Research Mentorship and Training in Communication Sciences and Disorders

Proceedings of a National Conference

Edited by
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TABLE OF CONTENTS

Page

Preface

On May 6 and 7, 1993, the American Speech-Language-Hearing Foundation (ASHF) and the National Institute on Deafness and Other Communication Disorders (NIDCD) sponsored the first national conference on Research Mentorship and Training in Communication Sciences and Disorders.

An impressive group of speakers and conference participants gathered on the NIH campus in Bethesda, Maryland, to critically reappraise the way in which we cultivate scholars for research endeavors. The papers that follow, which were presented at the conference, represent discussions of the most basic and important issues related to the future of education and research training in our academic disciplines and the professions of audiology and speech-language pathology. Section 1 introduces the topic of research mentorship and training. Data are presented on the status of research education and funding in the field. Papers also offer perspectives on changing patterns in research training and mentorship as they relate to specific disorder areas. Section 2 highlights the multiple dimensions of mentorship and examines the development of research competency within graduate curricula. Gender, ethnicity, and ethical issues in mentorship are explored. Section 3 presents research on mentoring models and focuses on strategies of effective mentorship. Papers of senior scientists examine research mentorship strategies that have been personally effective. Section 4 discusses features and outcomes of research mentorship and training approaches applicable to specific settings. Section 5 presents one person's views on the role mentorship will play for the next generation of researchers. Section 6 provides recommendations on research mentorship and training needs suggested by conference participants.

The focus on mentoring as a crucial vehicle in the preparation and ongoing development of scientists is timely. The provocative discussions in this publication should ultimately lead the reader to an active commitment to the continued growth of quality research and of our scientific disciplines.

The conference could not have occurred without the efforts of many people. The Treatment Research Group in Communication Sciences and Disorders, a professional organization of American Speech-Language-Hearing Association members, identified the need

for a national conference on research mentorship and training. Under the able direction of chair Howard Goldstein, the Conference Steering Committee (Judith Cooper, Nancy Minghetti, Lesley Olswang, and Steve Warren) spent over two years developing and organizing the conference program. NIDCD Director James B. Snow, Jr., and Foundation trustees Fred D. Minifie and Robert L. Ringel deserve appreciation and recognition for their respective roles, which inspired the conference vision and made this first collaborative partnership a reality. The insightful and thought-provoking comments of the speakers were instrumental in the conference's success. These individuals have profoundly affected the lives of students and developing professionals. Not only are they fulfilling their own professional visions through commitment, energy, and focus, but they are also assisting others in doing the same. They are mentors in the truest sense. Recognition is also given to Maya Porter, Judy Kutrumbis, and Tarja Carter for their assistance during the production of the conference proceedings.

As you begin these readings, challenge your basic concepts about how best to develop the next generation of researchers. Widen your horizons and think of new possibilities. Commit to research mentoring and training. Be the driving force that will inspire and motivate the future scientists in our disciplines.

Nancy J. Minghetti
Judith A. Cooper

Section 1

Overview of Research Mentorship and Training

Research Mentorship Training in Communication Sciences and Disorders

Fred D. Minifie
University of Washington

On behalf of the American Speech-Language-Hearing Foundation's Board of Trustees, I am pleased to see this conference come to fruition. For the past five years the Board has discussed the importance of mentorship as a vehicle for advancing knowledge within the field and rising the quality of our academic discipline and our professions. This conference could be the catalytic agent for significant changes in the philosophy underlying research training in our field. If this conference demonstrates the overriding importance of mentorship in research training, perhaps then the faculties of our doctoral and postdoctoral education programs, and the professions at large, will demand that mentorship be an essential ingredient in the preparation of researchers for our field. The deliberations of this conference will determine whether that happens.

Dr. Cynthia Shewan and I have the responsibility at the beginning of this conference to identify and discuss the current status of research training in communication sciences and disorders. I will present one person's perspective of a major crisis facing this academic discipline and the professions of audiology and speech-language pathology, and Dr. Shewan will then present information on the current status of education, training, and research funding in the field.

Let's begin by talking about science and scientists in general and science and scientists in our discipline. The National Academy of Sciences in its excellent primer entitled *On Being a Scientist* states that "from a distance science can be organized into a coherent framework, but in practice, research is as varied as the approaches of individual researchers" (p. 2).

In 1967 Sir Peter Medawar, in his book *The Art of the Soluble*, writes

> Scientists are people of very dissimilar temperaments doing different things in very different ways. Among scientists are collectors,

> classifiers, and compulsive tidiers-up; many are detectives by temperament and many are explorers; some are artists and others are artisans. There are poet-scientists and philosopher-scientists and even a few mystics (p. 132).

I ask you to consider the wide range of scientists needed in our field: neuroscientists, linguists, physiologists, acousticians, psychoacousticians, otolaryngologists, audiologists, speech-language pathologists, developmental psychologists, learning specialists, voice specialists, gerontologists, specialists in early childhood, and so on. No two researchers are alike.

We must ask ourselves two questions: How can the field of communication sciences and disorders educate the wide variety of scientists needed to gain the crucial knowledge necessary for the future growth and development of the discipline and for the survival of the professions? Can we successfully tailor our research training programs to the specialized, individual needs of such a diverse group of young scientists?

Obviously, our task is a difficult one. The problem is compounded by the fact that we have a limited number of doctoral and postdoctoral education programs and that some of these have so few faculty with bona fide research credentials that students aspiring to become scientists have little opportunity to develop strong research skills, much less experience the nurturing of mentorship. We have attempted to overcome this limitation in some parts of the country by allowing doctoral students to participate in traveling scholar programs wherein they can spend time at another university to work with a scientist whose research focus is germane to the area of study of the traveling scholar. Although the very existence of such programs speaks to the inherent limitations of all graduate training programs, it also acknowledges the importance of working with good mentors.

Perhaps we will discuss at this conference what type of scientists should be available in the doctoral and postdoctoral training institutions in our field. My reaction is that this may be a genuine imponderable. We cannot say with surety what type of scientists we need, because we don't know what type of science will be needed during the next decades.

Lewis Thomas put it this way in his little book, *Late Night Thoughts on Listening to Mahler's Ninth Symphony*,

> I cannot guess at the things we will need to know from science to get through the time ahead, but I am willing to make one prediction about the method: we will not be able to call the shots in advance. We cannot say to ourselves that we need this sort or that sort of technology,

> therefore we should be doing this or that sort of science. It does not work that way. We will have to rely, as we have in the past, on science in general, and on basic, undifferentiated science at that, for the new insights that will open up new opportunities for technological development. Science is useful, indispensable sometimes, but whenever it moves forward, it does so by producing a surprise; you cannot specify the surprise you would like. Technology should be watched closely, monitored, criticized, even voted in or out by the electorate, but science itself must be given its head if we want it to work (p. 28).

As diverse and idiosyncratic as are the sciences underlying human communication and disorders, and as challenging as are the problems facing doctoral and postdoctoral training of researchers for this field, there are some issues on which we can agree. First, I submit that "scientific knowledge emerges from a process that is intensely human, a process marked by its full share of human virtues and limitations" (National Academy of Sciences, 1989, p.1). Indeed, much of the progress in our field, as in other scientific disciplines, is not the product of scientific investigation, but instead involves value-laden judgments, personal desires, and even the researcher's personality and style. This is true of progress in the basic sciences underlying our field and in the acquisition of knowledge for direct application in our professions. These characteristics of the researcher are best developed in the nurturing scientific environment established in relationship with a true mentor.

Should the training of researchers be different if their career goals focus on the professions of audiology and speech-language pathology rather than on the discipline of communication sciences and disorders? Can we treat them all the same? How do we treat them?

Elizabeth Kennan argues that university training programs are exemplified by

> a retreat into smaller truths, the truths of various disciplines—content to ignore, whenever possible, those of our neighbors. Our professional fragmentation has suited the professional ambitions of our students. They have been left largely to pursue their specific interests without larger requirements, which is to say that they have studied the skills and techniques by which they hope to earn a living (Kennan, 1989, p. 33).

The question is, have we allowed our students to become too narrow as professionals, or too narrow as scientists, rather than broadly educated scholars capable of bridging the gap?

Roger Sale, in his 1989 essay "A Mind Lively and at Ease," presents the premise that

> many academic disciplines have become so overwhelmed by the narrowness of their ideas that many of the professors are apt to say,

> "There is just too much to know. I can only know a tiny bit of it." Thus it is that in a university it is often knowledge that enslaves; when one is paralyzed by "all there is to know" one is thinking of knowing only as a matter of knowing expertly. Such a paralysis may drive one to more expert knowledge, but it will not lead to freedom (p. 11).

I ask you, what is our task in research training—expert knowledge? Breadth of knowledge? How can our future researchers appreciate the contributions of their colleagues if they are trained so narrowly that they know only one thing? As I see it, we have a genuine dilemma. Too narrow, too broad. Is balance one of the qualities of a good researcher?

To address the crisis currently facing the field of communication sciences and disorders I want us to consider two examples used by futurist Joel Barker (Barker, 1989) in his videotape "Discovering the Future: The Business of Paradigms." Those of you who have seen this popular video will already know that Joel Barker was heavily influenced as a college student by Thomas Kuhn's book *The Structure of Scientific Revolutions* (Kuhn, 1970). Indeed, Barker's use of the concept of paradigms directly stems from that influence. Two of his examples may help us understand a basic crisis that must be faced by all businesses, organizations, scientific disciplines, and clinical professions. The first example is a comparison of products manufactured in Japan in 1960 with those manufactured in Japan in 1990. Typical American descriptors of Japanese products in 1960 included such terms as "cheap, imitation, poor quality, low cost, junk." In 1990, typical descriptors included terms like "high quality, high cost, top of the line, innovative," and their businesses were described with terms like "good management, dominant market share." The descriptors in many cases were complete opposites. Something changed. Japanese businessmen implemented innovative management practices they learned from American consultants Deming and Jurand. They turned their business practices around, their economy thrived, and they became a dominant economic world power.

The second example is from the world of watchmaking. If asked what country in the world produced the most watches in 1965, you would likely respond, Switzerland. Indeed, in 1965 the watchmakers in Switzerland had a dominating 68% share of the world market. If you were to ask which country in the world produced the most watches in 1992, the answer would be Japan. In 1992, Switzerland held only a small 8% of the market share. What caused the change? How could a country so dominant in the world market only 25 years ago lose its competitive edge? Let me describe for you the chain of events.

In 1968, there was a young scientist working in a research laboratory in one of the major watch manufacturing companies in the world. He came up with a new idea about how

to measure time. In his design, he used a quartz crystal and an electronic circuit that provided a much more precise measure of time than did the elegant mechanical watches of the day that were designed to work with springs and gears. He took his idea to the owner of the watch manufacturing company where he was employed. He showed the owner his new idea and explained its operation. We do not know what the owner of the company said except that he indicated that electronic watches were not the future of the watchmaking industry, and turned away his employee to think about other ideas. In fact, the watch manufacturer thought so little of the idea that he did not even seek to protect it with a patent. Because it was a novel idea the owner permitted his company to display it at the next annual world exhibition of new watches. Interested observers from Seiko and Texas Instruments passed by their exhibit area, and the rest is history. The employee had invented the concept of the liquid crystal that revolutionized the watchmaking industry. It is interesting to note that the employee worked for a Swiss watch manufacturer, so the idea could have propelled the Swiss into a new era of watchmaking and could have allowed them to become even more dominant in market share. However, because the owner of the company was so married to the paradigm of watchmaking that had served them well in the past, he had blinders on when it came to seeing the value of a new idea.

Now, you may ask, what have these two examples got to do with a conference on mentorship? I submit that the second example speaks to the issue of complacency and commitment to the status quo. The first example speaks to how thoughtful changes can be instituted that can reshape and strengthen the business in which we are engaged.

We have been in the process of training researchers in communication sciences and disorders for about 65 years. Although most disciplines in the health sciences have evolved to the stage that a period of postdoctoral education is obligatory if the young scientist hopes to gain the specialized research experience necessary to become a successful researcher in the discipline, ours has not! A primary ingredient in a high-quality postdoctoral research experience is working with an established scientist who can provide the mentoring experience so essential to understanding the specialized technology used in that area of science, to the refinement of scientific rigor, the tempering of scientific judgment, and the development of an innovative, thematic, programmatic research mission that will allow the young scientist to launch a productive research career. Perhaps it is a reflection of the youthfulness of the field of communication sciences and disorders that the primary model for educating young scientists for research careers has been, and continues to be, predoctoral education, with the dissertation as the culminating research experience. With notable exceptions, the dissertation research project is often the only independent or quasi-independent research project

undertaken by the candidate. And the level of research mentorship is dubious. Something is wrong with this picture.

Is it possible that we, like the Swiss watchmaker of 1965, stand at the threshold of disaster? I believe so, particularly if we continue training researchers the way we always have. To me, it is no longer a viable option to believe that we can educate the scientists needed for research careers in our discipline and professions through traditional predoctoral training programs. There is neither sufficient time nor sufficient expertise available within our training programs to adequately accommodate, mold, and develop the varied research interests of young, research-oriented doctoral students. We must rely on expertise available in related disciplines. To fulfill our goal of training researchers for the years ahead, I submit that we must insist that our young scientists complete a period of postdoctoral research under the guidance and direction of a skilled mentor in their area of research interest. It is only in such an experience that the young scientist will gain sufficient perspective and expertise to launch an independent research career.

Is there a crisis in research training in communication sciences and disorders? Frankly, I am troubled, and somewhat depressed, by the data presented today by Dr. Shewan (See Shewan, this volume). We are training fewer researchers today for the basic areas of our discipline than we have in several decades past. Even so, by my lights, the crisis is not so much a crisis of numbers as it is a crisis of quality. Many of our present assistant professors struggle during the early years of their appointments in our universities. They seem almost paralyzed by the prospect of the productivity required for tenure. This problem is exacerbated when their ability to mount an independent research mission has not yet matured. Too often, they suffer from inadequate research skills. Not only would these young researchers have a far easier time succeeding in our discipline if they had participated in a high-quality postdoctoral research experience prior to accepting an academic appointment, but I submit that they would also start contributing to the knowledge base of our discipline and professions at an earlier point in their careers than those who had not been so exposed.

In conclusion, let me leave with you the question that Joel Barker leaves with his audiences. What is it that is not now known, that if known would forever change the nature of your field? Answering that question can often lead a researcher into a productive new line of research—research that could really make a difference in his or her field. I want this conference to address the question, What is it that we are not now doing in research training, that if done, would profoundly strengthen the quality of future research in this field? If you think the concept of research mentorship can significantly improve the quality of future

research in this field, then we must change our model for research training. Perhaps it is time to undertake the kind of critical reappraisal of our research training programs that the Japanese business community undertook in 1960, and set our course for significant change in how we do business.

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Research Training and Research Project Funding in Communication Sciences and Disorders

Cynthia M. Shewan
American Physical Therapy Association

Academic Training in Communication Sciences and Disorders

Doctoral Training Programs

Academic training at the doctoral level is available in three areas within the communication sciences and disorders discipline. Although currently 50 or more institutions provide training in audiology and speech-language pathology, only 30 of them offer training in speech-language-hearing science (Table 1). The number of training institutions has remained relatively constant for audiology and speech-language pathology for the past nine years, but there has been an almost 25% decline for speech-language-hearing science (Creaghead, Bernthal, & Gilbert, 1991).

Doctoral Student Enrollment

Doctoral student enrollments were at an all-time high in the 1990-91 academic year, with a total of 822 students (Table 2). The majority were in speech-language pathology, and the fewest were enrolled in speech-language-hearing science. The numbers represent 22.5% and 54.6% increases for speech-language pathology and audiology, although speech-language-hearing science suffered a 43.6% decline. Considering the stability described above in the number of training programs, the average number of doctoral students per institution is currently higher than in the past.

Consistent with the discipline as a whole, 30% or fewer of doctoral students enrolled in all areas of study (audiology, speech-language pathology, speech-language-hearing science) are men, and this percentage has declined over the past nine years (Table 2). Students from minority groups account for approximately 10% of doctoral students, with African American

students being the largest group (7.0%) among all minorities (Table 3). These figures are very similar to those reported in 1982-83. Although overall gains have been small (less than 1.0%) among minority doctoral students, the percentage is double that for minorities within the American Speech-Language-Hearing Association (ASHA) membership, 5.5% in 1991 (ASHA, 1991a). Non-U.S. citizens account for 9.4% of doctoral students (Table 3).

Doctoral Degrees

Audiology and speech-language pathology. Although the number of institutions offering doctoral training in audiology and speech-language pathology has remained constant and the number of doctoral students enrolled has increased, the number of doctoral degrees awarded has not kept pace. Fewer degrees (128) were awarded in 1989-90 compared with 1981-82 (153) (Table 4). The numbers represent an increase for audiology (21.6%), but a decline for speech-language pathology (28.4%). Possible explanations include the following: (a) Fewer students are completing degrees. (b) Students are taking longer to complete a doctoral degree, increasing the time between enrollment gains and corresponding degree increases. Because the number of part-time students has not increased during this time span, part-time study does not explain the enrollment-degree difference. (c) The enrollment increases represent students in the earliest stages of their doctoral study and the increase in doctoral degrees will not be seen until these students graduate.

Speech-language-hearing science. For speech-language-hearing science, the relationships among the training program, student enrollment, and degrees awarded data are consistent, although discouraging, as decreases are seen in all categories.

Origin of Graduate Students

Many factors probably exert an influence on the choice of a doctoral program. If doctoral students behave as graduate students in general, then geography plays a particularly influential role. Sixty-five percent of graduate students originated from their own communication sciences and disorders program or from another institution within the state (Table 5). Another 20% of graduate students came from out-of-state communication sciences and disorders programs, whereas 14.3% transferred from another discipline. Nontraditional students (i.e., older students) accounted for 21.1% of graduate students.

Research in ASHA

ASHA Researchers

Researchers comprise a small and declining proportion of the ASHA membership. In 1993, 0.5% reported research as their primary professional activity and an additional 1.3% reported research as their secondary professional activity (Table 6). These figures represent a decrease from 1984, when researchers comprised 2.6% of the membership. Although the absolute number of researchers increased between 1984 and 1993, the rest of the membership grew at a faster rate, accounting, in part, for the declining percentage.

Demographic Characteristics of ASHA Researchers

Both primary and secondary researchers can be characterized as white women in their early forties who hold doctorate degrees, are ASHA-certified, and work either in college/university or hospital facilities (Table 7). This profile is very similar to that for 1984, with two modifications. A greater percentage of current researchers are women and fewer are employed in a college/university setting. As a group, researchers stand apart from the general ASHA membership by virtue of their older age, their higher educational level, and their university/hospital work base. Despite the fact that the majority of researchers are women (65.2%), women are still underrepresented when compared with the entire ASHA membership (90.4%) (ASHA, 1993).

Funding Among ASHA Researchers

Comprehensive, reliable data related to funding among ASHA's primary and secondary researchers are not available. From the 70 known doctoral and postdoctoral programs, ASHA's Research Information Service (RIS) collected data on principal investigator, research topic, total dollar amount of grant, type of funding (i.e., federal, state, local government, institution, private), source (e.g., Deafness Research Foundation), and ASHA member status. Because only half the programs provided data, whether the information would provide a representative national picture of funding among ASHA researchers is questionable (Malm & Shewan, 1990).

Other data sources, such as the Council of Graduate Programs in Communication Sciences and Disorders (CGP) and the Deafness and Other Communication Disorders Interagency Coordinating Committee (DCDICC), have produced only aggregate funding

information, which does not specify principal investigator. Therefore, from these sources it is not possible to determine how much money is garnered by ASHA researchers.

