals, in a defined population, will benefit from a well-defined treatment applied for a given problem under ideal conditions of use. The term treatment effectiveness is defined as the probability of benefit to an individual, in a defined population, under ordinary conditions by the average clinician for the typical client (Montgomery, 1994). Health care administrators, legislators, and the professionals themselves seek (re-)assurance that the rehabilitative services that are provided are beneficial and cost-efficient (Gagné & Tye-Murray, 1994; Hyde & Riko, 1994). These challenges must be given serious consideration. Moreover, they should be viewed as an opportunity to further promote and foster the development of the profession. The best way to promote audiological rehabilitation is to provide empirical data on the efficacy of the services provided to clients. In the present context the term client refers to individuals for whom a treatment program is designed. Thus, clients may be individuals with a hearing impairment or other individuals who interact with them, including spouses, colleagues, and significant others.

Some authors have proposed that a distinction be made between *treatment research* and *treatment evaluation* (Barlow, Hayes, & Nelson, 1986). Both activities consist of a series of systematic observations on the effects of a specific treatment among persons who share common characteristics. The two activities are distinguished by their goals and purposes. It is suggested that the primary purpose of treatment research is the pursuit of better organized scientific statements between a given treatment and specific aspects of a client's behavior. On the other hand, the primary purpose of treatment evaluation is the pursuit of better client outcome (Barlow et al., 1986). In our view, the distinctions between those two activities are not irreconcilable. It is conceivable that both purposes can be pursued simultaneously in an ethical fashion. It is possible to design a systematic investigation of treatment efficacy that has as its goals to provide a better outcome for the client as well as providing data that will make it possible to extract formal rules that describe the relationship between the treatment and the behav-

ior of clients who share common characteristics. Moreover, this can be accomplished ethically by ensuring that the clients are provided with all the relevant information concerning the investigation and that they fully consent to participating in the proposed activity. It is this type of activity that is addressed in the present article. Hence, throughout this article the term *evaluative research* is defined as any systematic investigation that aims to describe both the effects of a given treatment for specific clients as well as provide data that will make it possible to elucidate the relationship between the treatment and the clients.

Evaluative research provides a unique venue to describe the components and the quality of some current rehabilitation services that are successful. Also, evaluative research makes it possible to identify and modify some current services that require improvements. Additionally, research findings may instigate the development of new and innovative services and programs. Evaluative research is an interactive process whereby clinical research findings lead to a better understanding of the rehabilitative process and the needs of clients. In turn, this understanding spurs the development of more comprehensive theoretical constructs and models of hearing disabilities and situations that produce handicaps. These refined theoretical constructs and models can serve to re-evaluate the quality and effectiveness of clinical practices.

In recent years there has been a growing recognition of the importance of evaluative research to assess the efficacy of rehabilitation services in all allied health disciplines. Yet, much more work is required in order to develop appropriate paradigms for evaluative research in rehabilitative audiology. The purpose of the present article is to summarize some factors that should be taken into consideration in developing conceptual paradigms for evaluative research in audiological rehabilitation. First, some shortcomings of current approaches to evaluative research are outlined. Then, factors that must be considered in the development of functional evaluative research paradigms are presented. Finally, possible directions to consider in the development of appropriate paradigms for evaluative research in audiological rehabilitation are proposed.

#### **PARADIGMS TYPICALLY USED TO EVALUATE TREATMENT EFFICACY**

Evaluative research is the process of assessing the effectiveness of a treatment (i.e., a clinical procedure) that is administered in a systematic fashion to a population of individuals who share a common predicament. Throughout this paper we adopt the definition of predicament provided by Hyde and Riko (1994). That is, a predicament is the sum of all pertinent aspects of client state and situation, including: disorders, impairments, disabilities, handicapping situations, environments, demands, resources, beliefs, attitudes, behaviors, and so on. Evaluative research emerged from curative models of health. It assumes that some undesirable predicaments are shared by certain individuals and that those predicaments

can be measured and quantified. Almost always, the predicament consists of a dysfunction (an impairment) or a disability (a maladaptive behavior or substandard performance on some well-defined function of daily life). In curative models of health, a treatment consists of a procedure (or a series of procedures or services) designed to eliminate, reduce, or retard the progress of the disorder or disability. Evaluative research consists of measuring the amount of change that can be attributed to treatment (Montgomery, 1994). Moreover, it requires that a clinical judgment be made to determine the direction and amount of change that is desirable or acceptable for an individual who undergoes the treatment under investigation. The rationale for selecting a particular treatment is often based on the body of knowledge available from the fundamental sciences, findings from animal models, or results of pilot investigations conducted on a small cohort of individuals.

Specific experimental research designs have been applied to treatment efficacy research. They often take the form of randomized clinical trials. In this type of research design, a large group of subjects who display a similar predicament (usually related to the type and degree of hearing impairment) are recruited for an investigation. The subjects are randomly assigned to one of several groups. The groups constitute the independent variable. Some subjects receive the treatment under investigation (or variations thereof) while other groups, the control groups, receive no treatment (or variations thereof, such as a placebo). In comparative treatment efficacy research, experimental subjects are assigned to alternative treatment groups (Demorest & Erdman, 1994). A test (broadly defined as any systematic measure of performance or attitude) is administered to the subjects before and after the treatment is administered to the experimental subjects. This test constitutes the dependent variable and usually consists of some measures of impairment or disability. In some cases the test is a measure of the subject's attitudes towards the impairment or disability. In evaluative research the dependent variable is referred to as the outcome measure. In the broadest sense of the word an outcome measure is a test (any measure) that is administered in a systematic fashion to a cohort of individuals in such a way that a statement can be made of the probability of benefit due to a clinical procedure or procedures (Montgomery, 1994). Much effort has been devoted to the development of outcome measures that display robust psychometric properties such as reliability, validity, sensitivity, and specificity (see: Demorest & Erdman, 1994; Erdman, 1994; Montgomery & Demorest, 1988; Olswang, Thompson, Warren, & Minghetti, 1990; Walden, Demorest, & Helper, 1984).

In traditional paradigms of evaluative research, the treatment success is usually evaluated in one of two manners. One option is to compare the post-treatment scores on the dependent variable to a pre-established operational definition of what is considered to be normal or acceptable criterion on the dependent variable. Alternatively, statistical procedures are used to compare the difference-scores

(post treatment vs. pre-treatment level of performance on the outcome measure) obtained for the groups that received the treatment and the control groups. Based on the results of the statistical analyses, conclusions are reached about the efficacy of the treatment under investigation. The results of treatment efficacy research are generalized to individuals who display similar predicaments as those who took part in the investigation.

Some aspects of traditional treatment efficacy research do not readily lend themselves to functional evaluative research, especially as it relates to rehabilitative audiology. Traditional evaluative research is entrenched in a curative model of health. Usually, the focus is placed on the treatment of impairments and disabilities rather than on disabling situations and handicapping situations. That is, traditional evaluative research does not consider the client's perception of the predicament and the context (including the physical, social, and psychological context) in which difficulties arise. Moreover, curative models typically hold a very static view of health. Little consideration is given to factors that can change as a function of time, including: the impairments, the disabilities, the context, and the client's perception (and awareness) of the difficulties. The next section outlines the components of a health model and an approach to rehabilitation that are considered appropriate for audiological rehabilitation.

## **FOUNDATIONS OF A REHABILITATION MODEL**

### **Rehabilitation as a Process**

Many authors view rehabilitation as a problem-solving process (Erdman, 1993; Héту & Getty, 1991; Hyde & Riko, 1994; Sanders, 1982; Schum, 1994). The concept of process implies that the needs of the person with a hearing impairment evolve from the time that hearing loss is acknowledged as an everyday limitation to that of having reached an optimal restoration of normal life habits (Héту, Getty, & Waridel, 1995). This implies that there is often a period of limited awareness of the effects of hearing loss and, hence, of problem identification (Héту, Riverin, Getty, Lalande, & St-Cyr, 1990; Jones, Kyle, & Wood, 1987). It should be noted that having a limited awareness of a problem is not the same as denying that a problem exists. In the latter case, an individual is aware that problems exist but certain factors (personal, social, or other) preclude that person from acknowledging the difficulties that are experienced in specific situations. In contrast to a curative model, there is recognition that a person's awareness of having hearing difficulties is part of a process that evolves over time. This implies that solutions to problems associated with a hearing impairment are not likely to be solved by a "one-shot" intervention program such as the use of a hearing aid or participation in a 6-week multi-component communication training program.