Research Activity Among ASHA Members

General research activity. The ASHA researcher data do not encompass all the research that ASHA members carry out. However, the relevant historical data collected have not been consistent in content or in time frame. According to the 1990 Omnibus Survey, 13.7% of the ASHA membership conducts research related to the clinical aspects of communication sciences and disorders (Keough, 1990). The 1989 Omnibus Survey indicated that 11.4% of the ASHA membership had been involved as an investigator, principal or among a group, seeking funding for a research project during 1987-89 (Shewan, 1989). In 1982, 6% of ASHA members reported conducting funded research and 17% reported conducting nonfunded research. Therefore, a reasonable estimate is that 15% of ASHA members may be engaged to varying extents in conducting research.

By definition, primary researchers spend most of their time engaged in research, which could be estimated to be an average of 30 hours or three-quarters of a work week. A similar estimate for secondary researchers might be quarter time, or 10 hours per week. ASHA members in general, across all work settings, reported spending an average of 6.9 hours per week conducting research (Mansour & Punch, 1984), which contrasts with the average 2.5 hours per week reported by full-time employed respondents to the 1986 Graduation Cohort Survey (ASHA, 1986). To attempt to provide any conclusions regarding the research time spent by ASHA members would be risky, given that the data available are both limited and variable.

Funded research. Data comparisons from several Omnibus Surveys indicate variable percentages of funded research among ASHA members. In 1982, 6% reported conducting at least one funded research project; between 1987 and 1989, 8.4% reported conducting research with one or more funded grants; and in 1990, 5.3% reported conducting funded research related to the clinical aspects of communication sciences and disorders (Fein, 1983; Shewan, 1989; Keough, 1990). Therefore, it would be reasonable to conclude that between 5% and 8.5% of ASHA members conduct funded research in any given year.

With the 10% gap between the estimated percentages of ASHA members conducting nonfunded and funded research, one might conclude that lack of funding might present a major barrier to conducting research. However, the data do not support this conclusion. Of

the 1990 Omnibus Survey respondents who reported they did not conduct research, three-quarters (74.9%) indicated the reason was because research was not part of their job. Five percent reported they were not trained for research and 11% indicated they lacked funding/support. The remaining 10% had other reasons for not conducting research.

Furthermore, of those who applied for grants between 1987 and 1989, 81.2% were successful in obtaining at least some funding (Table 8). Nearly half obtained two-thirds or greater of the number of grants applied for, with audiologists more successful than speech-language pathologists in obtaining funding (Shewan, 1989).

Research Funding in Communication Sciences and Disorders

Funds for research can be divided into the two broad categories of research training funding, which includes support for doctoral and postdoctoral study, and research grant funding, which includes support for research projects. In addition to the dollar amounts, of considerable interest is the sources of funding. A large portion of funding derives from government agencies, federal, state, and local. Institutions of higher education provide some funding, and other sources include private foundations and industry.

Funds for Research Training

Institutional funding. Colleges and universities support training through doctoral-level assistantships. In 1990-91, universities provided 476 assistantships, which might be associated with teaching, clinical, or research responsibilities. This represents a 30.4% increase in the number of assistantships provided compared with 1982-83, when 365 were offered (Creaghead et al., 1991). Unfortunately, data were not provided for the dollar amounts associated with these training funds. A reasonable estimate is $5.5 million, based on conversations with several communication sciences and disorders program directors who reported doctoral stipends that ranged from $10,000 to $13,000.

Federal funding.

- *Scientific Area*. Federal agencies provide funding for research training at the predoctoral and postdoctoral levels both to institutions of higher education and to individuals. For FY 1991, federal agencies provided 50 institutional training grants, totalling over $7 million in the scientific areas within communication sciences and disorders—that is, hearing, voice, speech, and language (Table 9). Fifty-one awards

were made to individuals, for a total of $950,000 (DCDICC, 1992). Within communication sciences and disorders, approximately half the number of grants and half the dollar amounts were awarded in the area of hearing.

- *Federal Agency.* Among federal agencies, the Department of Veterans Affairs (DVA), the Department of Education (ED), the National Institutes of Health (NIH), the National Science Foundation (NSF), the Department of Defense (DoD), and the National Institute of Occupational Safety and Health (NIOSH) provided research training funding, with the majority of funds provided by ED and NIH (Table 9). In FY 1991, within NIH, four institutes supported training in communication sciences and disorders, with the major support coming from the National Institute on Deafness and Other Communication Disorders (NIDCD) (Table 9).

Within NIH, several funding mechanisms support research training. In September 1992, for example, NIDCD supported a total of 42 National Research Service Awards (NRSA) in voice, speech, language, and hearing. Of these, 15 were individual postdoctoral fellowships (NIH category F32). There were no NRSA Senior Fellows (F33) at this time. Of the 27 institutional awards (T32), 10 were exclusively at the postdoctoral level and 17 included both predoctoral and postdoctoral levels. The institutional grants support varying numbers of individuals at either the predoctoral or postdoctoral levels. In September 1992, these institutional awards included approximately 44 training slots at the predoctoral level and 86 at the postdoctoral level. Caution must be used in interpreting these data because they represent the funding picture at only one point in time, counts can be made in different ways using different criteria, and the training slots represent differing lengths of training opportunities.

Career development awards represent training opportunities for individuals who are at the beginning stages of a research career. In September 1992, NIDCD funded 10 Research Career Development Awards (K04), designed to foster the research development of researchers in the formative stages of their careers. In addition, NIDCD offered seven Clinical Investigator Development Awards (K08), which provide clinically trained individuals, such as speech-language pathologists and audiologists, to prepare for academic careers in the communication sciences.

In their 1990-91 National Survey, the Council of Graduate Programs (Creaghead et al., 1991) reported $17.7 million in nonresearch project funding from institutional, federal, state, and other sources. Because specific information regarding the scope of the term "nonresearch" is not available, actual amounts allocated to training cannot be extracted.

However, training grants probably accounted for most of the federal and some of the institutional monies in this category (Creaghead, 1993).

Funds for Research Projects

Institutional funding. Universities have a tradition of supporting researchers within their institutions. Of all research project funding, institutional support accounted for 12.0%, that is, 173 grants totalling $4.1 million, according to the 1990-91 National Survey from the Council of Graduate Programs in Communication Sciences and Disorders (Table 10) (Creaghead et al., 1991).

Federal funding. Federal agencies reported funding 1,107 research grants in communication sciences and disorders in FY 1991, for a total of $148.6 million (Table 11) (DCDICC, 1992). The percent of federally supported speech-language-hearing grants awarded to investigators who are ASHA members ranged widely, from 5% in the National Science foundation to 54% in the Department of Veterans Affairs (ASHA, 1992).

- *Scientific Area*. Of the four scientific areas within communication sciences and disorders, hearing obtained the greatest number of grants (504) and grant dollars ($85.1 million). Funding expenditures for hearing contrast dramatically with those for voice, which obtained only 51 grants totalling $8.8 million (Table 11).

- *Federal Agency*. When research project funding is examined by federal agency, NIH provided the majority of the funding (90.3%). What might be surprising is the small number of grants from the Department of Education (ED). However, most of the reported $75.1 million supporting deafness and other communication disorders in FY 1991 is classified as nonresearch expenditures. These expenditures include service provider training, demonstration projects, and funds for the Helen Keller National Center and Gallaudet University. Therefore, much of the ED hearing, voice, speech, and language support that readers may be familiar with falls outside the categories of research or research training.

- *National Institutes of Health*. Within NIH, 10 institutes funded research projects in communication sciences and disorders in FY 1991. Consistent with the funding pattern for training, NIDCD was the largest source of funding dollars ($100.9 million). Institutes that provided the next largest amounts were the National Institute of Child Health and Human Development (NICHD), the National Institute of Mental

Health (NIMH), and the National Institute on Aging (NIA) (Table 11) (DCDICC, 1992).

State funding. State funding for communication sciences and disorders amounted to $2.4 million (38 research projects) in 1990-91 and accounted for 7.2% of research funds from all sources (Table 10) (Creaghead et al., 1991).

Other funding. According to the Council of Graduate Programs, an additional $1.4 million for research grants came from other sources (Table 10). Although not specified, this category would probably include private foundations and industry, among others. Unfortunately, the individual funding data for all foundations are not readily accessible. Profiles of Funding Sources (ASHA, 1991b) lists numerous foundations, funds, trusts, and so forth, whose funding missions include communication sciences and disorders. However, it is not known either how much funding they provide to communication sciences and disorders in any given year or how closely this would coincide with the 1990-91 National Survey data reported above (Creaghead et al., 1991).

Funding Across Time

Based on the 1990-91 National Survey data (Creaghead et al., 1991), research project funding increased 43.7%, from $23.8 to $34.2 million, from 1987 to 1990-91. When dollars are adjusted for inflation, this overall increase is reduced to 20.8%, or an annualized rate of 4.8% per year. Although the percentage contributions from federal and state governments remained stable during this period, institutional funding increased from 5.5% to 12.0%, and other funding declined from 14.7% to 4.1% (Table 10).

Data from the DCDICC were available for the first time in 1992. Therefore, federal agency funding in communication sciences and disorders across all agencies cannot be examined from a historical perspective. However, the 1992 data do provide an important benchmark against which to compare future data.

Of course, dollar amounts do not address the questions of success rates, stability in funding, or the types of research being funded. Although these issues are of great interest and importance, they are beyond the scope of this presentation.

Within NIDCD, research funding for grants, contracts, and training has increased from $72.7 million in FY 1988 to $134.9 million in FY 1992. Total research grant funding accounts for more than 80% of the NIDCD budget. This picture is encouraging. However,

when success rates are considered, that is, the percent of grants funded relative to the number of submissions, the picture is less rosy. The success rate was 38.6% in 1989, but had dropped to 23% in 1992. Therefore, competition for the funds available is increasing and a smaller percentage of researchers is being funded. With technological advances and the increased complexities of research questions being asked, less and less research can be done without funding. Added to this is the increasing cost of conducting research. The average research grant size at NIDCD was $155,400 in 1988 and rose to $226,000 in 1992. This occurs in the context of pressure within universities to publish research and to bring research funding dollars to the institution. Both are important criteria for promotion and tenure among university faculty members who are substantial contributors to the overall communication sciences and disorders research endeavor. All these factors combine to make a very pressured situation.

Acknowledgments

I would like to acknowledge ASHA staff members Andrea Blake and Sarah Slater for their assistance in assembling some of the data for this paper. In addition, staff at the National Institute on Deafness and Other Communication Disorders at the National Institutes of Health were helpful in interpreting some of the federal agency data.

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Table 1. Doctoral training programs in communication sciences and disorders.

Area	1982	1991	% Change
Audiology	50	50	0
Speech-language pathology	52	56	7.7
Speech-language-hearing science	39	30	-23.1

Source. 1990-91 National Survey, Council of Graduate Programs in Communication Sciences and Disorders

Table 2. Doctoral student enrollment in communication sciences and disorders.

Area	1982/83[a]		1990/91[a]		1982/83 to 1990/91 % Change
	No.	%	No.	%	
Audiology	141	20.0	218	26.5	54.6
Speech-language pathology	432	61.2	529	64.4	22.5
Speech-language-hearing science	133	18.8	75	9.1	-43.6
Total	706	100.0	822	100.0	

	Male		Female		Male		Female		% Diff. in males
	No.	%	No.	%	No.	%	No.	%	
Audiology	63	44.7	78	55.3	66	30.3	152	69.7	-14.4
Speech-language pathology	90	20.8	342	79.2	94	17.8	435	82.2	-3.0
Speech-language-hearing science	56	42.1	77	57.9	21	28.0	54	72.0	-14.0

[a]Data are adjusted to reflect 100% of programs reporting to allow comparisons across time.
Source. 1990-91 National Survey, Council of Graduate Programs in Communication Sciences and Disorders

Table 3. Doctoral student enrollment by racial/ethnic background in communication sciences and disorders.

Racial/ethnic background	1982/83[a]		1990/91[a]		1982/83 to 1990/91
	No.	%	No.	%	% Difference
Black	45	6.3	57	7.0	0.7
Hispanic	6	0.8	13	1.6	0.8
American Indian/ Alaskan Native	NA[b]	NA	2	0.2	
Asian/Pacific Islander	NA	NA	17	2.1	
Other	22	3.1	NA	NA	
Combined	(73)	(10.2)	(89)	(10.9)	0.7
White	642	89.8	728	89.1	-0.7
Total	715	100.0	817	100.0	
Non-U.S. citizen	NA	NA	77	9.4	

[a]Data are adjusted to reflect 100% of programs reporting to allow comparisons across time. [b]NA=Not available.
Source. 1990-91 National Survey, Council of Graduate Programs in Communication Sciences and Disorders

Table 4. Doctoral degrees awarded by area of study and gender in communication sciences and disorders.

Area	1981/82[a] No.	%	1989/90[a] No.	%	1981/82 to 1989/90 % Change
Audiology	37	18.5	45	29.6	21.6
Speech-language pathology	116	58.0	83	54.6	-28.4
Speech-language-hearing science	47	23.5	24	15.8	-48.9
Total	200	100.0	152	100.0	

	Male		Female		Male		Female		% Diff. in males
	No.	%	No.	%	No.	%	No.	%	
Audiology	20	54.0	17	46.0	19	42.2	26	57.8	-11.8
Speech-language pathology	21	18.1	95	81.9	18	21.7	65	78.3	3.6
Speech-language-hearing science	11	23.4	36	76.6	11	45.8	13	54.2	22.4
Total	52	26.0	148	74.0	48	31.6	104	68.4	5.6

[a]Data are adjusted to reflect 100% of programs reporting to allow comparisons across time.
Source. 1990-91 National Survey, Council of Graduate Programs in Communication Sciences and Disorders

Table 5. Origin of graduate students in communication sciences and disorders, 1990-91.

Origin	%
Own communication sciences and disorders program	46.9
Another university within state	17.8
Total within state	64.7
Out of state/within region	13.9
Total within region	78.6
Out of state/out of region	6.9
Another discipline	14.3
Total	99.8
Nontraditional (older students)	21.1

Source. 1990-91 National Survey, Council of Graduate Programs in Communication Sciences and Disorders

Table 6. ASHA researchers in 1984 and 1993.

	1984		1993	
	No.	%	No.	%
Primary researcher	332	0.8	378	0.5
Secondary researcher	690	1.8	951	1.3
Total	1,022	2.6	1,329	1.8
ASHA Member/CCC	39,396		74,886	

Source. Mansour & Punch (1984); *ASHA Membership Database* (1993).

Table 7. Demographic characteristics of ASHA Researchers.

	1993			
	Primary	Secondary	Combined	1984
Age (Years)				
Median	42	42	42	NA[a]
Mean	44	44	44	39.2
Gender				
Female	69.5	63.7	65.2	57.0
Male		30.5	36.6	34.843.0
Racial/Ethnic Background[b]				
American Indian/Alaskan Native	0.0	0.2	0.2	NA
Asian/Pacific Islander	3.6	2.6	2.9	NA
Black (Not Hispanic)	1.8	2.6	2.3	NA
White (Not Hispanic)	94.0	93.3	93.6	NA
Hispanic	0.6	1.3	1.1	NA
Educational Level				
Bachelor's Degree	0.0	0.4	0.3	1.0
Master's Degree	39.5	39.8	39.5	39.0
Doctorate Degree	58.1	58.7	58.7	59.0
Other		2.4	1.1	1.51.0
Certification Status[b]				
CCC SLP	50.5	61.8	58.6	55.6
CCC AUD	27.5	26.3	26.6	22.5
CCC SLP/AUD	4.5	4.8	4.8	6.2
Not certified or in-process	17.5	7.0	10.1	15.7

(continued)

Table 7. Demographic characteristics of ASHA Researchers. (continued)

	1993			
	Primary	Secondary	Combined	1984
Employment facility[b]				
School	7.2	9.0	8.5	1.9
College/University	43.9	49.3	47.8	62.4
Hospital	18.2	22.6	21.4	NA
Residential health care	1.1	1.1	1.2	NA
Nonresidential health care	4.3	12.1	10.2	7.6
Industry	2.7	0.7	1.3	NA
Research/Scientific organization	13.9	1.8	5.3	NA
Other	8.8	3.0	4.6	28.0

[a]NA=not available. [b]Numbers may not add to 100.0% because of rounding.

Table 8. Degree of funding success by profession.

Degree of success	Speech-language pathology (n=94) %	Audiology (n=86) %	Total (N=239) %
Very successful (67-100%)	45.7	53.5	47.7
Successful (34-66%)	26.6	17.4	24.5
Somewhat successful (1-33%)	9.6	8.1	9.1
Not at all successful (0%)	18.1	20.9	18.8

Source. 1989 Omnibus Survey.

Table 9. FY 1991 federal funding for research training in communication sciences and disorders.

	Institutional		Individual	
	Number of grants	$ (in thousands)	Number of grants	$ (in thousands)
		By Scientific Area		
Hearing	24	4,465	27	465
Voice	10	57	3	32
Speech	2	401	4	30
Language	14	2,163	17	423
Total	50	7,086	51	950
		By Federal Agency		
DVA	-	-	5	70
ED	5	3,550	1	32
NIH	(34)	(3,397)	(32)	(779)
NIDCD	23	2,194	17	434
NICHD	9	980	7	178
NIMH	2	223	7	138
NIAAA	-	-	1	29
NSF	-	-	6	24
Other[a]	11	139	7	45
Total	50	7,086	51	950

[a]Includes Department of Defense (DoD) and National Institute of Occupational Safety and Health (NIOSH).
Source. Deafness and Other Communication Disorders Interagency Coordinating Committee, 1992.

Table 10. Funded research projects in communication sciences and disorders.

Source	Number of projects	%[a]	$ (in millions)[b]
Federal government	227	76.8	26.2
State government	38	7.2	2.4
Institutional	173	12.0	4.1
Other	35	4.1	1.4
Total	473	100.0	34.2

[a]Numbers may not add to 100.0% because of rounding. [b]Data for each source and the total are adjusted individually to reflect 100% of programs reporting. Therefore, the numbers do not add to the indicated total.
Source. 1990-91 National Survey, Council of Graduate Programs in Communication Sciences and Disorders.

Table 11. FY 1991 federal funding for research projects in communication sciences and disorders.

	Number of projects	$ (in thousands)
	By Scientific Area	
Hearing	504	85,142
Voice	51	8,809
Speech	188	18,164
Language	364	36,481
Total	1,107	148,596
	By Federal Agency	
DVA	94	4,214
ED	27	2,583
NIH	(909)	(134,110)
NIDCD	444	100,888
NICHD	157	19,583
NCRR[a]	213	2,303
NIMH	36	4,241
NIA	32	3,533
NINDS	10	1,270
Other[b]	17	2,292
NSF	52	3,145
Other[c]	25	4,544
Total	1,107	148,596

[a]NCRR=National Center for Research Resources. [b]Includes National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Cancer Institute (NCI), National Institute of Environmental Health Sciences (NIEHS), and National Center for Nursing Research (NCNR). [c]Includes Department of Defense (DoD), Food and Drug Administration (FDA), Indian Health Service (IHS), Health Resources and Services Administration (HRSA), and National Institute of Occupational Safety and Health (NIOSH).
Source. Deafness and Other Communication Disorders Interagency Coordinating Committee, 1993

Research Training and Mentorship in Voice/Speech-Language Disorders

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The fundamental concern of this conference is graduate education and its relation to careers in research. My comments will relate to the following questions: (a) How should we define the common denominator of graduate research education? (b) What are the varieties of research careers and research styles? (c) How can we break the disciplinary molds that hinder truly interdisciplinary education and research? and (d) What are the prospects of securing funding for both research education and research careers?

Defining the Common Denominator of Graduate Education

What should graduate education be? Is there a shared vision or understanding of the purposes and nature of graduate education? One definition of the graduate experience was given by the National Commission on Student Financial Assistance (1983) in a report with the disquieting title "Signs of Trouble and Erosion." Their definition reads as follows:

> The essential graduate experience, that period of formal education following the bachelor's degree, has several common characteristics whether the field of study is Greek literature or molecular biology. The experience involves mastering the theory, body of knowledge, and modes of thought of a discipline; training in the skills, techniques, and tools of intellectual inquiry appropriate to that field; and applying that education and training to an original research problem that advances the discipline and adds to our core of knowledge. Education at the graduate level is designed to create not only new scholarship but new scholars as well—individuals with the capacity to learn independently, to define and attack new problems, to advance our fundamental understanding of the world, and to teach and explain what they have learned to others.