### **Rehabilitation as Alleviation of Disability and Handicap Situations**

The problems that result from a hearing impairment were considered from an ecological perspective by Noble and Héту (1994). In this model, disabilities result from a mismatch between auditory demands and limited auditory capacities. Moreover, a disability does not stand by itself. Rather, it is the result of a concrete *situation* faced by a person with limited capacities. Hence, when the effects of the mismatch between auditory capacity and auditory demands are considered, it is more appropriate to refer to **disabling situations** and **handicapping situations**. Within this perspective, solutions to hearing difficulties generally include more than the individual with a hearing impairment. Specifically, people who interact with the individual who has a hearing impairment, including the persons who control listening or communication environments (e.g., a restaurant manager, a bank-teller, or the receptionist at the health care clinic) must be considered when solutions to a person's hearing problems are sought. Moreover, individuals with normal hearing who interact with persons who have a hearing impairment (e.g., a spouse) may also experience disabling and handicapping situations. These individuals are candidates for rehabilitation services.

An ecological model of rehabilitation implies that the major focus is placed on *real life situations* and that the experience of hearing impairment is contextualized. Accordingly, rehabilitation objectives (and outcome measures) must also be individualized and contextualized. The recognition that socio-cultural factors have an influence on situations that cause disabilities and handicaps implies that there may be substantial differences in the nature, extent, and type of disabling and handicapping situations among clients with similar impairments and disabilities. Consequently, there will be differences in the manner in which functional rehabilitation goals are defined among clients with similar impairments. As it relates to evaluative research, and especially to the assessment of rehabilitation needs and outcome measures, the implications of an ecological perspective are considerable. By definition this perspective precludes the use of normative scales of hearing capacities or difficulties because those scales include a number of items that are irrelevant to specific individuals. Also, the statements of difficulties included in those scales are not always provided within a context that is appropriate for the individual (Noble, 1994).

### **Rehabilitation as a Client-Centered Intervention Process**

Within the framework of an ecological model of health, and consistent with a problem-solving approach to rehabilitation, it is considered essential that the client be actively involved in every aspect of the rehabilitation process. Specifically, the client must be involved in: the identification of the difficulties experienced, the negotiation and definition of the objectives of the rehabilitation program, the elaboration of the intervention program itself, the definition of the desired outcome, and the criteria developed to evaluate the outcome of the program.

Further, a client-centered approach incorporates a phenomenological dimension (see: Erdman, 1993). The client's *perspective* is essential in order to capture the personal meaning of the experience of hearing difficulties, to identify potential ways to solve the problems, and to evaluate the success of negotiated intervention programs. As with any data collection procedure, it is important that the information exchanged between the clinician/researcher and the client be valid. The procedures used to collect the data (e.g., open-ended interviews) must make it possible for clients to provide their perception of all facets of the rehabilitation program. This can be achieved by ensuring that there is an open and accepting relationship between the clinician and the client. Moreover, clients must be invited and able to provide a description of the predicaments associated with their hearing loss at each stage of the rehabilitation program. Also, the clinician must be able and willing to accept and believe the client's perception of those predicaments.

The model of health and the process of rehabilitation described above differ from other approaches currently applied to audiological rehabilitation. In many respects some current approaches to audiological rehabilitation (and hence the paradigms used to evaluate their efficacy) are incompatible with an ecological model of health and a client-centered intervention process. Two examples are provided to illustrate this point. First, some clients are reluctant to acknowledge that their hearing impairment affects their daily activities. This reluctance to acknowledge the presence and effects of hearing impairment is a defense mechanism developed to reduce the threat to one's identity associated with a disabling situation (Hétu, 1995). Denial of hearing problems is often identified by clinicians as a major barrier to rehabilitation (Schum, 1994). However, within the perspective of rehabilitation proposed above, the following goal would be inappropriate for an intervention program (or as a desired outcome in an evaluative research program): "to make the client admit to having hearing problems in certain specific situations." As mentioned above, a client-centered intervention approach stipulates that goals of rehabilitation programs must be negotiated between the clinician and the client (McKenna, 1987). Although it would be possible for a clinician to express his or her perception of the client's predicament concerning the issue of denial, it is unlikely that a client would agree to a goal such as the one formulated above.