This message could be distilled into the following formula:

graduate education = [what is known] + [how knowledge is acquired] + [original contributions to what is known]

The first two parts are often the easiest. Graduate curricula are a kind of file directory of what is known in a certain field. The computer analogy of file directory is apt because the names of file directories are only broadly suggestive of their contents. And so it is with the names of courses that appear in university catalogs and academic transcripts. If a curriculum can be defended at all, then it should be at least defensible in its reflection of the acquired knowledge in a particular field of scholarship. The curriculum must address the theories of the field, a substantial portion of its facts, and the ways of thinking in the field. This core knowledge is typically tested in a comprehensive examination or culminative project of some kind. The name of this examination or project, and its placement in the sequence of graduate experiences, varies among universities. This requirement is usually a major rite of passage; the student who satisfies it is regarded to be adequately knowledgeable about the field or discipline to pass on to another stage, which is often dissertation research.

To some degree, the comprehensive examination or culminative project also can evaluate the student's adeptness with the skills, techniques, and tools of the field. Because the potential array of skills, techniques, and tools is considerable, most students master some subset that is most relevant to their scholarly or research interests. Common pursuits include statistics, computer applications, and laboratory methods. Mastery of some basic methods gives the student a kind of "starter set" that supports the conduct of independent research. But the mastery of an initial set of methods also provides experience in what should become a lifelong pursuit. Tools and methods learned in graduate school can be quickly antiquated, and it is therefore important that the student learn how to learn, that is, to master new tools and methods as the need arises. And surely the need will arise and probably increase at an accelerating pace. Research skills bound to a particular technology are likely to have half-lives of less than a decade. And maybe far less. According to a colleague who keeps close watch on computer technology, the average time between the release of a new product and the withdrawal of that product from the market is about 10 months. A graduate student who acquires expertise with a particular computer application may well find that the technology becomes obsolete during the data collection stage of dissertation research. Today, more than ever, the would-be researcher must cultivate efficient ways to learn new methods and even new fields of study.

The final element of graduate education, original research, usually emerges as a singular product, the doctoral dissertation. The dissertation remains the centerpiece of doctoral work in most universities and departments. It fills several roles. For the student it is a venture in original research, an application of what has been learned so far in the academic program, and an emergence into a research specialty. For the department granting the degree, dissertations are a significant aspect of productivity, representing both personal preparation and the generation of new knowledge.

One risk is that graduate thinking may become ritualized into formal steps of academic progress, whether or not the steps instill the attributes we hope to see in a future generation of researchers. We do not want assembly-line education with its design chiseled in stone. Apart from academic requirements and patterns of academic progress, graduate education can be accomplished in various ways. Mentoring is the theme of this conference. A mentor, according to Webster, is a counselor or guide, and this is perhaps all that the term should mean. Mentors should guide their charges, not make them intellectual clones or puppets. Mentors may assume a primary role in educating their charges, but rarely should they be the only ones to hold such responsibility. A mentor may model important qualities, teach in certain specialties, and introduce the student to particular skills or concepts. But in most situations, the mentor is not the only source of education and probably does not want to be. Beyond guiding students through the maze of academic life, the mentor should also challenge would-be researchers to think about life beyond the dissertation, that is, about research careers.

Research Careers and Research Styles

With various degrees of deliberation and foresight, scientists make choices about research style. Questions of research style go beyond the mere quantitation of productivity to characterize the pattern of research in a scientist's career. That is, two scientists may have the same number of publications in a career but have very different ways of going about research. Johnston & Pennybacker (1980) defined research styles as the nature of research questions that guide methodological questions. Some examples of research styles are programmatic, independent, and demonstration. The programmatic style involves the conduct of studies that are thematically linked, often in a progressive investigation of a given problem. This research style has good potential to yield fundamental knowledge. The independent style of research is of more limited scope, frequently taking the form of one or two studies on a particular topic. This style can have an opportunistic flavor in which the investigator selects different problems to study as various opportunities arise. The demonstration style is one in

which investigators do not attempt to relate their research to basic underlying concepts or theories; rather, the intent is to study a somewhat isolated aspect of a phenomenon.

Research careers, and even research disciplines, can be founded predominantly on one or another research style. For example, Kearns and Thompson (1991) evaluated treatment research on aphasia published between 1978 and 1987. About 70 published papers were part of the review. More than 80% of these papers were considered to be independent-style investigations; only 10% were of the programmatic variety. Moreover, 75% were categorized as demonstration in style. Kearns (1992) remarked that, "The trend toward an overabundance of independent-style studies and a relative paucity of programmatic investigations represents a potential roadblock to the future of aphasia treatment research" (p. 10). Johnston & Pennybacker (1980) noted that when a discipline's scientific literature is predominantly of the independent style, it may lack the coherence that is necessary for a satisfactory interpretation. Similarly, an overabundance of demonstration-style investigations can produce a literature that is weak in its conceptual or theoretical underpinnings.

The point of these remarks is not to impugn research on aphasia treatment. It is likely that similar proportions of research styles would be identified for other topics in speech, voice, and language research (and perhaps nearly every scholarly discipline). This line of inquiry helps to describe the kind of scientific activity that informs an area of investigation. It also helps to identify the styles that scientists follow in their careers.

Programmatic research typically requires a sustaining budget or at least committed laboratory space, subject or specimen availability, and personal effort. When these are not available, programmatic research is difficult if not impossible. Independent-style research is often opportunistic in both its topic selectivity and its resource requirements. An investigator sometimes chooses a particular research study because of the availability of the necessary equipment, subjects, or other requirements. I would not want to quench independent-style research altogether. It can help to invigorate a scientist's thinking and can open important directions of research. But the issue is one of balance between types of research and the general desirability of encouraging programmatic research.

Breaking the Mold

How should scientists be prepared to break through the disciplinary walls that confine our knowledge and ways of thinking? Legions have declared the importance of escaping disciplinary confines in teaching and research. Volumes have been written about interdisciplinary, multidisciplinary, and transdisciplinary models. A discipline is a field of

study, or, in effect, a kind of intellectual mold. Each field carries its own facts, theories, and ways of knowing. These make the mold. As you may recall, these are the essential ingredients of graduate education as defined in the introductory section of this talk. Just to read the relevant literature, a contemporary speech-language scientist should have at least a basic acquaintance with subjects such as connectionism, genetics, task dynamics, neurophysiology, cognitive neuroscience, artificial intelligence, linguistic theories, and human information processing. If these and other topics are not covered in the disciplinary curriculum, where is the student to gain the requisite knowledge?

How quickly we are dissatisfied. No sooner have we offered our congratulations to the newly minted PhD then we shake our heads in disappointment that this fresh educational product fits the mold of our field. On second thought, we would rather have broken the mold, to set free the intellect to explore the richness of other fields. Unfortunately, interdisciplinary education remains nearly a paradox within educational systems that continue to enforce the standards of competence within the discipline. When a student registers for a large number of courses outside a given field of study, there will usually be at least one professor who exclaims that the student hasn't learned the major field of study. And that professor may very well be correct. Another undesirable outcome of plans for interdisciplinary education is that the student simply emerges from the whole experience with several separate areas of knowledge.

Approaches to interdisciplinary mold-breaking are of four general types (see Figure 1):

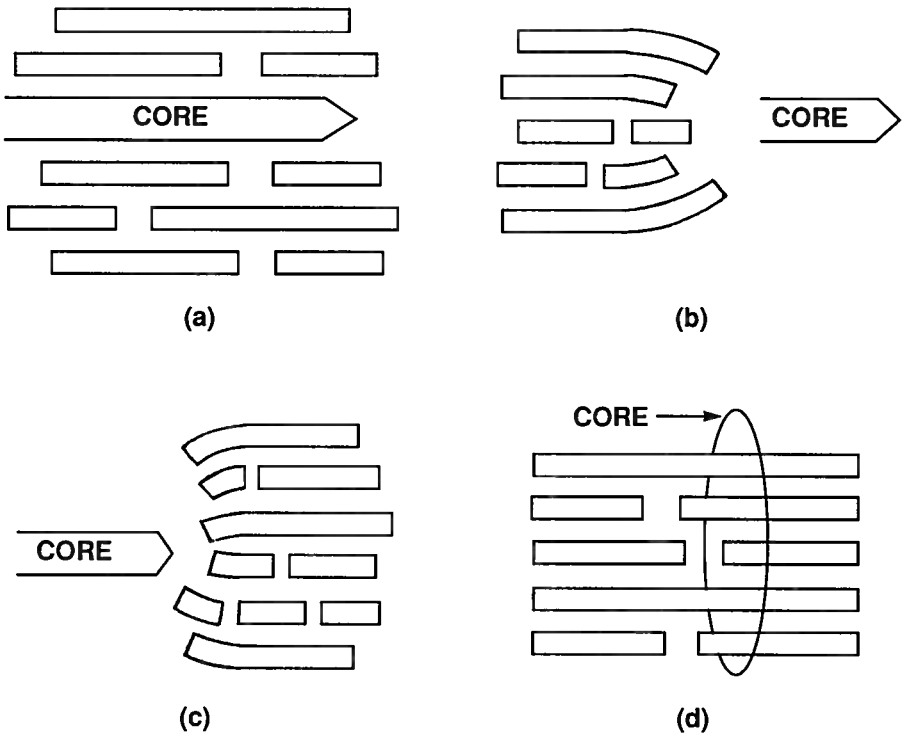
Type A. Encourage the student to pursue interdisciplinary knowledge concurrently with education in the major field. For example, the university may require "breadth" or "distributional" experiences.

Type B. Interdisciplinary knowledge is acquired before concentration in the major field of study. In this case, the faculty must attract students who have the desired interdisciplinary or multidisciplinary background.

Type C. Interdisciplinary knowledge is acquired after concentration in the major field of study. Having netted their charges, the faculty now release them in the currents of the interdisciplinary streams.

Type D. The major field of study is defined as a combination of interdisciplinary pursuits. This is perhaps most challenging of all, because it comes perilously close to denying any disciplinary continuity.

Figure 1. Models for interdisciplinary research education.



Each model has advantages and disadvantages. Each can be a failure for one student even as it succeeds for another. Perhaps the choice of one model is not so important as the simple fact that a choice of some kind is made at all. Because if some kind of choice is made, then the goal of interdisciplinary education has been taken from the realm of shibboleth to the realm of practice. Instead of merely admiring the refreshing waters, we bathe in them.

If I may indulge in a moment of academic fantasy for the purpose of illustration, suppose that someone were appointed to be the czar of doctoral education for communication sciences and disorders. What should this person do regarding doctoral programs? I hope this person would encourage several different models of graduate education. There would be, in a sense, a portfolio of educational programs. No one program would be assumed to be the ideal. Program A is compatible with the educational approach in many universities today. Programs of Type B would likely attract students who have diverse backgrounds and are now ready to apply their generalist education to a field of study. Programs of the C variety would

likely send their students out for interdisciplinary education after first giving them enough knowledge of the field to enable wise choices of interdisciplinary content. Program D may not be easily implemented in the usual departmental structure of university education. It is more easily accomplished in a flexible arrangement that permits a student to create an individualized plan of study. But all four approaches should recognize that mere exposure to other disciplines does not guarantee integrated thought and knowledge. Exposure without integration simply produces fractionation.

One recently announced doctoral program that adds to the diversity of the research training portfolio is a joint effort involving MIT, Harvard Medical School, Massachusetts Eye and Ear Infirmary, and Massachusetts General Hospital. This new academic program is specifically directed to increase the pool of scientists and engineers who will undertake basic research. Certainly, there is a need to prepare individuals for this kind of research career. But lest one believe that basic research is the only kind of scientific preparation that needs bolstering, I have frequently heard from clinical practitioners of the need for people who are knowledgeable about clinical issues and can design and conduct studies that have relevance to clinical practice. Innovative programs also are needed to prepare individuals for careers in clinical research.

Funding

Suppose that a graduate of a program of Type B seeks employment in a university. Suppose further that part of this graduate's learning is in both molecular biology and communication sciences. Our imaginary graduate applies for a position in the Department of Communication Sciences and Disorders in a major research university. What kind of laboratory for molecular biology does our graduate find? In all likelihood, next to nothing. What kind of budget might be wrested from the university administration to support such a laboratory? In an optimistic scenario, our graduate may receive start-up funds in the range of $50,000 to $100,000, which would be a modest start in equipping a laboratory. More realistically, at least in some experiences that I know about, the amount may be on the order of $20,000. For many types of research, that amount is barely adequate for basic laboratory furnishings and supplies, let alone sophisticated equipment.

The point of this imaginary example is that the new PhD graduate armed with expertise in technology-dependent science may face the difficult challenge of developing a suitable laboratory de novo. Departments of communication sciences and disorders do have some well-equipped laboratories but it is rare indeed to find one that could support cutting-edge work in fields such as cytogenetics or neurochemistry. It is not enough to attract students

who can bring an interdisciplinary or multi-disciplinary perspective. They must be offered an environment that makes their work possible. If they do not find such an environment, they are likely to seek their future elsewhere.

The foregoing example is of course just the chilling tip of an iceberg that looms in the back of just about every scientist's mind. How can we support all the research that we would like to do? Funding agencies are able to support only a fraction of the applications submitted. Recent budgetary projections indicate that within the NIDCD there may be both across-the-board cuts in the budgets of funded research proposals and a reduction in the number of newly funded proposals. Many new investigators have become discouraged when their applications for funding were not successful. And there are more than a few experienced investigators who have received the unwelcome news that their applications will not be supported. Investigators must be not only scientifically able but also patient, adaptable, and resourceful in an entrepreneurial way. After all, an entrepreneur is one who organizes, manages, and takes the risk of a venture. Scientists often find that an entrepreneurial spirit is a valuable companion in the search for funding. Yes, we need to mentor students to be creative and productive scientists, but we also need to acquaint them with the realities of equipping laboratories and gathering data. Some argue that scientists must become more politically and socially active, so that the research agenda of our disciplines can move forward. If we are completely wrapped up in our small personal worlds, we may be heading in directions that end in unpleasant surprises.

Conclusion

Models of research training should be developed to consider the need to prepare scientists for the development and conduct of programmatic research, changes in research directions during an individual career, and participation in interdisciplinary efforts. It is doubtful that any single model of research training will be uniformly successful across educational institutions and individual research careers. It is therefore important to encourage diversity and innovation in research education.

Steps should also be taken to stop the erosion of our research infrastructure, especially the laboratories in which research education has its practical basis and in which science is practiced. As a parallel action, efforts should be made to enhance scientific careers by providing for research support, exchange of information among scientists, and training opportunities to further knowledge in a scientist's research specialty or to prepare scientists for work in new areas of research.

This conference may or may not follow the compass points of this talk. But I hope that at least some of these comments will resonate in the minds of other participants, who will have wisdom for us as we consider how to mentor and how to foster research careers.

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Research Training and Mentorship in Hearing Disorders

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The great English poet and playwright Oscar Wilde was once asked his opinion of another distinguished Englishman, George Bernard Shaw. Wilde said," Mr. Bernard Shaw has no enemies but is widely disliked by his friends." This may be said of me after today's talk. I am going to say some things that many of you won't like and probably don't want to hear, but if we want to be realistic about research in our field, they just have to be said.

The organizing committee sent us a series of suggested questions that we might address. I will give you my answers to each in turn. First:

Are We Keeping Up With Research Needs?

No! The pressing issues of 40 years ago are still, by and large, the pressing issues of today. We have not advanced very far in solving the persistent problems of people with hearing impairment because we have tended to fixate at the level of the tool rather than at the level of the substantive issue. Here is a list of some past and current tools popular in the field today:

- auditory evoked potentials
- otoacoustic emissions
- psychophysical tuning curves
- real-ear gain measures
- brain imaging
- statistical inference
- protein electrophoresis

As a journal editor I see too many papers concerned with one or another aspect of such a tool for its own sake rather than as a technique for addressing a substantive issue. Every conceivable parameter is scrutinized, turned over, looked at from the bottom, reanalyzed, and agonizingly reappraised. There are already, for example, countless papers on every dimension of real-ear gain measurement but precious few on whether it makes any difference to the ultimate satisfacion of hearing aid users.

It is the mentor's job to put these tools into perspective for the fledgling researcher, to keep the focus on how they can be used to address important issues rather than as objects of study in their own right. Take, for example, statistical inference. Now statistical inference, *t* tests, *F* tests, analysis of covariance, and so forth, are nothing more than tools for making decisions in the face of uncertainty. Yet a substantial number of mentors continue to confuse this tool for decision analysis with a method for identifying truth. For them the 5% level is no longer the probability of an alpha error given a particular decision axis, but a way of telling whether an effect does or does not exist. Things the mentors should have learned about the countervailing effects of beta errors in decision analysis no longer seem to bother them. The distinction between making decisions and discovering truth has been lost. This relatively naive misuse of an important mathematical tool has been propagated through succeeding generations of mentors for such a long time that it is difficult to estimate where the train left the track. It illustrates, I think, how the preoccupation with tools for their own sake has often blunted our efforts to confront serious issues.

Here, on the other hand, are some issues that continue to plague us:

- Why do people with hearing impairment have trouble understanding speech?
- What are the electrophysiologic markers of auditory processing?
- How does hearing impairment affect the development of auditory perceptual abilities?
- How does hearing impairment affect binaural processing?
- What are the biochemical mechanisms of drug toxicity?
- What is the most cost-effective way to screen the hearing of babies?
- How does aging affect auditory processing?

- How can we differentiate auditory processing problems from other sources of academic distress in children?
- How can we promote the acceptance of amplification devices by people with hearing impairment?

Mentors need to convey to fledgling researchers the questions we really need answered. It is the mentor's job to be sure that the student views tools and issues in their proper perspective and weds tools to issues rather than studying tools in their own right. Consider, for example, the problem of getting people with hearing impairment to accept hearing aids, to worry about how hearing aids perform rather than whether they can be hidden. When I entered this field more than 40 years ago, one of the first things I learned from my mentor was that the single biggest problem in getting people to use hearing aids was the "cosmetic" issue. You had to carry the hearing aid around in your shirt pocket. There was a wire running from your shirt pocket up to your ear, and there was a button protruding from your ear. Today the hardware is at least an order of magnitude smaller. Yet the principal problem with getting people to use them is still cosmetic. Our progress on this problem has been virtually nil. Hearing aids are still something to be hidden. They are still equated, in the public mind, with a negative image of senility. Current estimates show that at least three out of four people who could be helped by aids still are not wearing them. And in all these years we have not really addressed the underlying issue. We have pandered to the user's basest motives, acquiesced to the manufacturers' plea that only tiny hearing aids sell, and done little or nothing to understand how we might change basic attitudes about the use of amplification. Where is the mentor challenging his/her students to take up this fallen battle standard? Is this the researcher's concern? I think so.

Consider another issue. How can you differentiate auditory processing problems from other sources of academic distress in children? This is one of the most pressing problems in contemporary audiology, affecting a very large number of children, but one that has been largely neglected by researchers. As a result most clinicians are still using archaic behavioral tests incapable of telling the difference between a modality-specific deficit and a more general attentional deficit. We still use tests of auditory function in which performance depends on the very factors we are trying to rule out. We are forced to use the techniques that we knew were inadequate three decades ago. Neuropsychologists have faced the same problems and have come to grips with the issues. We could learn a lot from their approaches to problems of modality-specific measurement, but we haven't, perhaps because our fixation on a single tool, the monosyllabic word list, has prevented us from taking a bold leap to new

measurement approaches. We have anguished over such weighty issues as whether there should be 50 words or 25 words, whether to use a carrier phrase, what exactly should the carrier phrase be, are we talking about phonetic balance or phonemic balance. There is even an extensive literature on how you can tell whether one PB score is significantly different from another, based on the binomial expansion. There is another literature on the relative merits of an arcsine transformation of the scores in order to satisfy certain critical assumptions—and on and on. But you get the idea. The role of the mentor is to break students out of this strait-jacketed thinking by putting the tool dimension into proper perspective and challenging the student to open his or her mind to the fact that the truly challenging issues confronting us require bold new initiatives, not more variations on the same old themes.