Second, hearing aids (and other amplification systems) are designed to improve communication in various settings. The benefits provided by hearing aids have been the focus of many evaluative research investigations in rehabilitative audiology. In some studies, the outcome measure consists of a rating scale that is used to assess the ease of communication in various settings (e.g., Dillon et al., 1991b; Mulrow et al., 1990; Mulrow, Tuley, & Aguilar, 1992; Taylor, 1993). Much effort has been devoted to the development of outcome measures that are psychometrically robust and that capture the ease of communication in many dif-

ferent "typical" environments (e.g., Cox, Alexander, & Gilmore, 1991; Cox & Gilmore, 1990; Gatehouse, 1994; McCarthy, 1991; Schow & Gatehouse, 1990; Walden et al., 1984). The benefit provided by wearing a hearing aid is evaluated by comparing the scores of a self-report rating scale (the outcome measure) administered to the subjects pre- and post-hearing aid fitting. Such studies make it possible to evaluate the efficacy of the treatment (i.e., the dependent variable, which in this case is the benefit provided by the hearing aid). However, these studies fail to accurately describe the effects of the treatment (the provision of a hearing aid) on the independent variable (i.e., individual clients, with their unique predicaments, who report communication difficulties in very specific situations judged by them as being important and necessary). For example, a person who resides in a nursing home may only wear a hearing aid occasionally. This person is likely to show no benefit in wearing a hearing aid based on the results of general hearing aid benefit scales. However, the benefit of having a hearing aid may be rated very highly by that person because the aid facilitates communication on occasions when family members visit the nursing home. Facilitating communication with family members may have been the primary goal of the intervention program designed for that client. In this instance it is unlikely that a population-based (normative) rating scale of hearing aid benefit would have provided a valid appreciation of the intervention program. The next section lists some of the factors that should be considered in developing appropriate paradigms for evaluative research.

### **FACTORS TO INCORPORATE INTO FUNCTIONAL EVALUATIVE RESEARCH PARADIGMS**

#### **The Desired Goal of Evaluative Research**

Presently, evaluative research is narrowly defined. In some cases, the objective of evaluative research appears to be the development of outcome measures rather than a systematic procedure designed to gather information on the efficacy of intervention programs. In most cases, contemporary evaluative research paradigms are designed to evaluate specific treatments or procedures (e.g., the effects of a lipreading training program or hearing aid fitting procedure). Traditional paradigms may be more appropriate to evaluate the effects of treatments on the reduction of impairments and disabilities. However, the ultimate goal of rehabilitative audiology is to eliminate or diminish disabling and handicapping situations. Current evaluative research paradigms are not likely to be adequate to evaluate the effects of an intervention program on the reduction of *disabling and handicapping situations*. The scope of evaluative research must be broadened to incorporate the measurement of changes in all facets of the client's predicament, including the effects of the rehabilitation program on the beliefs, attitudes, and behaviors of the client.



The ecological model of health, and a client-centered approach to rehabilitation summarized in the preceding sections, require that certain modifications be made to current paradigms of evaluative research. Some of the factors that should be incorporated into functional evaluative research paradigms are listed in Table 1.

#### **Factors Related to the Intervention Model**

An ecological model of health and a client-centered approach to rehabilitation predicates that a client's hearing problems can only be defined by that person. Further, the model implies that the description of the problems will be influenced by factors other than hearing impairment and disability (see: Erdman, 1993; Gatehouse, 1994; Hyde & Riko, 1994). Specifically, the *context in which the problems exist* in the client's daily life activities, as well as the *client's perception of the problems*, are key factors in the identification of all problems associated with a hearing impairment. Comprehensive rehabilitation programs must consider all the relevant aspects of the client's predicament as well as the specific context in which disabling and handicapping situations are experienced. Hence, the identification of specific problems, including the extent, frequency, and importance of each problem, can only be provided by the client. Moreover, the client must be involved in all other aspects of the rehabilitation program including: the identification of the goals of the intervention program, the selection of activities to be included in the intervention program, and the definition of the criteria that will be used to evaluate the success of the program (Hyde & Riko, 1994; McKenna, 1987). The client must participate actively in the evaluation of the efficacy of the rehabilitation program. Also, the client should be consulted to identify the elements of the program that were responsible for the changes observed.

Evaluative research paradigms must accommodate the fact that aspects of the client's predicament (including the beliefs, attitudes, and behaviors of the client and the significant individuals in the client's environment) are susceptible to modifications while the person participates in a rehabilitation program. However, some of the changes observed may be triggered by activities not directly associated with the intervention component of the rehabilitation program. For example, a self-report rating scale, such as the CPHI, could be used as an assessment tool in a clinical setting or as an outcome measure in an evaluative research project. Completing the self-report scale may in itself influence the client's awareness of the effects of the problems caused by the hearing impairment on some aspects of daily activities (Demorest, 1987). It is possible (and in some instances even desirable, given the evolutionary nature of the rehabilitation process) that the scores obtained after the completion of the intervention program reveal that the client experiences more (or greater) hearing difficulties after completing the intervention program than at the outset. This outcome can not necessarily be interpreted as an indication that the intervention program was inappro-

**Table 1**

Factors to be Considered in the Development of Functional Evaluative Research Paradigms

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<b>Factors Related to the Intervention Model</b>	
★	Rehabilitation as alleviation of disability and handicap situations <ul style="list-style-type: none"> <li>– individualized and contextualized intervention</li> <li>– acting on real life situations</li> </ul>
★	Rehabilitation as a client-centered process <ul style="list-style-type: none"> <li>– negotiation of intervention objectives</li> <li>– process and outcome assessed by the client</li> </ul>
★	Rehabilitation as a process <ul style="list-style-type: none"> <li>– evolution of awareness and felt needs</li> </ul>
<b>Factors Related to the Evaluation Procedures</b>	
★	Procedural issues <ul style="list-style-type: none"> <li>– assessment time</li> <li>– integration within routine intervention</li> </ul>
★	Methodological issues <ul style="list-style-type: none"> <li>– use of single-subjects (individualized) research designs</li> <li>– sociodemographic and audiological characterization of the clients</li> <li>– use of qualitative data to describe outcome (e.g., personal meaning of objectives and outcome)</li> <li>– use of qualitative data to characterize the process of the rehabilitation program (e.g., triggers, facilitators, obstacles)</li> <li>– efficient procedures</li> </ul>
★	Statistical issues <ul style="list-style-type: none"> <li>– conversion of qualitative information into quantitative data</li> <li>– capability to generalize to wider segments of the clientele</li> <li>– appropriate psychometric properties</li> </ul>

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priate or ineffective. The measured outcome may be a result of changes in the client's predicament caused by factors or events other than those associated with the intervention program. Comprehensive functional evaluative research paradigms must include procedures that make it possible to monitor the evolutionary process of a client's awareness of the problems. Moreover, those research paradigms must take into account modifications in the client's predicament (including beliefs, attitudes, and behaviors) as well as changes in the person's expressed needs for rehabilitation that might occur as a function of time and that can be influenced by factors other than the treatment program per se (Hyde & Riko, 1994).

Ideally, an evaluation of the rehabilitation process should be undertaken in parallel with evaluative research. At present, little information is available concerning the procedures that successfully reduce specific disabling and handicapping situations as well as the factors that trigger changes in a client's attitudes, beliefs,

and behaviors. A better characterization of the rehabilitation process would provide helpful insights on how to improve current rehabilitation programs or on how to design better ones. Qualitative research paradigms, such as interviews that include open-ended questions on the process of rehabilitation (e.g., "What helped you solve the problems you had in that situation?") might constitute an appropriate method to obtain pertinent information on the process of rehabilitation (Stephens, 1994). An individualized qualitative approach does not preclude conversion of such information into quantitative data for large number of clients (King, Keolane, & Verba, 1994).

### **Factors Related to the Evaluation Procedures**

Rehabilitation programs are often described as a series of distinct professional activities that are carried out in a sequential manner. Specifically, most audiological rehabilitation programs are organized into modules that consist of components such as: identification, assessment, intervention, and evaluation (e.g., Alpiner, Kaufman, & Hanavan, 1993; Giolas, 1982; Goldstein & Stephens, 1981; Hyde & Riko, 1994). When considered in this manner, the activities related to outcome evaluation are removed from the other components of the rehabilitation program.

It is often reported that the time taken for assessment and evaluation limits the time available for intervention. Thus, there is a tendency to develop and use assessment procedures that are short so that the time taken to evaluate the rehabilitation needs of the client are limited to a minimum. It is our view that when rehabilitation is conceptualized as a client-centered problem-solving process, assessment-related activities are interwoven with therapeutic activities that consist of interactions between the client and the clinician. Thus, assessment of the client's needs becomes part of the therapeutic-intervention process rather than a distinctive component of the rehabilitation program. Similarly, the procedures used to evaluate the efficacy of the intervention program (i.e., the outcome measures) should be designed in such a way that they are integrated into the natural interaction patterns that develop between the clinician and the client. The client-clinician interactions involving evaluation of a goal often serve as an opportune time to define new goals for rehabilitation (McKenna, 1987). This means that the assessment of baseline level performance is based on specific objectives developed by (and negotiated between) the clinician and the client at a specific point in the rehabilitation process.