What Has Been the Impact of Recent Research Advances?

Significant research advances in our field have tended to be made by specialists in other disciplines:

- ABR—neurophysiologists
- OAEs—physiologists
- Event-related potentials (ERPs)—psychologists
- Neural regeneration—psychophysiologists
- Programmable hearing aids—engineers

Our unique research role should be learning how to apply these technological improvements to the problems challenging the clinician. In some cases we have risen to the task, but too often we have spun our wheels with endless variations on further study of the tools.

Consider just one example, ABR in the testing of babies and young children. The first publications on the successful recording of brain stem responses evoked by clicks occurred in the late sixties and early seventies. But it was not until 1974 that we saw the first research publication on the application of this new tool to testing the hearing of babies at risk for hearing loss. A physiologist, Bob Galambos, and a pediatric neurologist, Kurt Hecox, pointed the way for us. Audiological researchers were relatively late on the scene. In the area of difficult-to-test children it is safe to say that ABR is the most important new development in decades. Yet serious research on how ABR might be used to optimize such testing, how best to use it to supplement behavioral testing, and how the results of such research might be brought down to the clinical level has been so sparse that even today, more

than 20 years after the discovery of ABR, we still encounter newly trained clinicians who have gone through an entire two-year training program without ever seeing ABR used to assist in the evaluation of a young child suspected of a hearing problem. But research on the fine grain of ABR parameters continues unabated.

We must train researchers who can move beyond the tools for their own sake and apply them to clinically relevant issues.

Are We Training Researchers Optimally?

Probably not. We cannot train researchers to be expert in every relevant discipline. They must focus on the auditory system: how it is organized, how it functions, how its performance can be measured, what happens when there is malfunction. To be sure, this focus may be too narrow to address the kinds of broad questions raised by the present explosive growth of knowledge. The answer is collaboration. If a question requires an understanding of biochemistry, then find a biochemist with whom you can collaborate. In a very real sense, the winner of the game will be the one with the most collaborators, the researcher who knows what disciplines to tap and who can tap them for him or her.

One of the current buzz words is "molecular biology." The future, we are told, lies in reduction of our problem to the sub-microscopic level. And there can be no doubt that, in recent years, there have been spectacular strides due to the techniques of molecular biology. Shall we then tell our students to abandon traditional approaches and seek their fortunes in molecular biology? Certainly not! If we want to find timely solutions to our more pressing problems, then the better strategy is to find a molecular biologist you can collaborate with. Let that individual supply the new tool. The unique contribution of the audiologic researcher must continue to be his or her knowledge, not of every conceivable tool of science, but the fundamental research issues confronting our field, issues that have been with us for a long time, and will continue to be with us for a long time to come.

Are Current Research Training and Mentorship Practices Appropriate?

No! We are not developing a cadre of productive, competitive researchers. It is an unpleasant but true fact that our people do not compete successfully for funds at the national level. They are being swamped by neuroscientists. Very few audiologists, for example, still hold NIH grants. But 30 years ago it was people like Ray Carhart, Wendell Johnson, and Bill Hardy who dominated the system. How did this happen? How did we lose our leadership role?

I think one big problem is that, in the pursuit of excellence for its own sake, we lost sight of who we really are. We sought to emulate the basic scientists rather than developing our own unique area of applied research.

But such a movement was doomed by our system for educating audiologists. Too many programs sought to use the PhD degree program as a thinly veiled professional doctorate. They took too many people who lacked the scientific background necessary for competitive research and passed them through the system with only a superficial understanding of how a relevant clinical issue might be approached experimentally. The result has been a surfeit of individuals who teach courses, direct a clinic, and do "research" on Friday afternoons.

There are, to be sure, a number of well-trained individuals who are committed to full-time careers in research. In too many cases, however, these individuals have had little exposure to clinicians and clinical problems during their training. Indeed, their mentors often considered it a badge of honor to be isolated from the clinical track. As a result too many of our best researchers lack the clinical perspective so important in our field, and consequently their work tends to have less impact than it should.

The ideal researcher in our field is the individual who combines a familiarity with the rigors of the scientific method with a first-hand knowledge, based on patient contact, of what are the important questions to address.

Such an individual is, of course, going to be difficult to train. But we must move in this direction. Certainly the tendency to steer potential researchers toward "basic" as opposed to "applied" research, to equate clinically relevant questions with "soft science," and to try to make little neuroscientists out of them, has not worked and will only dig us deeper into the hole we are already in.

Research in hearing disorders must be carried out by well-trained researchers who are not ashamed of what they are, and do not aspire to be something else.

When we can show the funding agencies that we can apply unique research skills to clinically relevant questions, then and only then can we begin to do something about the negative bias we undeniably suffer in study sections.

Should There Be Different Training Regimens for Different Types of Research?

No! As noted earlier we need to define our own niche and be as good as we can be in it. But, you might ask, how will this permit us to address research in vastly different areas,

such as brain imaging versus auditory training? The answer, again, is collaboration. Part of the training of any contemporary researcher should be to learn enough about other fields of research so that he or she knows when to have a collaborator and whom to seek out.

Where Do We Go From Here?

First, we return the PhD degree to what it was always supposed to be—a program for training people to carry out rigorous research in hearing disorders. We take only people who have the necessary background in physics, electronics, mathematics, and biology to be able to master the sophisticated techniques now commonplace in research. We temper this training with some healthy exposure to the world of real people with communication disorders, and we try to give them a feeling of pride in the career choice they have made. This cannot be done by legislative action or by academic fiat. It can be accomplished only by inspired mentoring. The mentor must be the role model who embodies the qualities and attitudes we are trying to promote. He or she must create *an atmosphere of inquiry*. An atmosphere in which everything is questioned. Why are we doing things in a particular way? Is there a better way? What would happen if we tried this? The best way I know to do this is to get clinicians and researchers together in the same room and talk about cases. Real cases. Actual patients. When you get clinicians to start questioning why they do something in a particular way, then the ideas begin to flow, and the real priorities will emerge.

Teach by example! Don't just teach a course in experimental method and send students off to figure out their own designs. Let them participate as you design your own experiment.

Define the substantive issues! Again, I don't know of a better way to do this than by talking about cases. The important issues will jump off the paper as you talk about what a particular test result does or doesn't mean when you are talking about actual patient data.

Cultivate collaborators! Find out who are the experimentally minded among colleagues in related medical specialties, in psychology, in pharmacology. Plan some joint efforts with them. Invite them to present at research seminars. Play baseball with them if you have to. But just get to know them so that when you need one of them you are not talking to a complete stranger.

Finally, and most important, *be a leader, not a follower, in translating research findings into everyday clinical practice*. If you are not doing this actively you are failing your profession. There is no more important aspect of mentoring than showing the potential researcher, by your own example, that research is not complete until its implications have

been translated into clinical practice. This, unfortunately, turns out to be one of the most difficult tasks you will ever face. And unless you are rather deeply involved in clinical affairs in your institution, you don't have much chance of success.

I know of one institution where the researchers are doing cutting edge work on the digital manipulation of speech signals by sophisticated computer techniques while their clinical colleagues, in the same institution, are still doing speech audiometry by monitored live voice, a technique that was, from the standpoint of standardized test signals, rendered obsolete by the invention of the gramophone.

In short, I believe that, to be a successful research mentor in this field, you must get into the clinic and make your presence felt. Only in this way can the fruits of research be made available to people with communication disorders.

My answer to Fred Minifie's question is simply this: We are not doing mentoring right. Yet the research mentor is, in a very real sense, the key to the future of our profession.

Section 2

Issues in Research Mentorship and Training

Perspectives on Research Mentorship

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The prototypical relationship most likely to be considered when we think of "research mentorship" is the student-advisor relationship that develops during a doctoral program and during the dissertation project in particular. No matter how satisfactory such relationships are, such experiences rarely seem sufficient to inspire productive research careers. For this reason, a major criterion used to evaluate the quality of teaching of programs and individual faculty members in research universities is the research productivity of their advisees. A number of strategies might be considered at a programmatic level to address more effectively the need for highly qualified researchers in the field of communication sciences and disorders. For example, providing more pervasive and more diverse research experiences may improve effectiveness. We may need to consider how to capitalize on existing opportunities to develop the interests and skills necessary for people to succeed at pursuing research careers in communication disorders and other fields. It may be worthwhile to broaden the context for research mentorship experiences to consider undergraduates, master's-degree students, and practicing clinicians, as well as pre- and postdoctoral students.

It may be valuable to examine what can be done at an individual level for advisors to be more effective at encouraging others' research careers. In a variety of fields, mentoring models have been proposed as mechanisms to promote a novice's professional and/or personal development and to improve the chances of success for novices encountering new challenges (Borman & Colson, 1984; Clawson, 1980; Collins & Scott, 1978; Fagan & Walter, 1982; Gray & Gray, 1986; Haring-Hidore, 1987; Kram, 1983; May, Meleis, & Winstead-Fry, 1982; Merriam, 1983; Rowe, 1981a,b; Wildman, Magliaro, Niles, & Niles, 1992; Woodlands Group, 1980). One goal of this paper is to broaden participants' perspectives on opportunities for developing mentoring relationships and to stimulate insights into how mentors and proteges might maximize benefits and reduce the burdens involved.

Allow me to contribute to this discussion with some perspectives on mentorship. First, what is mentorship? Are there unique components of mentor-protege relationships that enhance the effects of research training? Second, what are some common pitfalls addressed in the literature on mentorship that we might need to be prepared to resolve? Third, why is mentorship such an appealing concept?

What is Mentorship?

The term *mentorship* is popular these days; it is used often, but as most scientists would be quick to point out, without much precision. An examination of the literature on mentorship sheds more light on the concept, however. A colorful description of a mentor is someone who provides "a brain to pick, a shoulder to cry on, and a kick in the pants" (Josefowitz, 1980). In short, a mentor is someone who fosters development. Sometimes, mentorship is thought to involve producing "worthy successors." Many definitions of mentorship emphasize relationships involving two adults; these relationships must be comprehensive and intense enough to have an important effect on the development of a less experienced adult's potential (Clawson, 1980; Gluck, 1984; Levinson, Darrow, Klein, Levinson, & McKee, 1978; Phillips-Jones, 1982; Woodlands Group, 1980).

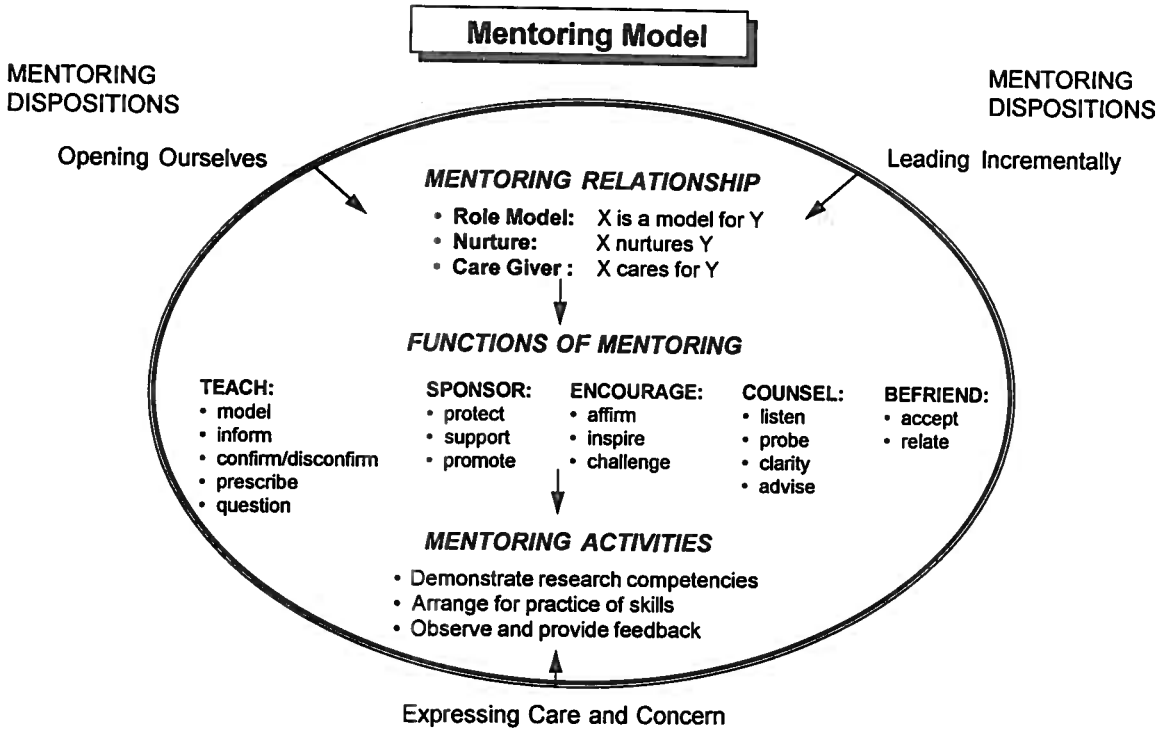
A Mentoring Model

The skillfulness of mentors or the effectiveness of mentoring relationships requires an examination of multiple behavioral dimensions. The model (see Figure 1) proposed by Anderson and Shannon (1988) does an admirable job of highlighting dimensions that have been considered components of mentoring—at least in traditional mentoring models that focus on mentor-protege dyads.

Anderson and Shannon's mentoring model is divided into four levels of analysis: (a) the relationship between mentor and protege, (b) the functions of mentoring, (c) the behavior of mentors, and (d) the dispositions of mentors. A review of this model raises one's consciousness of the decisions that come into play in the development of mentoring relationships. For example, prospective mentors may want to consider what roles and functions they are willing and able to perform. They also may want to communicate such decisions to proteges explicitly and even suggest alternative ways for certain needs to be met.

Mentoring relationships. The relationship between mentor and protege has at least three dimensions worth considering: role modeling, nurturing, and caring. First, the mentor serves as a role model to the protege. Leading by example perhaps has the most robust effect

Figure 1. A model of research mentoring adapted from Anderson & Shannon (1988).



attributable to mentoring relationships (Anderson & Shannon, 1988; Bolton, 1980; Clawson, 1980; Schokett & Haring-Hidore, 1985; Speizer, 1981). We often mediate this modeling notion with a limited dose of "Do as I say, not as I do." But credibility on both a personal and scientific level is quickly dissipated with too much of this advice. Proteges must see a part of their adult and professional selves in their mentors. A sense of what they are and what they would like to become underlies the facilitation of growth and development in proteges.

Second, the mentor as nurturer must recognize the ability, experience, and maturity of the protege to provide appropriate growth-producing activities. Sensitivity to individual differences is necessary for the nurturer to provide or adapt learning environments. The mentor as nurturer decides how best to guide development and maximize growth in proteges. In addition to this flexibility, the mentor must operate with a belief that the protege being nurtured has the potential to blossom into a productive researcher and to contribute to the field.

This confidence in the protege relates to a third dimension, the mentor caring for and about the protege. An ongoing, caring relationship hinges on the belief and trust that the personal and professional growth of the protege is of utmost importance. Caring is, of course, expected to be reciprocated. The protege's gratitude for the mentor's help and guidance may kindle affection and respect.

One should be careful about drawing analogies between mentors' relationships to their proteges and parents' relationships to their children. Mentorship involves adult-adult relationships. Proteges enter mentorship relationships to gain assistance in achieving specific life goals (Clawson, 1980; Knowles, 1987; Levinson et al., 1978; Phillips-Jones, 1982; Zemke & Zemke, 1981). Indeed, proteges typically are adults who have established independent and multifaceted lifestyles. Mentorship addresses one aspect of the protege's life, most often an educational phase to prepare the protege for new or improved career opportunities. Although the scope of influence varies among mentoring relationships, the spirit of mentoring assumes that true mentors are concerned about the comprehensive welfare of their proteges. This attitude need not be wholly altruistic. We would be naive not to recognize that benefits accrue to both partners of mentor-protege relationships (Busch, 1985; Haring-Hidore & Paludi, 1989; Rawlins & Rawlins, 1983; Speizer, 1981). A list of advantages to proteges and mentors discussed by Phillips-Jones (1982) is presented in Table 1.

Functions of mentoring. The second level of analysis examines five functions of mentoring. Anderson and Shannon suggest that these functions are conjunctive, meaning that a mentor must be prepared to demonstrate any or all of the functions as the need arises. The functions subsume most if not all the roles that have been associated with mentorship historically (cf. Schockett & Haring-Hidore, 1985). Each of these functions alone has been viewed as synonymous with mentoring, which may have muddled the concept. More important, requiring that a mentor be prepared to engage in all five functions may help discriminate who is mentoring and to what extent. The multiple functions may help assign more potency to the concept of mentoring.

The first function, teaching, involves basic instructional techniques, including modeling, informing, assigning readings and tasks, prompting practice, confirming/disconfirming, and questioning. These behaviors are used within a context of adult education.

Although there are various perspectives on adult education, there are several common themes (Knowles, 1980; Merriam, 1988). Adults take an active role in learning; they typically prefer self-directed learning. Adult learners have expectations, which are products of their goals and experiences. It is important to take time to share expectations and to clarify

commonalities and differences that may exist. Learning is viewed as intrinsically reinforcing, but it is viewed as a means to an end, not an end in itself. Maintaining self-esteem and pleasure are strong secondary reinforcers for adult learners. Adults bring a great deal of life experience to the learning situation; it behooves mentors and proteges to take advantage of those experiences.

The second function, sponsoring, involves three essential behaviors: protecting, supporting, and promoting. Mentors may protect proteges by persuading them to avoid overzealous projects for the time being. They may protect proteges from injuring themselves (e.g., sleep deprivation). Mentors may offer support when they participate in an activity assigned to the protege or to the mentor and protege jointly (e.g., writing a chapter together). Mentors promote their proteges in a variety of ways (e.g., introducing them to other leaders in the field, encouraging them to present papers at conferences, recommending them for committees, and helping them find jobs).

Encouraging, the fourth function, is a process that includes affirming, inspiring, and challenging. Mentors can affirm the proteges' ability to function as scientists and educators. They can inspire their proteges by example and by their words of encouragement. They can challenge proteges to take advantage of growth-producing experiences. A useful concept introduced to me by Nicholas Hobbs is what he called JMD—just manageable difficulty. He perpetuated the idea that one should relish personal and professional development and the best opportunities for doing so are presented as JMDs.

Counseling is the fifth function, and involves behaviors that are used to help proteges solve their own problems. Counseling as a problem-solving process entails behaviors such as listening, probing, clarifying, and advising.

Lastly, mentoring demands befriending. As we all know, being friends can take a myriad of forms. Mentorship requires friendship, but not necessarily close friendship. In fact, mentors and proteges often must exercise considerable caution to avoid intimate relationships. Nonetheless, mentorship does entail at least two critical behaviors: accepting and relating. As a friend, mentors continually convey their understanding and support to proteges. They will express their acceptance and their recognition of the proteges' individuality. Mentors must be willing and able to relate to their proteges; they cannot truly be mentors if they communicate that they have no time for them. A good mentor-protege dynamic is built upon a good interpersonal relationship and sufficient time for the mentor and protege to relate; time to interact is needed to ensure an appropriate quantity and quality of mentoring.