As mentioned in a previous section, most of the current paradigms used to evaluate the efficacy of intervention programs are based on curative models of health. Studies typically take the form of large-scale, population-based investigations. Such studies diminish the importance of the independent variable (i.e., individual subjects and their unique sets of predicaments). Traditional paradigms assume that subjects share the same predicaments, or that subject differences are

either negligible or randomly distributed across the cohort of subjects. This assumption is counter to one of the major tenets of individualized and functional approaches to rehabilitation. The latter is based on the premise that each client is characterized by a unique set of predicaments and that the goal of rehabilitation is to reduce the *specific situations* of disability and handicap reported by the individual client. In this perspective, it is clear that treatment efficacy research must rely on single-subject research paradigms. Siegel and Young (1987) concluded that single-subject research designs constitute a valid paradigm for evaluative research.

The dilemma, as it relates to evaluative research in audiological rehabilitation, may be summarized as follows: There exist evaluative research paradigms that incorporate the use of outcome measures that have widely accepted psychometric properties. However, those paradigms are based on curative models of health which are inappropriate for evaluative research in audiological rehabilitation. There exist functional and individualized models of rehabilitation that lend themselves to evaluative research. However, the outcome measures associated with functional and individualized models of rehabilitation have not been sufficiently developed to be widely accepted. Moreover, the criteria typically used to assess the psychometric properties of outcome measures used in population-based studies cannot be applied to the type of data obtained from programs based on individualized and functional rehabilitation approaches. The theoretical premises that underlie those two approaches to rehabilitation are simply too different (McReynolds & Kearns, 1983).

As a first approximation, qualitative research paradigms appear to be well suited for evaluative investigations of audiological rehabilitation programs based on individualized and functional approaches. For example, the use of a phenomenological research paradigm would make it possible to characterize all the dimensions of a client's predicament by taking into account the person's real life situation, the context in which problems are experienced, and strategies for which solutions are sought. Moreover, the information can be recorded in words that reflect the client's own perception of the predicament and the rehabilitation process. However, the application of a phenomenological approach to evaluative research in audiological rehabilitation is not intuitively obvious. The application of this methodological approach requires highly developed data collection and interpretation skills. The data collection procedures associated with this approach can be particularly long and tedious if they are applied by untrained and inexperienced clinicians and investigators. Also, the strategies used to extract information relevant to a client's rehabilitation program from the pool of data collected can be very time consuming. Consequently, the application of a phenomenological research paradigm for the purpose of evaluative research may not be efficient nor applicable in most clinical settings. More field studies are required to evaluate the application of qualitative approaches to evaluative research in audiologi-

cal rehabilitation. For example, it is possible that the use of a small number of well-defined open-ended questions would yield responses that would be confined to the specific goal of the investigation. If so, the information obtained from the subjects would be easier to summarize and could be converted into quantitative data (King et al., 1994). Parametric statistical analyses could be applied to the transformed data in order to evaluate the effectiveness of the intervention program. Moreover, established procedures could be used to assess the psychometric properties of the data collected in this fashion.

A strength of qualitative research paradigms is that the data collection procedures make it possible to obtain a unique and individualized description of the client's predicament, one that takes into account the person's own perception of the situation (Moustakas, 1994; Spradley, 1979). However, an important goal of evaluative research is to be able to generalize findings obtained from individual clients (or groups of subjects) to wider segments of the clientele. As mentioned above, the pursuit of this goal requires that the procedures used to obtain individualized data be systematic and uniform. Moreover, the principles of generalization require that the same procedure be administered to a large number of clients *with a relatively homogeneous predicament*. It is acknowledged that data related to impairment alone (i.e., the type and degree of hearing loss) do not provide sufficient information to identify groups of subjects with a similar predicament (e.g., Dillon et al., 1991b; Erdman, 1994; Gatehouse, 1993, 1994). Sociodemographic, cultural, environmental, psychological, and other factors must also be considered in the definition of a person's predicament (Hyde & Riko, 1994). However, the factors that must be considered when attempts are made to group together subjects with a similar predicament are not well defined at the present time. This information is essential for any large scale evaluative research in audiological rehabilitation.