Mentoring activities. The third level of analysis considers mentoring activities. Mentoring activities are the behavioral expressions of research training that correspond to the five mentoring functions outlined above. Discussions about research training explore a number of issues: What knowledge and skills should be taught? What competencies should be mastered? What are effective and efficient strategies for promoting learning? Mentors may demonstrate or provide models of research competencies. They may arrange for proteges to practice relevant skills. This allows mentors opportunities to observe and provide feedback and to shape proteges' application of those competencies (such as analytical, writing, oral expression, or clinical skills). Mentors may set the occasion for use of these skills in supportive contexts, exposing the protege first to simulated settings and later to real-world contingencies.

Mentoring dispositions. The final level of analysis identifies dispositions that mentors should have to carry out the full complement of mentoring functions and activities. Dispositions refer to prevailing tendencies and thus are broader constructs than skills. Anderson and Shannon (1988) identify three dispositions that they believe are essential to the concept of mentoring. First, mentors must be willing to open themselves to their proteges. They should allow their proteges opportunities to observe them in action and should be willing to openly discuss underlying rationale and purposes behind the decisions they make and the things they do. Second, mentors should be disposed to leading incrementally. They must be analytical, patient, and flexible in judging what knowledge and skills are needed by individuals and how quickly they can be introduced and mastered. Third, mentors should be disposed to express care and concern about the personal and professional welfare of their proteges. There is an expectation of reciprocity in adult relationships; status and hierarchical relationships play no part when it comes to caring and concern.

Figure 1 summarizes the essence of mentoring and its basic components. Perhaps its greatest value is pointing out what mentorship should be. If it seems like a tall order to be a mentor, it may help be helpful to recognize the need for other people's contributions to the nurturing of proteges. An examination of this model helps us understand the complexities of the definition of mentoring forwarded by Anderson and Shannon (1988):

> A nurturing process in which a more skilled or more experienced person, serving as a role model, teaches, sponsors, encourages, counsels, and befriends a less skilled or less experienced person for the purpose of promoting the latter's professional and/or personal development. Mentoring functions are carried out

within the context of an ongoing, caring relationship between the mentor and protege.

Anderson and Shannon's (1988) mentoring model incorporates many roles, functions, and activities that are evident in other research training contexts, such as teacher-student, advisor-advisee, or consultant-consultee relationships. The demands may appear daunting depending on the extent to which the multiple dimensions outlined are manifested in a particular mentor-protege relationship. The distribution of effort may be complicated by the existence of multiple proteges for a mentor or multiple mentors for a protege. Dr. Haring's paper introduces other models of mentorship. Certain variations may be better suited to the time and task juggling that mentors typically face.

Potential Problems

As in all kinds of relationships, mentors and proteges commonly encounter problems in their mentoring relationships. The literature indicates that as many as half the individuals who identify a past mentor express serious misgivings about their mentorship relationships (Bolton, 1980; Brooks & Haring-Hidore, 1987; Kram, 1983; Rawlins & Rawlins, 1983; Shapiro, Haseltine, & Rowe, 1978, Woodlands Group, 1980). An awareness of what mentoring is and how it develops may help prospective mentors and proteges prevent or resolve problems more effectively. I will introduce some of these common problems identified in the literature on mentorship and perhaps some productive ways to think about them.

Excessive time and energy commitments. Commitment to a mentoring relationship must be reflected in actions, not just words, to be successful (e.g., Brooks & Haring- Hidore, 1987; Phillips-Jones, 1982). Therefore, a certain amount of time and energy must be committed. Keep in mind that it takes more time at the beginning of the relationship. Commitments of time and energy must be discussed if a mentor and protege are to share common expectations. The mentor and protege must talk, plan, and review their plan. The protege must be willing to spend at least as much time as the mentor and usually more.

Inappropriate choice of mentor or protege. My mother's adage "There's a pot for every cover" seems to apply. A person who is a good mentor is not necessarily good for or compatible with all prospective proteges. From the outset, mentors and proteges should devote some time and energy before a firm commitment to the relationship is established to reduce the chances of inappropriate choices (Brooks & Haring-Hidore, 1987; Phillips-Jones, 1982; Rowe, 1981a, b). Despite one's best efforts, some inappropriate choices of mentors

and proteges cannot be prevented, and it may be necessary to terminate a relationship. If so, great care and grace is needed to deal with the situation. One might cite differences in style or differences in commitments when discussing terminating a mentoring relationship. It is not advisable to close the door to future interactions for the mentor or the protege.

Unrealistic expectations for mentors or proteges. A number of investigators have identified this problem (Brooks & Haring-Hidore, 1987; Phillips-Jones, 1982; Sorenson & Kagan, 1967). A mismatch in expectations is common and may underlie a variety of other problems. It is probably the most frequently identified problem in mentoring relationships, but it is one that is often preventable or resolvable. Mentors and proteges must examine carefully why they are frustrated with what appear to be unrealistic expectations. Mentors and proteges may need to review what they have communicated verbally and nonverbally. This problem should be dealth with promptly, so it is important to watch for signs of tension in mentoring relationships and stress in individuals.

Expectations of protege failure. An expectation of failure is often a self-fulfilling prophecy. No one should become a mentor who has serious doubts about a protege's potential for success. Just the opposite is needed. Phillips-Jones (1982) cites encouragement as the component of mentorship most often talked about by proteges—a "you and me against the world" spirit that spurs proteges on.

If a mentor has doubts or develops doubts about a protege, some effort needs to be made to identify and work on any weaknesses. Then, if adequate progress is not demonstrated, the mentor should help the protege find some other source of help. If the protege is determined to succeed, there is no doubt that someone—or a number of someones—could work wonders.

Protege's feelings of inferiority. Proteges may not feel worthy of their mentor, especially if their mentor has an impressive history of accomplishments (Phillips-Jones, 1982; Woodlands Group, 1980). Proteges may need a more appropriate basis of comparison. A healthier alternative would be to adopt a criterion-referenced assessment perspective. Proteges might be encouraged to judge their progress by monitoring a task analysis of objectives and successful completion of those objectives and related tasks.

Unfair manipulation by a mentor or a protege. Manipulation can take a myriad of forms (Brooks & Haring-Hidore, 1987; Phillips-Jones, 1982). Minor problems may stem from unintentional transgressions that can be quickly resolved through a process of reviewing whose best interests actually are being served by a person's behavior. More serious problems may stem from ethically questionable transgressions. Obviously, manipulations like stealing

ideas or working for one's own gain are likely to be devastating to a mentoring relationship. The negative influence on adult development can be profound to say nothing of its impact on the interest and desire to pursue a research career on the part of a protege.

When manipulation is experienced or suspected, one needs to take an objective look at the relationship and evaluate whether he or she is contributing to the problem intentionally or unintentionally. Then he or she must schedule time for a discussion, having decided on some tentative solutions beforehand. Chances are that there are patterns that both partners in the relationship want to alter. If a satisfactory resolution or compromise is not reached and the partners stay involved in the relationship, the person feeling manipulated may need to become more assertive or make limits clearer. If not, resentment will fester and will probably destroy the relationship.

Stifling development of a protege. One cannot assume that a relationship that is satisfactory for a mentor works equally well for the protege (Phillips-Jones, 1982; Woodlands Group, 1980). The mentor's best intentions cannot compensate for an inability to meet a protege's needs. Mentors must be careful to avoid confining their proteges' growth potential to their own knowledge and experiences. Investigators have noted the tendency for mentors to attempt to develop clones, albeit inadvertently (Blackburn, Chapman, & Cameron, 1981).

There may be a tendency for mentors to be overprotective. But mistakes through inexperience should be expected and mentors and proteges should strive not to take errors personally, as hard as that may seem.

Overdependence on mentors or proteges. Discussing expectations and planning seems in order to promote increasing independence during a mentoring relationship. Interacting with more than one mentor or protege at a time may help reduce the reliance on one riveting relationship.

Excessive jealousy from mentors or proteges. This problem is related to the self-esteem and the self-confidence of the partners in a relationship. It is natural to expect fits of jealousy, considering the close relationships and the progression through developmental phases inherent in mentoring relationships. Consequently, partners need to monitor their relationship, keep communication open, and discuss related problems frankly early in the relationship.

Excessive jealousy from others. Others may become suspicious of the time and attention exchanged, especially in cross-gender mentoring relationships. Similar to the previous problem, open channels of communication are essential.

Unwanted sexual involvement and harassment. Problems related to sexual involvement and harassment occur frequently in mentoring relationships despite repeated warnings, advice, and rules against sexual involvement (Brooks & Haring-Hidore, 1987; Fitzgerald et al., 1988; Haring-Hidore & Paludi, 1989; Swoboda & Millar, 1986). Such problems inevitably complicate mentoring relationships. Again, it is necessary to closely monitor relationships and to communicate openly in hopes of avoiding and preventing problems. These problems are less likely if one can develop emotional intimacy and sexual relationships outside mentor-protege alliances.

It is realistic to expect that problems will be experienced in mentoring relationships—in all relationships, for that matter. One cannot expect mentoring always to be mutually reinforcing to mentors and proteges. But making expectations explicit plays a large role in determining success. A clearer understanding of what mentorship is and a mutual understanding between mentor and protege is helpful in avoiding problems. Prevention and prompt resolution of problems enhance the chances that mentoring relationships will be successful.

Others have provided insights into developmental phases of mentoring relationships (Kram, 1983; Phillips-Jones, 1982; Haring, this volume). The developmental process also must be considered in facilitating shared expectations. Keep in mind that successful mentoring relationships evolve to the point where two more experienced adults relate productively, but with increasing independence, both benefiting from their intense and shared experiences together.

The Appeal of Mentorship

Having reviewed some of the complexities and challenges inherent in mentoring relationships, it may be valuable to evaluate the appeal of mentorship to prospective research mentors. Why has mentorship, an abstract concept with a modest research foundation, caught the imagination of so many?

Mentorship may have appeal because it allays researchers' feelings of loneliness and tokenism (Speizer, 1981). Those of us striving to succeed in times and environments with heavy restrictions on available resources, with extraordinarily thin schedules of reinforcement,

and with a rather punitive process for disseminating our findings may feel a bit estranged. It is not that misery loves company, as few researchers would consider their lives as scientists miserable. But it may be natural for mentors to believe that alienation could be alleviated if there were more people like themselves.

We also can rationalize our interest in research mentorship on loftier grounds. Mentorship may enable individuals in the discipline to meet a longstanding need—the need for individuals who will generate a stronger empirical foundation for understanding, treating, and preventing communication disorders.

The appeal of mentorship may stem from the realization that close relationships between mentors and proteges have a high likelihood of furthering one's own development. Surely, mentoring relationships are a good source of stimulation, fun, and fulfillment.

Others may have embraced the idea that mentorship is necessary for success. This notion was given a good deal of credibility when the *Harvard Business Review* published an article in 1978 entitled "Everyone Who Makes It Has a Mentor." Researchers might point to one of the statistics cited in that article. Collins and Scott (1978) noted that 41% of the 286 Nobel laureates named between 1901 and 1972 had a mentor or a senior collaborator who also was a Nobel laureate.

Is mentorship necessary to contribute worthwhile research in communication sciences and disorders? Certainly, others have argued that this is not the case (Speizer, 1981). One can pursue such a goal by trusting in one's own competence, unconcerned about whether one has a role model or a mentor. The problem is that such goals are not so highly valued and reinforced in our society that many people would choose that path on their own. On the other hand, the nurturing of interest and desire and the development of knowledge and skills are most likely to be accomplished through close, caring, productive relationships. Maybe it is the nurturing of interest and desire that is best accomplished through mentoring relationships. A commitment to research mentorship may require a reevaluation of priorities; mentors are asked to value the development of new and talented researchers, their proteges, as much as any of their own scientific discoveries. Those of us in university settings know that nurturing the development of researchers is part of our job descriptions. A number of other papers (see chapters in this volume by Boysen, Johnson, and Krantz) present convincing arguments that clinical settings should, can, and do afford opportunities to mentor researchers as well.

One final note to prospective proteges—working with mentors is not necessarily the easy way of getting ahead. First, finding the right mentor(s) is and should be a demanding,

tedious process. Second, mentors can be demanding. Proteges cannot expect mentors to do their work for them. It is only realistic to anticipate that proteges will need to work at least as hard as their mentors. Third, although mentors may have the best of intentions, there may be a strong tendency for them to steer proteges toward their own goals instead of those of their proteges. Thus, a certain amount of assertiveness is required. Fourth, others will often expect proteges to be just like their mentors. That expectation may be a source of pressure on you to do well. It also may make it more difficult to develop your own distinct identity. Finally, many seasoned researchers consider themselves proteges who have had the pleasure of long-lasting relationships with one or more mentors. Those relationships have evolved, they have continued, and one can look back fondly on experiences that would not be exchanged for anything in the world.

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Table 1. How mentorship relationships benefit both partners.

Proteges may:

1. Gain advice on career goals
2. Receive encouragement to build their self-confidence
3. Acquire new or improved skills and knowledge
4. Be offered models to follow, especially for how to handle baffling or intimidating situations
5. Be afforded opportunities and resources
6. Be provided increased exposure and visibility
7. Be provided guidance and an example to help bridge difficult life transitions

Mentors may:

1. Get more work done with proteges' help
2. Be rewarded for spotting and developing new talent
3. Achieve vicariously through proteges
4. Find that investments in proteges are returned later through their proteges' contacts, advice, expertise, and so forth
5. Gain a sense of fulfilling obligations to society or to those who helped them
6. Gain satisfaction from trying to remedy the situation for underdogs—women, racial and ethnic minorities, persons with disabilities
7. Find that relationships with proteges are a good alternative to professional loneliness
8. Find mentoring a good means of avoiding stagnation as proteges inspire rejuvenation and creativity

The Importance of Neuroscience Training in Communication Sciences and Disorders

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In the 1970s when I began my scientific career as an experimental neuropsychologist, the vast majority of studies aimed at understanding brain/behavior relationships focused on the study of speech and language. Because of the importance of language in understanding human neural processing, the left or language hemisphere came to be known as the dominant hemisphere. Clearly, in the pursuit to understand the neural basis of higher cognitive function, studies of speech and language were the predominant focus for many decades.

The 1990s have been declared by the U.S. Congress as the Decade of the Brain in recognition of the tremendous advances that have occurred in the burgeoning field of neuroscience. Yet in 1992, when the key words "speech" or "language" were entered into the database representing research presented at the annual meeting of the Society for Neuroscience, dismally few entries could be found. What has transpired from the early 1970s, when the central focus of brain/behavior research was speech and language, to the present? It appears that speech and language scientists have virtually missed the "Neuroscience Revolution." Thus, in the Decade of the Brain, even in the midst of a new and growing field of cognitive neuroscience, the most human of all neural functions, language, is rarely studied using basic neuroscience approaches. How and why has this change occurred? Why is there such a large cognitive neuroscience commitment, with concomitant rapid scientific advances, in the areas of visual processing, motor systems, and memory, but not a comparable neuroscience emphasis on central auditory processes, speech, or language? I believe several factors have resulted in this depressing turn of events for the speech-language scientist interested in basic neuroscience.

First, I believe that the emphasis of speech-language pathologists, linguists, and many psychologists on language as a unique (special) process, innate only to humans, has led to the conclusion that, unlike other human processes, language is not built upon the foundation of other more basic (nonlinguistic) neural systems. With this philosophy firmly entrenched, the rationale for studying basic neural processes subserving speech perception or for developing appropriate animal models to study the subsystems that may underlie specialized sensory/motor systems that subserve speech and language processes has been difficult to justify. Without the ability to use animal models to test basic hypotheses, it has been virtually impossible to enter the modern field of neuroscience. As a result, remarkable breakthroughs have occurred in understanding the neural basis of many higher cognitive functions (notably vision and memory), but far less progress has been made in the areas of most interest to audiologists and speech-language pathologists, such as central auditory processing, speech, language, and reading.

In a cyclical fashion, because of the lack of a growing database pertaining to a basic neuroscience of speech and language, speech-language pathology and to a lesser extent audiology curricula have failed to incorporate the growing field of neuroscience. Conversely, neuroscience curricula have failed to incorporate topics pertaining to audition, speech, and language. Most significant is the result that fewer and fewer newly trained scientists have the neuroscience background to develop and address questions related to the neural basis of speech and language.

These same factors have also led to an increasing lack of appropriate expertise in basic neuroscience among peer reviewers of grants in the speech and language field. This has, in turn, made it increasingly difficult for basic science-focused speech and language grants to receive appropriate peer review. There is, furthermore, growing concern that with the reorganization of the National Institutes of Health, with Communicative Sciences moving out of the Neurological Institute and into the Deafness Institute, speech and language have been moved even further from a neurological or neuroscience focus. Unless far more attention is paid to neuroscience training and mentorship for individuals interested in communication sciences and disorders, study sections that currently review grants in these areas will become increasingly devoid of scientists with basic neuroscience training. On the other hand, should a grant be assigned to a more basic science study section, there is equal concern that specific expertise in communication sciences will be missing, leading to even less research in these areas.

I propose that there is a need for fundamental change in current speech-language pathology and audiology training programs, with increased emphasis on training in the basic sciences of the field, particularly from a neuroscience perspective, if we hope to provide the skills necessary for the next generation of communication scientists. But what evidence is there that communication scientists need this type of training to keep up with the research advances occurring in areas pertaining to their field of interest, as well as to lead the field in new directions in the future? To address this issue we could focus on numerous areas of interest to audiologists, speech-language pathologists, and other communication scientists that would be enhanced by increased neuroscience training. But that would be outside the scope of this paper. Instead, as a case in point, we will focus on research in child language disorders and central auditory processing for which neuroscience training is particularly relevant.

Cerebral Lateralization

Until recently, research into the neural basis of specific developmental language impairment (LI) has been constrained by a lack of available methodologies that could be safely applied to developing children. However, with the recent advent of noninvasive, in vivo brain imaging, a new frontier has opened for studying brain structure (neuroanatomical, neuromorphological) and function in LI children. The first reported MRI studies have demonstrated significant volumetric reductions and hemispheric cerebral asymmetry differences in the brains of LI children. Jernigan et al. (1991) reported that LI children were found to have reduced volume bilaterally in the temporal lobes as well as in some specific subcortical brain regions (striatum and diencephalic structures). Interestingly, it was also recently reported that acquired lesions in childhood to the cortical areas subserving language resulted in only temporary speech, language, or reading disability. However, when lesions extended deep to subcortical (specifically striatal) regions, long-term disruption of these communication processes resulted (Aram, 1989). Taken together, these new results suggest an important role for subcortical/cortical connections in the development of processes subserving speech and language functioning. Thus, training in anatomy, physiology, and neurochemistry of subcortical as well as cortical systems are becoming increasingly important to the understanding of the neural basis of developmental and acquired language disorders in children.

In addition to volumetric reductions, evidence of aberrant cerebral asymmetry has been found in the brains of LI individuals from MRI studies as well as neuropathological examination. Analyses of structural/functional relationship reveal a highly significant

correlation between the degree of volumetric reduction in the left temporal lobe and reduction in verbal IQ, whereas aberrant cerebral asymmetry was found to be significantly correlated with auditory temporal processing and memory deficits (see Tallal et al., 1991, for a review). Although the sample was too small to demonstrate statistical significance, there were trends in the data that indicated gender differences, particularly in corpus callosum widths and volumes. However, the most highly significant correlation with MRI asymmetry differences related to a measure of prenatal risk factors, with a high degree of maternal stress prenatally being associated with abnormal development of cerebral lateralization (Cowell et al., 1991).

Animal studies have shown an important relationship between pre- and post-natal stress, hormone manipulation, and hemispheric thickness asymmetry as well as corpus callosum width (Denenberg et al., 1991). Based on these animal studies, and observations of functional as well as structural asymmetry differences in dyslexics, Geschwind and Galaburda (1985) hypothesized a potential relationship between hormones, brain development, cerebral lateralization, gender differences, and developmental communication disorders. The recent MRI results with LI children confirm the importance of further investigation of the "Geschwind hypothesis." Such studies depend, however, on the development of appropriate animal models for studying the role of hormones on both structural and functional cerebral lateralization and subcortical/cortical connections, specifically as they relate to central auditory processes.

Although functional cerebral lateralization has been well documented in humans for both language and nonlanguage abilities, it has been unclear until recently whether animals show functional (behavioral) cerebral lateralization. However, recent studies have documented a right ear advantage (REA) for conspecific calls presented dichotically in nonhuman primates, similar to that documented for speech perception in humans (Petersen et al., 1978, 1984). Our laboratory has recently developed a new paradigm for studying cerebral lateralization in rats, and we have reported finding an REA for rapidly presented tone sequences (Fitch et al., in press). This may be particularly important in light of the consistent finding of highly significant deficits in processing rapidly presented tone sequences in LI children, as well as the MRI results, which found aberrant structural cerebral asymmetry in LIs to be highly correlated with deficits in processing tone sequences.

The finding of an REA for tone sequences in rats provides a powerful new model for studying the origins of structural and functional cerebral lateralization for sensory systems that may subserve speech perception. This new animal model may provide a unique opportunity for studying the neurobiology of the temporal processing deficits that have been shown so

consistently to characterize LI children. Using this newly developed rat model, it is now possible to address questions pertaining to (a) the neuroanatomical, neurophysiological, and possibly neurochemical development of cerebral lateralization, (b) the effects of stress and hormone manipulation on structural and functional lateralization, (c) the effects of postnatal environmental influences on brain development, (d) the role of gender in specific aspects of brain development, and (e) the pathways and neurotransmitter systems connecting subcortical (specifically striatal and thalamic structures) with sensory/motor cortex. What is particularly exciting is that it may now be possible to begin to study at least one subsystem that may be a prerequisite for the development of speech perception, in a manner similar to that which has yielded such fruitful information about the neural basis of other cognitive processes, such as visual perception or memory.

Neurobiological Basis of Temporal Information Processing

Longitudinal studies have demonstrated that the vast majority of preschool LI children will become severely learning disabled (LD), and many will evidence increasing symptomotology associated with attention deficit disorder (ADD). The nature of this comorbidity needs to be further investigated. Furthermore, there are striking similarities between children diagnosed as language impaired and those diagnosed as dyslexic. In addition to their shared phonological disorders, these children share a typical neuropsychological profile that includes severe temporal perceptual/motor dysfunction. Recent studies with dyslexic children have pinpointed deficits in processing the rapid transient components of visual information (Livingstone & Galaburda, 1990). Results from both neuropathological and electrophysiological studies have led to the hypothesis that people with dyslexia suffer from a specific deficit in the magnocellular visual subsystem. Fortunately, the anatomical, physiological, and behavioral components of this visual subsystem are well understood from animal research and thus lead to the ability to test specific hypotheses pertaining to the neurobiological basis of transient information processing systems that may be essential for the development of speech, language, and reading.

The striking similarity of the findings of transient information processing deficits, as well as phonological impairment, in both dyslexic and LI children warrants further study. It is unclear at this point whether dyslexia is an outcome of developmental language impairments or a distinct clinical syndrome that is often comorbid with language impairments. A detailed multidisciplinary study comparing LI, dyslexic, and ADD children using behavioral, electrophysiological, and brain imaging procedures is a high research priority. These studies

would be particularly informative if done in conjunction with animal studies investigating the neural basis of rapid information processing.

Genetic Transmission of Language Impairments

The past 10 years have seen an explosion of new breakthroughs in the field of molecular genetics. This has led to the ability to link specific genes to specific medical and mental disorders that appear to run in families. Several recent studies have documented increased familial aggregation of language disabilities in the primary family members of LI children (Lewis et al., 1989; Tomblin, 1989; Tallal et al., 1989a). Detailed analyses of transmission patterns suggest findings compatible with an autosomal dominant mode of genetic transmission (Tallal et al., 1989b). In a recent study, Tallal et al. (1991) compared the phenotypic (behavioral) profiles of LI probands either with or without other affected family members. Interestingly, the only consistently significant phenotypic differences between these subgroups, studied longitudinally, occurred in the areas of auditory attention, rate processing, serial memory, and receptive phonological abilities. These results suggest that those language impairments that run in families (and are potentially genetically transmitted) may be best characterized by central auditory processing and phonological disorders.

Two independent laboratories recently have reported the results of evaluations of adult subjects with a lifelong history of developmental language impairment (Tomblin, 1991; Lincoln et al., 1992). Both studies concluded that in later life the ability to detect the initial language deficit becomes problematic using currently available standardized language tests. However, nonlinguistic auditory temporal processing and memory abilities continue to be highly impaired. These results have both theoretical as well as important practical implications for genetic research. They suggest that measures of auditory temporal processing may represent a "biological risk marker" for developmental language disorders. Should this prove to be the case, this may be particularly useful in future gene linkage studies in which the ability to accurately identify the phenotype in adult family members becomes paramount.

The results of family genetic studies, as well as recent studies with LI twins (Bishop, 1992), converge to suggest a potential genetic etiology for some developmental disorders of language. Combining twin and case-controlled family genetic studies would offer a powerful means of differentiating genetic and environmental influences in language impairment. These studies have the potential to lead to the identification of specific genes through the use of modern molecular genetic techniques.

Summary and Future Directions

The advent of noninvasive brain imaging techniques, as well as the remarkable advances occurring in the field of molecular genetics, opens new frontiers for basic neuroscience studies into the etiology of developmental language impairments. However, no matter how sophisticated new technologies become, the limiting factor in the field of child language will continue to be the sophistication with which theoretically driven, fine-grain behavioral analyses are carried out. Future advances will therefore depend on developing new, multidisciplinary training programs that integrate behavioral and neural sciences.

It would be useful for ASHA to survey its accredited training programs to determine the scope of basic neuroscience training included in current curricula. Such a survey would provide a database from which to develop the basic neuroscience needs of students who will become future communication scientists. Such a survey may also be useful to provide information to prospective students about the degree and scope of basic neuroscience training that is available in each program. In this way, those students who seek a research scientist career can have the information needed to select the more scientific and research-oriented programs.

For current communication scientists and graduate students it would be useful if either NIDCD and/or ASHA could develop specific intensive workshops or conferences for research-oriented speech-language pathologists and audiologists to obtain updated, state-of-the-art training in the basic tenets of neuroscience that are of most relevance to their field. Special postdoctoral and senior research fellowships could also be earmarked for additional research training in a neuroscience laboratory. Finally, to increase neuroscience research relevant to communication sciences and disorders, the NIDCD could develop special Institute-initiated opportunities (i.e., contracts, centers, RFAs, etc.) that would specifically focus on stimulating basic neuroscientists (including cognitive neuroscientists) to investigate issues pertaining to the neurobiology of communication systems. Specific emphasis should be placed on stimulating neuroscience training and research initiative in those specific areas of communication sciences that are currently most underrepresented in this respect. The rapid advances in medical science technologies and the concomitant research breakthroughs that are occurring in our understanding of the neural basis of higher cognitive function make it imperative that training in communication sciences be thoroughly evaluated and restructured where necessary to incorporate these changes.

The 20th century has seen remarkable scientific advances and an explosion in technologies that have altered fundamentally the way we think about brain/behavior

relationships. These advances have been thoroughly exploited in many research areas to the benefit of many patients. To pinpoint just a couple of examples of such advances, the development of auditory brain stem evoked response (ABR) techniques and the cochlear implant have revolutionized our field. These and many other major advances are the direct result of neuroscience research. If our field is to move effectively into the 21st century, we must provide the next generation of communication specialists with the tools they will need to play a leadership role in the future development of our science. I contend that a significant part of this arsenal of tools must include fundamental training in basic neuroscience.

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Fostering Research Competency in Audiology

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Over the past 15 years, I have had the pleasure of serving on the audiology faculties at two major research universities: Vanderbilt University and Indiana University. This time has been about evenly split between the two institutions, and of the 10 PhD students I have mentored during these 15 years, 6 were at Vanderbilt and 4 were at Indiana University. Moreover, I had significant influence on the direction of the PhD programs in audiology at both institutions through my appointment as Director of Research and PhD Programs in the Division of Speech and Hearing Sciences at Vanderbilt University and the Director of Audiology in the Department of Speech and Hearing Sciences at Indiana University. At both institutions, however, the final guidelines established for PhD students were very much a product of the entire faculty in both departments.

The PhD programs in audiology at both of these institutions shared several features that seem to derive from a common set of general premises. In the next several pages, I will review each of these premises and their consequences for the PhD programs that grew from them.

General Premises

Premise #1: The PhD is an advanced research degree, not a clinical or professional degree. At both institutions with which I have been affiliated over the past 15 years, a PhD handbook had been developed that very clearly indicated the research emphasis of the respective PhD programs. In fact, both of these handbooks contained the same quote from a policy statement on the nature of the PhD developed by the American Association of Graduate Schools in 1979. A portion of the passage quoted in each of these PhD handbooks is as follows:

> PhD programs involve scholarly and research activity directed mainly toward the acquisition of new and fundamental knowledge. PhD programs are to be distinguished from practitioner-oriented doctorates.... PhD programs lead the student to focus on what he or she can do to the subject; professional degree programs are more concerned with what the student can do with the subject.

The PhD should not be used for advanced clinical coursework or to update one's clinical skills. This should be accomplished with the clinical master's degree or the professional doctorate (AuD). Of the 10 PhD students I have mentored in the past 15 years, 9 had master's-degrees in clinical audiology prior to completing their PhD and 7 of these 9 were holders of the CCC-A (the remaining 2 of these 9 students, moreover, completed their CFY during the early portion of their PhD programs). In addition, of the 90 credit hours required for the PhD, no more than 9 of these credits were earned in courses required of the students in our clinical master's-degree courses. There should be very little overlap between the coursework required for a clinical master's degree or professional doctorate and the PhD, if one recognizes that the emphasis of each degree program is distinctly different.

Premise #2: The curriculum for the PhD should begin with a broad multidisciplinary foundation in the fundamentals and the acquisition of research skills. It should end in the independent application of this knowledge and these tools to more focused topics in the field. From this premise, it follows that the coursework will be more diverse with a heavier courseload during the first year in the program and become more focused and independent in subsequent years. Coursework during the first year depends heavily on the availability of research faculty in other departments. Coursework during the first 12-18 months of the PhD programs has typically included courses in areas such as neural science, cognitive science, psychology, acoustics, electronic instrumentation, computer programming (with emphasis on laboratory applications), digital signal processing, research design and statistics, and grant writing. Four courses per semester and two per summer have typically been required during the first year or two, with a reduction to three courses per semester and one per summer in subsequent years. As the coursework tapers off in subsequent years, research practicum is increased and the coursework becomes more intensive and independent. During the latter years of the PhD program, mentor-led seminars and independent studies have been offered in topics such as auditory physiology in normal and pathological ears, auditory perception by normal and hearing-impaired listeners, aging and the auditory system, the effects of noise on hearing, and recent research in amplification.

Premise #3: From the time of admission, a mutual commitment of time and effort should be established between the PhD student and the faculty mentor. The longer I have been involved in the mentoring of PhD students in audiology, the more I am convinced that one of the most pivotal points in the mentoring process comes at the time of admission. When the faculty member makes a commitment to serve as the PhD applicant's mentor, it must be a commitment made with the full knowledge of both parties that this will be a very time-consuming process for both the student and the mentor. The mentor, as a faculty member heavily involved in research, has certain objectives that must be met to maintain ongoing programmatic research efforts. The student, prior to making a decision to enroll in the PhD degree program, must have a clear idea as to how he or she is expected to help in those research efforts. The requirements of the degree program and the timeliness of their completion must also be clearly understood by both parties at the outset. This can best be accomplished through an interview between the applicant to the PhD program and the prospective mentor. As part of the interview process, the applicant's areas of interest are explored in greater detail to ensure that they are compatible with the mentor's areas of interest and expertise.

Prior to the interview, several pieces of information are considered during the application process. The applicant's grade point averages (GPAs) for all prior degrees are considered, along with letters of recommendation. Test scores on the Graduate Record Examination (GRE) are also considered. Although GPAs, letters of recommendation, and GRE scores are all considered during the admission process, at both Vanderbilt and Indiana University, the GRE scores ultimately have had the greatest effect on admission. This results from the fact that applicants seldom solicit letters from poor references and most of our applicants have had GPAs between 3.5 and 4.0 (on a 4-point scale). GRE scores of applicants, however, have ranged from about 1,000-1,600 (sum of Quantitative and Verbal scores only), with an admission requirement of $>$ 1,100 (and at least one of the scores $>$ 600). Consequently, it has been the scores on the GRE that tend to move applicants up and down the list of top-ranking PhD prospects.

A final key consideration in the admission process is the availability of financial support for the PhD student. PhD students should not be asked to devote three to four years of full-time effort to the development of research skills and knowledge without financial support for their endeavors. Over the years, the typical financial support for my PhD students has consisted of full payment of tuition and a stipend of $8,000-12,000.

Premise #4: Extensive research practicum for the student should be coordinated by the mentor throughout the PhD program. As noted previously, the emphasis of the PhD program is the acquisition of new knowledge and the development of research skills. Extensive research experience is critical to the development of research skills. At both Vanderbilt University and Indiana University, the minimum research practicum requirements consisted of a first-year research project, a second-year research project, and a dissertation. Typically, the first-year research project is similar in scope to a master's thesis, often mentor-initiated and closely supervised by the mentor. The second-year project, on the other hand, is usually student-initiated with guidance at several stages from the mentor and other faculty. The topic of the second-year project is frequently different from that of the first-year project and may be in an area in which the student anticipates working for the dissertation. In that way, the beginnings of a programmatic research effort involving both the second-year research project and the dissertation can emerge prior to graduation and foster the continuation of such efforts subsequent to graduation. The third required research experience is the dissertation, which is a large-scale independent research project conducted with guidance from the mentor and the other faculty members on the student's research committee. The dissertation, moreover, frequently involves a series of experiments and is conducted over a period of 12-24 months.

To gain additional experience with the dissemination of research findings, the results of the first-year and second-year research projects must be disseminated using one of several vehicles. Preferably, the projects will be of enough significance to warrant presentation of findings at national conferences and publication of results in scholarly journals. At a minimum, the results will be presented orally to a formal gathering of departmental faculty.

In many cases, the PhD students completing these requirements are also involved in the mentors' ongoing programmatic research efforts. As a result, they typically have much more experience with various aspects of the research enterprise than is represented by the minimum requirements described here.

Premise #5: The mentor should be a faculty member who is actively involved in research and, preferably, has been for several years. At a minimum, mentors should have 3-5 years of experience with all aspects of the research enterprise prior to attempting to guide the development of someone else's research expertise. The mentor should have considerable experience with experiment design, data collection and reduction, presentation and publication of results, development and management of a clinical or research laboratory, grant writing

and administration, and the review of papers, manuscripts, and proposals. This premise precludes the involvement of entry-level assistant professors as mentors, which is probably healthy for both the student and the potential mentor who is attempting to establish his or her own research career. This premise, however, does not entitle all senior faculty to mentorship opportunities. Only those actively involved in or with a long history of programmatic research should serve as mentors to foster the development of research competency in the PhD student.

Premise #6: External support for research is essential, and the PhD student should become familiar with the sources of such support and with the grant-writing process. Research is expensive. It is nearly impossible to do high-quality programmatic research without financial support. Most such support is obtained from federal agencies, with NIH being the primary source of federal funding in audiology and hearing science. It is a disservice to PhD students to train them to be independent, capable researchers without familiarizing them with the mechanisms with which to obtain financial support for their efforts following graduation. A grant-writing course should be a required part of all PhD programs in audiology. In such a course, the application, review, and award processes are reviewed for several federal agencies, with a primary focus on NIH. One of the course requirements is the preparation of a grant proposal using standard NIH forms, including all budget pages and other supporting documentation.

Premise #7: The student's department and university should be supportive of the research enterprise. Although largely self-explanatory, this premise acknowledges that the mentoring process must receive institutional support to be successful. Mentoring, whether pursued through a hierarchical one-on-one model or a more parallel networked model, is a time-consuming process. Faculty serving as mentors should receive an appropriate amount of release time to serve in this capacity. The faculty member must also have access to sufficient laboratory space and equipment to accommodate the training of future researchers.

Future Developments

The seven premises reviewed above have formed the basis of two PhD programs in audiology. Although I consider the programs built from these premises to be successful in their efforts to foster research competency in audiology, there are ways in which the field could enhance these efforts. The emergence of the professional doctorate in audiology, the AuD, will have a positive effect on the PhD by more clearly defining the latter as the primary

identifier of competency in research in our field. In the past, many receiving the PhD sought and received advanced clinical training, rather than research training.

In addition, many students in the field of audiology do not experience their first introduction to the field until the end of their undergraduate education. Earlier introduction of coursework in audiology at the undergraduate level, as well as more fundamental coursework in life sciences, physical sciences, and mathematics, will result in a greater number of well-prepared candidates for PhD programs in audiology. Introduction to research in audiology at the undergraduate level through research-oriented honors coursework and honors theses would also be helpful.

Finally, efforts made recently to recognize student research should be continued and financial support for student research expanded. Special student research awards are now made by the American Academy of Audiology and the American Speech-Language-Hearing Foundation. This should be continued and expanded.

Regarding greater financial support for student research and the mentoring process, inclusion of more predoctoral training opportunities in NIH training grants would be helpful. In addition, alternative mechanisms to support the research training process should be explored. For example, when a principal investigator of an NIH research grant elects to use $30,000 budgeted for research support personnel to hire two PhD students as research assistants, perhaps a training supplement of half that amount could be provided to the principal investigator for use in research training. This would further promote the involvement of PhD students in ongoing programmatic research efforts funded by NIH and provide supplemental funds to provide a better training experience for the student. Funds available through such a training supplement could be used to employ these same assistants in the summer, to send them to various scientific meetings during the year, to buy special pieces of equipment needed for a student research project, or to hire undergraduates to work in the laboratory with the mentor and the PhD students. From the principal investigator's standpoint, such a supplement may provide enough incentive to make it a cost-effective alternative to the long-term employment of a single, full-time research assistant with those same funds.

Gender Considerations in Research Mentorship And Training: Pitfalls and Solutions

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Do gender issues exist in research training and mentoring? Absolutely. Consider the possibility that research mentoring as a formalized effort may have grown out of gender issues, or more specifically, gender inequity in science and research. That is to say, the need for formal mentoring may have surfaced in response to gender inequity in the advancement of researchers. This may overstate the case, but understanding gender issues in research training requires an understanding of gender issues in the development of the researcher, and thus, gender issues in academe. Using academe as the backdrop for our discussion is based on the notion that an academic environment is the home for most research and for research training. And furthermore, considerable data are available concerning gender and research success in academe. Although my initial comments make reference to academe, the reported trends certainly will apply to other settings as well, particularly large institutions such as major hospitals.

In using academe as a backdrop for our exploration, the orientation becomes focused on women and the issues raised by their presence in the research academy. Simply stated, men and women have had, and continue to have, very different experiences in academe and in the pursuit of their research careers. The success of a researcher, male or female, is dependent upon an ability to manage a myriad of challenges. But as many of us know, and the data reveal, women are faced with managing a few extra challenges. As a result, women's efforts to pursue research careers have been burdened, and their successes in academe and research have been thwarted. This situation has shaped my comments concerning gender issues in mentoring.

Gender in Academe

Unfortunately, the current status of men and women in academe is bound in a long history of inequality between the sexes. Academe has been, and, in many ways continues to be, a male-dominated institution; this is particularly true for the area of interest to us today, the research-oriented academician. Contemporary attitudes about women in academe are rooted in the most amazing notions about women in education, some of which need to be shared. Consider "from whence we came" and the following perspective from the 19th century: "It was decided that women should not be allowed into higher education because the mental energy necessary for higher education would be drained directly from the uterus and would therefore weaken the women's reproductive capacity and destroy the race" (Chamberlain, 1988, p. 167). Clearly women have had to overcome numerous obstacles in their efforts to become academicians and respected members of the scientific community. Although attitudes have changed since the 19th century, the difficulties women have in proceeding and succeeding with academic careers and research careers still exist.