The challenge of evaluative research in audiological rehabilitation resides in finding ways of collecting relevant qualitative data in an efficient manner. Moreover, at least some aspects of the data must be obtained in a form that can be converted into quantitative indices for the purpose of generalization. The transformed quantitative data should display all the psychometric properties of desirable outcome measures.

#### **TOWARDS THE DEVELOPMENT OF APPROPRIATE PARADIGMS**

Recently, there have been attempts to develop research paradigms and outcome measures that are consistent (at least in part) with an ecological model of health and a client-centered approach to rehabilitation. One approach has been to design evaluation procedures that record both general and specific information on hearing difficulties experienced by individual subjects (e.g., Dillon, James, & Ginis, 1994; Dillon et al., 1991a; Gatehouse, 1993, 1994). For example, Dillon et al.

(1991a) described the use of the Goal Attainment Scaling (GAS) procedure as an outcome measure. The GAS is divided into two distinct components: a global GAS and a specific GAS. Both components of the GAS are administered before the rehabilitation program is designed and after it is completed. The Global GAS requires clients to rate their level of functioning in a number of pre-selected and specified situations that require hearing (e.g., understanding the television, telephone conversations with familiar individuals, or the recognition of environmental sounds such as doorbells). In addition, some of the questions address the client's emotional reaction to hearing impairment. The specific component of the GAS requires clients to nominate up to five very specific listening situations in which they experience difficulty (e.g., "I would like to understand the Doctor when we have an appointment to discuss the general health condition of my spouse"). The client's level of functioning is recorded for each of the specific hearing situations nominated. An analysis of the client's pre- and post-rehabilitation scores on the GAS provides a quantified outcome measure of the success of the rehabilitation program.

A modified version of this GAS, the Client Oriented Scale of Improvement (COSI), has been developed for clinical application within the Australian Hearing Services (Dillon et al., 1994). The COSI is also administered both before and after the client's participation in a rehabilitation program. The pre-intervention interview requires clients to nominate and rate specific listening situations in which they experience hearing difficulties. At the conclusion of the rehabilitation program, the client completes a similar rating scale (i.e., post-intervention COSI) that requires clients to assess the degree of improvement and the residual difficulty they experience for each of the nominated situations. Preliminary investigations indicate that the COSI may provide an adequate estimate of the benefit provided by an intervention program in audiological rehabilitation (Dillon et al., 1994). Moreover, the use of this procedure was reported to be helpful and appreciated by clients as well as clinicians (Dillon et al., 1991b).

Gatehouse (1993, 1994) described a procedure intended to measure the benefit provided by hearing aids. In this procedure, the *Initial Disability Interview* is administered before the client is fitted with a hearing aid. The procedure consists of a structured interview that attempts to characterize the individualized problems experienced by persons with a hearing impairment. First, data are collected on the problems experienced in 12 pre-determined listening situations. Then, the clients are asked to identify four specific situations that are important for them to hear in, independent of whether or not they have already been covered in the 12 pre-determined listening situations (S. Gatehouse, personal communication, February, 1995). For each of the 16 situations, the clients provide a rating for three specific questions: (a) How often does this situation occur?, (b) How much difficulty do you experience in this situation?, and (c) What effect does this difficult hearing situation have on you? Once the intervention program has been com-

pleted the *Aid Benefit Interview* is administered. The latter procedure also consists of a structured interview based on the same 16 difficult hearing situations assessed in the *Initial Disability Interview*. The questions asked during the post-intervention interview include: (a) How much do you use the hearing aid in that situation?, (b) How does the hearing aid help you manage this situation?, and (c) How happy or satisfied are you with your hearing aid in that situation? Gatehouse (1994) reported that the information obtained with this procedure could be potentially useful in the planning and delivery of rehabilitation programs tailored to the needs of individuals with a hearing impairment.