The difficulty women have had in attaining full representation on the faculty of colleges and universities is well known. This difficulty has persisted for decades. Only recently has the status of women in academe undergone positive changes. However, these changes have occurred primarily at the undergraduate and graduate level, and for entry-level faculty positions. Women now constitute approximately 50% of undergraduate enrollments in colleges and universities (Hensel, 1991). In the late 1960s, women represented 13.3% of those people receiving doctorate degrees from universities (Digest of Educational Statistics, 1989, p. 166). By 1990, women received 36.3% of all doctorates awarded (Chronicle of Higher Education, October 6, 1991, p. A20) (Figure 1). Women have also made gains into entry-level faculty positions, such as lecturers, instructors, and assistant professors. This increase of junior-ranked faculty is reflected in the increasing percentage of female faculty overall: 29% of all faculty are now women (Digest of Educational Statistics, 1989, p. 166), compared with 24% in 1976 (Hornig, 1980) (Figure 2). However, in spite of these gains, women are dramatically underrepresented in the senior faculty ranks. "Several recent studies have found that women composed about 1/4 of the faculty but only 1/10 of the tenured, full professors" (Hensel, 1991, pg. iii). (See Figure 3, Science, 1992.) "Furthermore, the attrition rate among women in academe is higher and women who stay, take two to ten years longer for promotion than their male counterparts" (Hensel, 1991, p. iii).

During the 1992-93 academic year, a study examining the status of women in the School of Medicine was completed at the University of Washington. In this study, we found similar

trends. Although more women are entering and graduating from medical school and being hired at the assistant professor rank, they continue to compose a small proportion of the total faculty, especially in the senior academic ranks and among administrative leaders. Men currently compose 88% of the faculty at senior ranks, associate and full professors, while women compose only 12% of the faculty at the senior ranks (Figure 4). Further, fewer women than men are classified as research faculty; women have tended to pursue clinical faculty positions. These data clearly reflect the national trend.

The discrepancy between genders is real in academe. Why is this? And more importantly, what can be done? Indeed, this discrepancy has prompted considerable debate and research, the explorations of which have led down two avenues, one biological and the other socio-political.

Biological Explanation

The biological explanation for the discrepancy suggests that women carry an additional burden of childbearing, child-rearing, and family responsibilities. This is not to say that men do not bear such burdens. This is certainly not the case. Many men are actively involved in child-rearing and family responsibilities. However, by and large, women continue to be the primary custodians for family-related duties. Without a doubt childbearing, child-rearing, and attending to other family responsibilities can affect research productivity. For research faculty, the problems associated with childbearing and infant care combined with ongoing research are numerous. Many research projects, given the nature of their methodology or their funding, cannot be interrupted. Furthermore, the amount of time to complete such projects adds to the burden. This creates an extraordinary situation for women wishing to have children, and for men wishing to participate in infant care. The problem of course in pursuing academic careers has been the continuously running tenure clock and inappropriate leave policies that typically accompany childbirth. Faced with the primary responsibility for childbearing and infant care, many women have elected not to have children until they reach a point in their careers when an interruption will not be devastating, such as the end of a particular research project or until receiving tenure. The data indicate that many women, rather than merely postponing childbirth, have dropped out of academe and abandoned their pursuit of research careers. In recent years many universities have reviewed and revised their leave policies, thus reducing the numbers of women opting for the decision to delay having children or to discontinue academic research careers. However, although universities are attempting to be more responsive in their policies to accommodate faculty members who become parents, the biological burden still is present.

A recent study completed at the University of Washington (Finkel, Olswang, & She, in press) attempted to investigate attitudes towards the implications of childbearing and child-rearing on faculty leave and tenure policies. Of the 2,598 questionnaires distributed to tenured and tenure-track faculty, 1,383 (53%) were returned; the results indicated that a majority of the faculty supported liberal childbirth and infant care leave policies, including paid childbirth leave, unpaid infant care leave, and stopping the tenure clock for infant care leave (Figure 5). Such policies would obviously help relieve some of the burden associated with childbirth and child care. The most interesting part of this research pertained to faculty members' perceptions of taking advantage of such leave policies. "A large number of respondents (70%) reported that they perceived that they themselves would be hurt professionally if they took such a leave. Women faculty reported this perception more frequently than male faculty. By rank, more assistant professors reported they felt their careers would be hurt by taking such a leave than either associate or full professors. Fifty-six percent (56%) of the respondents reported that there would be pressure from their departments to return to work after the birth of an infant regardless of the institutional policy, and this pressure would affect the length of leave they might take" (Finkel et. al., in press, p. 12-13) (Figure 6 and Figure 7). More liberal infant/child care leave policies and extension of the tenure clock are valuable only if faculty are comfortable with such policies. If taking a leave and an extension are interpreted as meaning women, or men, are less serious about their careers, the policies will not work. These data and this issue begin to reflect the complexity of the problem creating the gender disparity, and lead to the other explanation, the socio-political perspective.

Socio-Political Explanation

Several studies have examined the gender discrepancy by including in their database women who do not have children. Removing the biological factor does not remove the disparity (Cole & Zuckerman, 1977; Hamovitch & Morganstern, 1977). Clearly, other factors influence the gender difference. The socio-political explanation suggests that men "know" some things that women don't. These "things" are scientific/research-oriented and organizational/structural- or systems-oriented. The scientific/research component refers to the continuing education that one gets postdoctorate that helps to shape the independent successful researcher. The organizational/structural component refers to knowing how the system works. Both can be described as "learning or knowing the ropes," scientifically and organizationally. In our study of faculty women in the School of Medicine at the University of Washington, this factor was regarded time and again, and across ranks, as a major liability

for women. That is, women viewed themselves as having limited opportunities to "learn the ropes" about research endeavors and organizational/structural "ins and outs." The vehicle for guidance in science was limited, and the vehicle for guidance in organizational structure was limited—and therefore, academic success was restricted. In interviewing men and women on this topic of how one "learns the ropes," how one obtains guidance and continuing education, the answer typically has been, "through informal interactions." Informal, collegial, often spontaneous, interactions seem to form the learning environment that spawns success. Informal, collegial mentors serve to provide junior faculty with a lay of the land; they forewarn junior faculty of the dangers in conducting research and in being "part of the system"; they serve as guides, and in many cases, they even run interference for the junior person. Unfortunately, in part because of the numbers disparity, men by and large have more of these informal mentoring opportunities than women. Repeatedly, in our study in the School of Medicine, and in other studies examining the discrepancy in success of men versus women in academe, this fact has emerged: informal mentoring opportunities create an environment that facilitates success, and such mentoring opportunities, in general, are limited for women.

Consider the training of new researchers for the last three decades. How was it done? The term for the process was not "mentoring," but rather "collegiality." Doctoral students or new assistant professors were encouraged in their pursuit of research careers by professors at the senior ranks. Informal, collegial interactions, typically conducted both on- and off-campus (in the lab and in the pub), provided the kind of nurturing that enabled these young students to grow and prosper. Given the statistics, we know of course that the majority of these scientists were men. And we know that women, few in number as they were (24% in 1976), seldom participated in this informal, collegial nurturing. Further, we know from the data, that the majority of these women did not continue in their academic careers. The scenario from the 1960s, '70s, and '80s paints a picture of a "teaching" relationship that worked for some, but not others. In fact, the relationship worked quite well for the majority; it was a natural way for individuals to interact, to forge strong relationships, and to shape new careers. For this majority, there was no need for a special effort to encourage the development of research scientists. However, now we have a problem. Women are not becoming the successful research scientists at the rate that they should. Women are not emerging as career researchers out of the increasing numbers of women at the doctoral ranks at the rate that they should. And they are not emerging successfully out of the assistant professor ranks at the rate that they should. Women are simply not a part of the informal collegial relationships that have worked so well for men. The result is the need for a different

approach, a more conscious effort to guide. Gender disparity in the evolution of the successful career researcher may indeed have launched our need for formal mentoring efforts.

Mentoring as a Solution to Gender Inequity

Mentoring as one means of removing the disparity between genders appears to be a worthwhile avenue to pursue. Mentoring must include both personal and professional issues. The personal component relates to the guidance that men and women are seeking in terms of balancing family and career, or more broadly stated, balancing personal life goals and career goals. As the data reflect, this balancing act is difficult only in part because of restrictive organizational/administrative policies. Although policies are becoming more supportive of women regarding biological factors, the climate is not changing correspondingly. Traditional attitudes prevail about taking time off to bear and raise children. Personal guidance is needed to help women and men manage these realities. And for those individuals who are not electing to raise children, balance in personal life goals and career goals still needs to be addressed. Mentoring includes this broad range of personal issues.

Professional guidance and mentoring must also be available, corresponding to the socio-political explanation for the disparity in success between men and women. Women, like men, need mentoring in the scientific arena. They need continuing education in research preparation. Women, like men, need mentoring in the organizational arena. They need insight as to "how the system works" and "how to work the system." Mentoring can be a means of gathering this information.

Mentoring Issues

The value of good senior mentors for the career advancement of junior researchers is unequivocal. Women with mentors report more publications and more time spent on research activity than those without mentors (Levinson, Kaufman, Clark, & Tolle, 1991). Although the hierarchical (senior mentor and junior protege) approach to mentoring is one obvious and viable solution, it carries its own set of issues and difficulties. We turn our attention now to the issues and pitfalls of mentoring using this approach. In pursuing this discussion, the advantages and disadvantages of same-sex and opposite-sex mentors will be presented, followed by suggestions for different approaches to mentoring and resolving the gender disparity in academe and research.

Selecting a Mentor: Same or Opposite Sex

Selecting a mentor of the same sex appears as though it would be preferable, from a personal as well as professional point of view. Men and women have different life experiences; on one level one would regard same-sex mentoring as ideal for the personal mentoring component. Of course, the problem with this scenario for women is obvious: not enough women exist at the senior level to serve as mentors. Furthermore, where women senior faculty are available, they are often spread extremely thin in their jobs, being in great demand to serve on administrative committees and advise students, in part because of their gender. And, of course, women junior faculty are now in great demand by the increasing number of women doctoral students entering academe. This numbers situation is the "minority" catch-22. Furthermore, many senior women don't make good mentors. Some women, particularly those who struggled through the ranks, may regard mentoring as unnecessary. Their attitude may be that all junior researchers should "pass through the flames"; the "if I did it, you can do it" modus operandi. Or they may want to mentor, but just don't know how, because of their own lack of experience and role models. The result is that few women senior researchers may be available to serve as good mentors.

Related to the "shared life experiences" that women may have with one another, some research is suggesting that men and women in fact view the world differently. This has been discussed in terms of men's and women's "ways of knowing." Women appear to "view reality and draw conclusions about truth, knowledge, and authority" differently from men (Belenky, Clinchy, Goldberger, & Tarule, 1986). The implications of this position are far-reaching. Two aspects seem particularly striking and germane to the issue of mentoring and success in research. Both aspects have to do with women's versus men's goals in academe and research.

Data indicate that women teach more hours per week than men (Hensel, 1991). Further, women seem to value the interaction with students more than their male counterparts, as suggested by the amount of time they spend in informal teaching situations (Hensel, 1991). In schools of medicine, women spend more time in their clinical roles than men, and many eventually opt for this career path. This orientation may reflect a rather deep-seated gender difference that will create difficulties in a mentoring relationship. The difficulties result from differences in professional goals for men versus women, thus making guidance by an opposite sex mentor a potentially difficult job.

Even for the women who elect to pursue a purely research-oriented career, the differences in men's and women's "ways of knowing" may emerge to create difficulties for

the mentoring relationship. Empiricism, in its traditional quantitative method of inquiry, may reflect men's ways of learning and knowing more than women's. Such elements include attempts to isolate phenomena from their context and the competitive process of building theories by disproving theories and by disproving other's work (interview with Nancy Goldberger at the National Council of Schools of Professional Psychology conference, Tucson, Arizona, 1991). Many women researchers are more comfortable with context-bound inquiries, that is, qualitative research, which may correspond better to women's ways of learning. In general women may be more willing to combine analytic and intuitive, objective and subjective strategies for knowing. In a male-female mentoring relationship, men tend to direct, whereas in a female-female mentoring relationship, women tend to encourage and affirm. Differing opinions regarding research approaches and research paradigms may be a problem in a male-female directive relationship. Such observations again lead to the conclusion that same-sex mentors are better.

Certainly no one would suggest that same-sex mentoring relationships are the only ones that will work. In fact, research suggests that mentors of either sex are equally effective in counseling women about career advancement (Benditt, 1992). Excellent mentoring relationships exist between individuals of the opposite sex. Indeed, women often find male mentors particularly effective in helping them understand the male-dominated system. Senior men afford a view of the organizational system that women cannot currently provide. Junior women researchers can clearly benefit from the experience of a man who "knows the ropes," who can educate, open doors, sponsor, and advise. Likewise, male junior researchers often find female mentors particularly helpful regarding different research paradigms and educational/training issues. Clearly the differences between sexes can be enlightening.

Liabilities in the Mentoring Relationship

Inherent in any type of hierarchical mentoring relationship, same sex or opposite, is an experienced person who is in a superior position guiding a less experienced person. For mentoring relationships of this type to work well, some type of "special" relationship must be established. Unfortunately, appended to the successful relationship is a set of potential problems. First, a relationship other than a working relationship might develop between the participants. Second, a relationship other than a working relationship might be perceived by one member of the mentoring relationship. Third, a relationship other than a working relationship might be perceived by others, outside of the mentoring relationship. The problem with a sexual association developing between the participants, even if it is mutual, is that it alters the progression of the professional relationship. If the sexual relationship dissolves, of

course the negative outcomes can be disastrous. If the relationship is long-standing, or if no sexual relationship exists but is perceived as such by others, the results are often negative for the mentor and the protege. The mentor may be regarded as making a mistake in judgment, such that his or her position in the organization suffers, or worse, his or her credibility deteriorates in the eyes of his or her colleagues. For the protege, the outcome can be quite negative. A real, or perceived, intimate relationship with a mentor might cast doubt on real achievement by the protege.

Another inherent consequence of the hierarchical mentoring relationship is the potential for sexual harassment—again, real or perceived. This of course can occur in same-sex or opposite-sex mentoring relationships, but certainly exists more in the latter. When men are in a position of power as mentors and women are in the more vulnerable position as proteges, the possibility of exploitation enters the relationship. These situations often provide an environment ripe for sexual harassment. Real or perceived harassment unfortunately lurks very close to the surface in many relationships. Sexual harassment is about perception. The "harasser" is perceived as behaving in a way that is inappropriate from the standpoint of the other person in the relationship. In hierarchical mentoring, a special relationship is created by maintaining formality with the appropriate amount of informality. No trickier situation can exist between the sexes, particularly for cross-generational relationships; therefore, the potential for real or perceived sexual harassment occurs. Such situations become ammunition for claims that hierarchical mentoring and mentoring relationships cannot be successful.

Mentoring Suggestions

The pitfalls of hierarchical mentoring relationships are not insignificant, nor are they insurmountable. For many women, this type of mentoring relationship may be established, and indeed it may serve as a positive route to changing gender inequity. Several suggestions are offered in the discussion that follows. Some adhere to the hierarchical mentoring approach and others propose a different model.

First, a proactive stance in regards to supporting women in academe and research must be taken. This stance cannot end with enlightened admission policies and hiring practices, but rather must extend through women's graduations, promotions, and successes as independent researchers. Institutions must develop formal mentorship programs. Mentoring, like teaching, like research, does not necessarily come naturally. Senior researchers need to be aware of their role and must learn approaches and strategies for being good mentors. Junior researchers also must assume responsibility in both seeking appropriate and useful mentors

and role models and implementing and sustaining these relationships. Senior researchers must appreciate their roles and responsibilities, and junior researchers must appreciate their needs, both professionally and personally.

Second, within the hierarchical mentoring relationship few believe that a single mentor can serve all roles and meet all needs for a junior person. Often one person can perform quite well as a professional mentor, and another person, with similar or different scientific interests, as a personal mentor. This split in roles and responsibilities should be considered by junior women.

A variation on the hierarchical, single-person mentor, following the lines of "one person can't do it all," is the use of a mentoring committee. Mentoring committees can be particularly helpful for the socio-political factors that challenge the success of women. The mentoring committee is composed of senior researchers who help guide and ease the junior person's movement through the system. The committee can provide advice, open doors, and run interference for the junior person as she becomes established in her field. This particular model works well for professional and career guidance, leaving the personal component to other avenues of support, such as developing contacts within the larger community (e.g., across institutional departments).

Third, the hierarchical mentoring relationship is not the only one that can be successful. Peer or network mentoring has been shown to be quite effective. A network of peers removes many of the obstacles of a hierarchical relationship, foremost of which is reliance on one person. Many researchers believe that a stronger model for success is a multiple alliance front. The essence of a peer networking system is that reciprocal relationships exist. Peers alternate in their leadership roles depending upon who knows more. The agenda is set by the participants, not by a mentor, thus expectations are reduced. Using a network of peers can be a viable method to obtain both social and career enhancement for women. In fact, peers have the advantage of providing current and future support for development. This idea for women has been quite appealing and successful. Indeed, women may find that this model better matches their style of interaction and their view of support and guidance. Along these lines, in the March 13, 1992, special section on Women in Science in *Science*, a computer networking, electronic mentoring system was described. This system, called "Systers" (systems and sisters), is run through Digital Equipment Corporation's Western Research Laboratory in Palo Alto, California, serving women from a variety of disciplines, providing mentoring on both professional and personal issues.

As women's needs are being better identified, and more is being learned about mentorship, creative solutions are emerging. Traditional, hierarchical mentoring relationships remain a viable vehicle for supporting women in their pursuit of research careers, but the limitations are becoming increasingly apparent. Alternative approaches are being created and implemented, with apparent success. The advent of networking models seems a most encouraging route to explore.

Conclusions

As the media say, "We've come a long way." Fortunately, no one currently believes that a woman's presence in academe will result in her children being sickly or that she will suffer from physical and mental weakness. But, unfortunately, the current data reveal that we have a long way to go. Gender disparity in academe and other traditionally male institutions exists today. Gender disparity among career researchers is significant. The problems are real and complex. Furthermore, the complexities multiply in a discipline such as ours, where the majority of new researchers are now women. From a historical perspective, mentoring is viewed as a double-edged sword, being part of the problem and part of the solution. Informal, hierarchical mentoring has been the traditional road to success; however, in its traditional form it has been exclusionary. Formal mentoring, using a variety of approaches, may contribute to resolving gender disparity. The outlook, however, seems bright, because the options for improving women's chances of success are many. Formal mentoring is an important vehicle for change that has many positive, successful forms. Our task is to pursue these options for change, encourage women in their pursuit of research, and help expand and enrich the attitudes of our colleagues.