Some authors have proposed approaches to measure the efficacy of rehabilitation programs that rely exclusively on client specific data collection procedures. For example, Montgomery (1994) described a *Problem Solving Approach* (PSA) to audiological rehabilitation. The author claims that the procedure could be used as an outcome measure to evaluate the efficacy of communication intervention programs. The approach is totally individualized. It is tailored to the individual's performance in the everyday communication environment and reflects the person's specific needs, values, and goals. In this approach, the client is involved in identifying problematic situations. The client keeps a log of the specific problems or difficult communication situations encountered. Possible reasons for each communication breakdown are recorded. The client is engaged in a structured and systematic self-observation or monitoring of daily activities. During that time, the client participates in an intervention program that includes various aspects of communication therapy (e.g., assertive listening, speechreading, assistive devices, the use of appropriate repair strategies). After the intervention program, an assessment is made of the overall percentage of problem occurrences that have been resolved per week. The overall percentage is based on the success in each difficult situation, weighted by the frequency of the situation. The measure quantifies the extent to which the client's communication difficulties have been resolved (Montgomery, 1994).

McKenna (1987) described a procedure to define specific and individualized goals for audiological rehabilitation. The procedure requires that the client actively participate in the identification and definition of the goals of the rehabilitation program. Each objective is specific and described in terms that make it possible to later verify quantitatively if the objective has been reached. Other elements of the goals setting procedure include: the identification of all the individuals involved in the pursuit of the goal, a clear delineation of the responsibility of each person involved in the pursuit of the goal, a description of the conditions under which the goal will be accomplished, the establishment of the criteria that will be used to assess goal attainment, and the time-frame provided to achieve this goal. An example of a client's goal for rehabilitation might be:

When he fails to follow the conversation while playing bridge, Mr. Smith will inform his card-playing partners that he did not understand what was said (be-

cause of his hearing problems) and he will request a specific repair strategy to overcome the communication breakdown. Mr. Smith will perform this action 80% of the time, after the completion of a six-week intervention program.

The goal setting procedure described by McKenna (1987) is appealing for several reasons: (a) The goals are defined with the client and they are individualized to meet the needs of each person, (b) the elements that must be found in the formulation of each goal are clearly established, (c) the client actively participates in the formulation of the desired outcome, (d) the procedure used to set the goal and the desired outcome is systematic and it makes it possible to assess *quantitatively* if (and to what extent) each goal was achieved, and (e) the client actively participates in the evaluation of the success of the intervention program. Many aspects of the procedure described by McKenna (1987) could be incorporated into a procedure for measuring outcome in large-scale evaluative research investigations.

A procedure similar to the one described by McKenna (1987) has been applied to the development of a functional outcome measure in Occupational Therapy: the *Canadian Occupational Performance Measure* (COPM: Law et al., 1990; Law et al., 1994). In this procedure clients are asked to identify specific problems that they experience in activities related to either self-care, productivity, or leisure. Each of the problems identified is given an *importance rating* by the client. Clients are also asked to rate their *ability to perform* each specified activity and *their satisfaction* with that level of performance. Each attribute, performance, and satisfaction is rated on a 10-point scale. An intervention program is designed to address the five most important problems identified by the client. After the intervention program is completed, clients are asked to rate their level of performance and their satisfaction based on their assessment of the level of performance they now display for each of the difficulties previously identified. Pre- and post-intervention indices of overall performance and satisfaction are used as outcome measures. Preliminary validation studies of the COPM indicate the procedures used fulfill the goal of developing an individualized, client-centered outcome measure. Moreover, preliminary results indicate that COPM constitutes an acceptable tool based on a number of methodological and psychometric test properties. The initial reactions of clinicians and clients to the use of the COPM have been favorable (Law et al., 1994).

Some of the procedures described above may lead to the development of research paradigms that would be appropriate for functional evaluative research in audiological rehabilitation. However, more research is needed to refine the procedures described above and to develop methodological approaches that are practical and display the psychometric properties required to conduct valid evaluative research studies.



## CONCLUSION

In the present article, several factors that should be considered in the development of paradigms to conduct evaluative research in audiological rehabilitation were identified. Those factors emerge from the recognition of three fundamental principles of rehabilitation. These principles are: (a) rehabilitation consists of a problem solving process, (b) the goal of rehabilitation is to alleviate situations of disability and handicap, and (c) rehabilitation is primarily a client-centered process. Traditional evaluative research paradigms are based on curative models of health. Hence, those paradigms are not well suited to accommodate functional evaluative research initiatives based on contemporary models of rehabilitation. Recently, there have been attempts to develop evaluative research paradigms that take into account some fundamental principles of rehabilitation. Components of these initiatives have promising applications for the development of functional evaluative research paradigms in audiological rehabilitation. However, there remains a need for further research on the development of methodological approaches that are consistent with contemporary models of rehabilitation and consistent with basic methodological principles of traditional treatment efficacy research.

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