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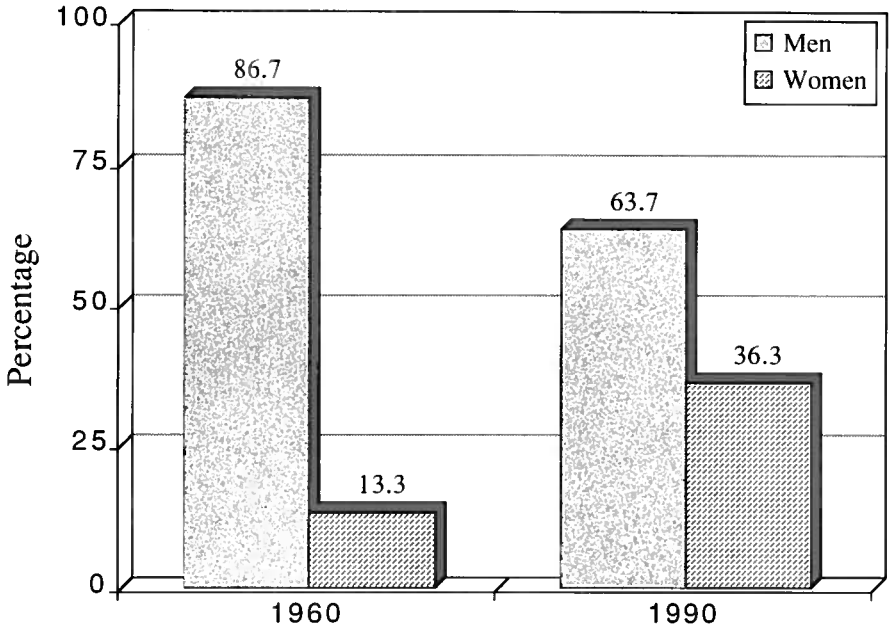
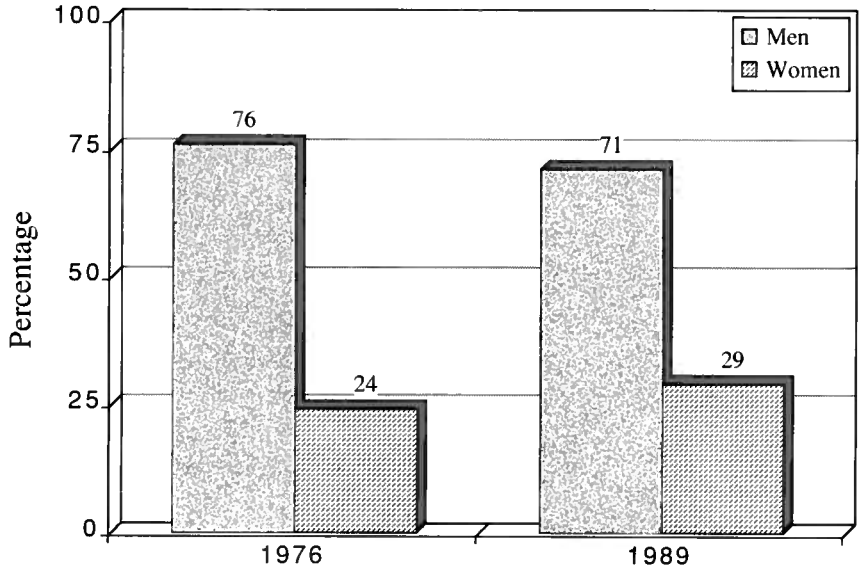
Figure 1: Percentage of individuals, by gender, receiving doctorate degrees in 1960 and 1990.



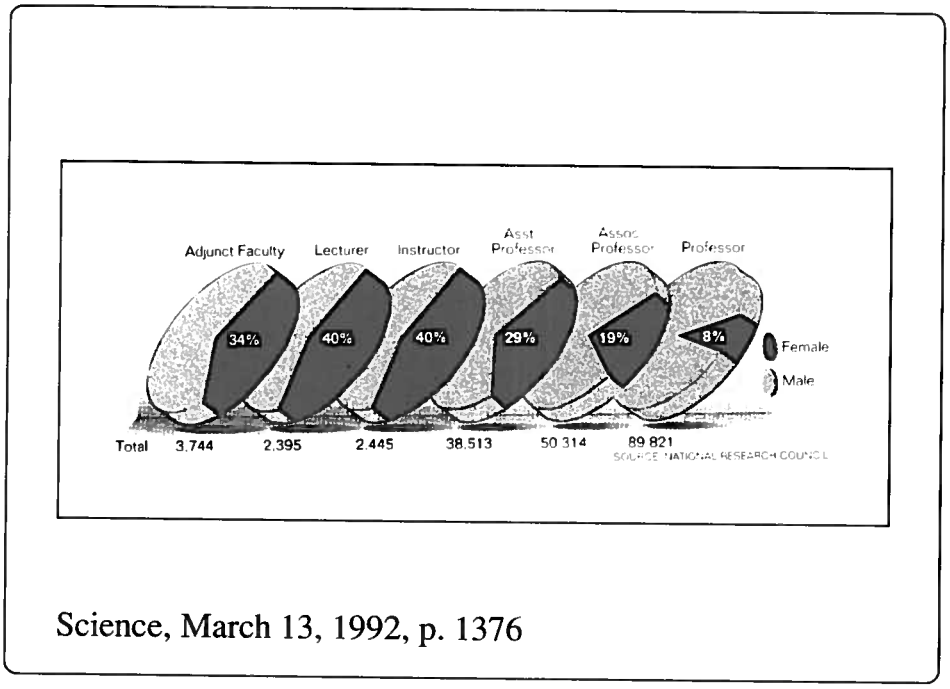
1960 data: Digest of Educational Statistics, 1989
1990 data: Chronicle of Higher Education, 1991

Figure 2: Percentage of faculty, including all ranks by gender, employed at colleges and universities in 1976 and 1989.



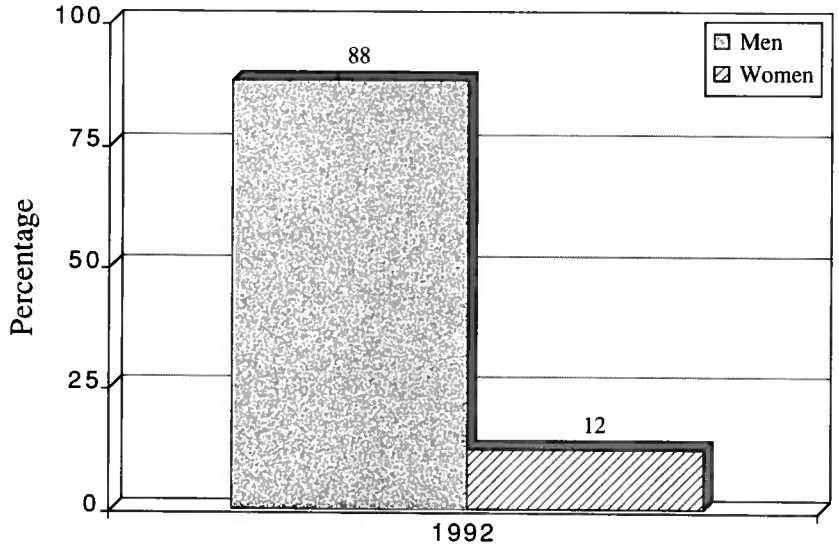
1976 data: Hornig, 1980
1989 data: Digest of Educational Statistics, 1989

Figure 3: Percentage of faculty by gender and by rank in colleges and universities in 1992.



Science, March 13, 1992, p. 1376

Figure 4: Percentages of faculty by gender in the senior ranks at the University of Washington School of Medicine.



University of Washington, Academic Personnel Records, 1992

Figure 5: Percentage of faculty at the University of Washington in support of infant care leave.

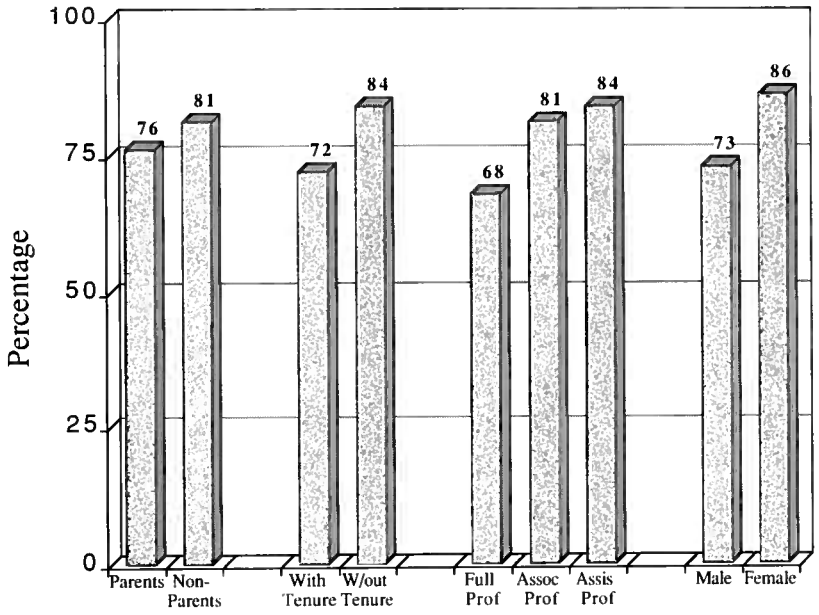


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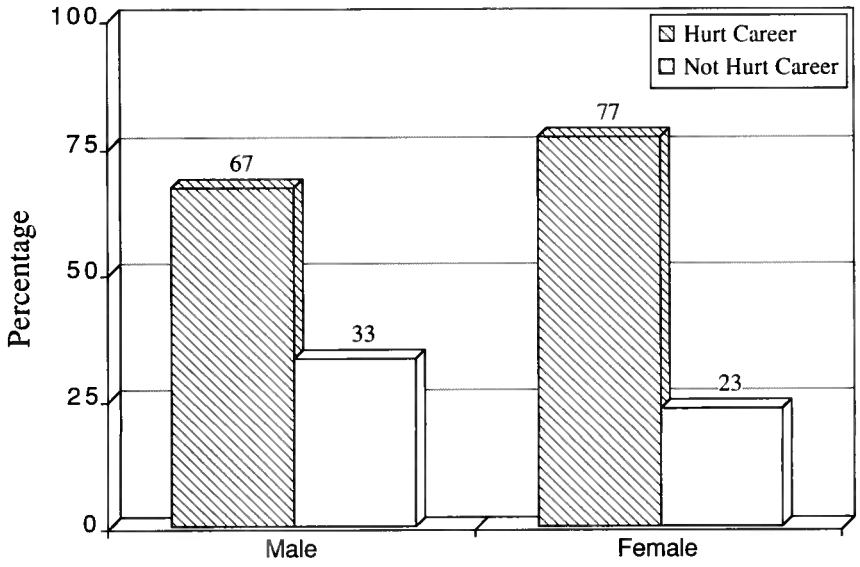
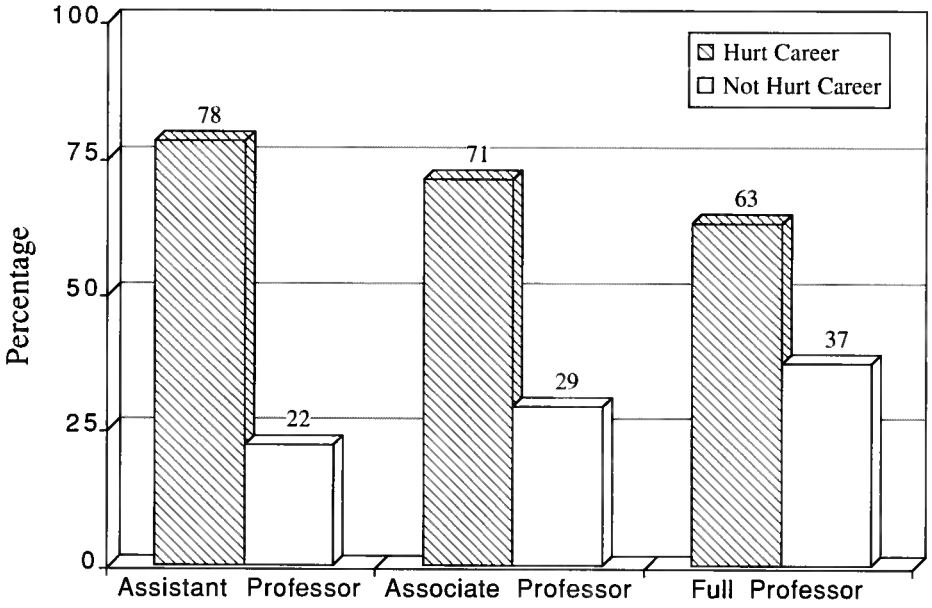
Figure 6: Perceptions of faculty at the University of Washington on taking advantage of infant care leave (displayed by gender).



Finkel, Olswang, & She, 1993

Figure 7: Perceptions of faculty at the University of Washington on taking advantage of infant care leave (displayed by rank).



Finkel, Olswang, & She, 1993

Mentoring People of Color: Challenges and Opportunities

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Several years ago, two individuals, both with outstanding academic records and generally recognized as being of equally high intellect, graduated from the same department in a nationally prominent research university. At the time of their graduation, both were thought to possess all of the tools required to become prominent researchers. Immediately upon graduation, Graduate One (G_1) took a position at a major research university in a department chaired by an individual who was also an alumnus of her university. In fact, they had the same dissertation director. This individual personally arranged for G_1 to get the faculty position through numerous conversations with the department chair. Five years later, G_1 is emerging as a major researcher in her area of specialization. She has 10 articles in refereed journals and an R29 research grant. She is well on the way to promotion and tenure.

Graduate Two (G_2) is a public school speech-language pathologist. Upon receipt of her PhD, she did not pursue employment in a research environment or at a university—and none came calling for her. Her advisor was not involved in her career decision. Five years later, G_2 has no publications, not even from her dissertation. She has no research program, nor has she made periodic clinical research excursions. She does not read national research journals, even though she receives them as a member of several national and regional professional organizations. Her major interest at the moment is acquiring an administrator's license in order to become a principal in the school district in which she works.

In all too many cases, this fictional story is true. Although both individuals in our scenario are making a contribution to society, one is fulfilling her potential through activities consistent with the research degree she has acquired—the PhD—but the other is not.

By the way, G_1 is a White American and G_2 is an African American.

What are the factors that contribute to the pursuit of successful research careers for many highly qualified individuals in one racial/ethnic group, but for few similarly qualified individuals in other racial/ethnic groups—particularly groups consisting of people of color?[1] In our current example, we are talking about two people with outstanding ability, demonstrated research potential as graduate students, inquiring minds, good writing skills, and degrees from a leading research-oriented university. I suggest that mentorship, or the lack thereof, may be a part of the answer—though not the entire answer. Clearly, discrimination, glass ceilings, and the like continue to be major impediments for people of color achieving their potential as researchers. This present discussion is limited exclusively to the mentorship dimension of this problem.

The Changing Demograpics

Before discussing issues pertaining to mentoring people of color for successful research careers in deafness and other communication disorders, let us revisit a few demographic statistics. They will help to give us a better perspective on the topic.

The demographic shift in the United States is real. According to the 1990 U.S. Census, which admittedly undercounted people of color, more than one American in four defined himself or herself as Hispanic, African American, Asian American, Pacific Islander, Native American, or as some other person of color. According to an April 9, 1990, *Time* magazine article, if current trends in immigration and birth rates persist, the Hispanic population will further increase by an estimated 21%, the Asian presence about 22%, African Americans almost 12%, and Whites a little more than 2% when the 20th century ends. By 2010, one third of the American population will be people of color, and by 2050, White Americans will probably constitute a minority of the American people.

The emergence of this New America—as I like to call it—has enormous implications for the scientific community in general and for the fields of deafness and other communication disorders in particular.

Most importantly, there are significant implications with respect to the pool of individuals who might choose research careers. If one half the population of New America

[1]Groups (people) of color—these terms are used throughout this paper to refer to individuals whose racial/ethnic origins are not European Caucasian. In general, the terms include Non-European Hispanics, African Americans, Asian Americans, Native Americans, Pacific Islanders, Eskimos, Aleuts, and so on.

are people of color by the middle of the 21st century, it is clear that we will have to intensify our efforts to recruit, mentor, and support scientists of color. Otherwise, New America will be in the position of significantly reducing its research and scientific talent pool by one half. Obviously, it is not in our national interest to limit our scientific talent pool—either now or in the future.

But our national record to date in producing a culturally diverse research community in virtually all fields, and especially in the fields of deafness and other communication disorders, is unacceptable. For example, although the PhD is normally considered to be the entry credential for research careers in the behavioral and basic health sciences, including communication disorders, recent U.S. Department of Education (1991) figures show that, nationally, 1,212 (3.1%) of the 39,294 doctoral degrees awarded in 1991 went to African Americans, despite the fact that they represent approximately 12% of the population. Of this same number, Hispanics were awarded 723 (1.9%) of the doctoral degrees, although they represent approximately 10% of the population. Asian Americans were awarded 1,458 doctorates (3.7%) and Native Americans were awarded 102 doctorates (.3%).

According to 1992 statistics provided by the Office of Multicultural Affairs of the American Speech-Language-Hearing Association, fewer than 200 people of color hold the PhD degree among its 71,000 members, with fewer than 40 of those individuals holding the PhD degree in audiology. Currently, 4,200 ASHA members hold a PhD degree.

My anecdotal estimate is that fewer than 10 persons of color hold tenure at the nation's research universities (Howard University excluded). These institutions have traditionally constituted the center of our nation's research community.

It is in the national interest to address this most serious problem. This view has little to do with political correctness, sociopolitical agendas, or moral considerations. It has far more to do with meeting the national need to maintain a research community for understanding the nature, prevention, assessment, and treatment of deafness and other communication disorders in all segments of the American population, and the basic science required to enhance such understandings.

Mentoring People of Color

The need for mentoring is obviously not limited to people of color. Indeed, a comprehensive mentorship program for doctoral students and recent PhD recipients is helpful

in developing the next generation of researchers at any time. In my view, there are a few general principles that should guide all mentoring relationships.

Perhaps the most important general principle to remember about mentoring is that successful mentoring requires a positive "chemistry" between mentor and protege. There is an interpersonal dynamic that determines the quality of all human relationships, and mentoring is no exception. This positive chemistry is built around such things as compatibility in communication behavior, personal/professional values, professional interests, and perhaps most of all, mutual trust. The mentor must recognize that some mentoring relationships simply will not work, even when the individuals involved come from the same culture, linguistic group, or gender. Sometimes, differences in values and styles between mentor and protege are simply too great to overcome for the mentoring relationship to work.

It is also important to remember that at the other end of the continuum, very fine mentoring relationships can develop between two people who differ in race, ethnicity, language, gender, and so forth. Even in those relationships, however, it is wise for both mentor and protege to spend some time enhancing their skills in relating across cultural, linguistic, and gender differences. In this way, the potential for unintentional cross-cultural and cross-gender barriers to mentoring can be reduced.

Finally, it must be said that mentoring can be successful only if the potential protege wants to be mentored. Without such a desire, a mentorship program cannot be successful, no matter how well conceived.

Mentoring may be one of the greatest needs for doctoral students and new faculty of color—and one of the greatest challenges we face as a scientific community. Indeed, many of our standard considerations for mentoring may need to be refined or customized to meet the needs of individuals from culturally diverse groups who may bring different perspectives, histories, fears, and needs to mentoring relationships based on the cultural preferences and social histories of the groups from which they come.

My perspectives on mentoring people of color are based on my experiences for the past 20 years at a Level I research institution (Howard University), which since the inception of its PhD program in communication disorders in 1973 has produced more African American PhDs in speech-language pathology than in any other university in the United States. Howard has had sizable federal support for this mission. Significantly, mentoring is an essential component of doctoral education and the guidance of junior faculty at Howard. To that end, Howard has a systematic program of mentorship and leadership for its doctoral students and

an informal one for new faculty. For students, it takes the form of a formal leadership seminar and the assignment to a faculty mentor.

My other perspectives on mentoring people of color are based on my rather extensive knowledge of the experiences of a substantial percentage of the people of color who hold the PhD degree in communication disorders, especially, but not limited to, African Americans. I have had the privilege of knowing many of these people on a personal level and of mentoring several of them in one form or another.

The need for mentoring for people of color cannot be overstated. These individuals typically have no legacy of researchers in their families or communities, certainly not in the fields of deafness and other communication disorders. They generally have few role models within their own groups. They might not know anyone personally from their cultural group who has had a successful research career, or who has acquired a PhD degree in deafness or other communication disorder, let alone an NIH research grant! This unfamiliarity often creates an aura of mystique and intimidation arround research careers for people of color, even more than for other cultural groups. Often, they feel that it is impossible for them to become a full-fledged member of the scientific research community. Therefore, they may gravitate to other professional interests, such as administration or clinical careers.

A presentation of do's and don'ts always runs the risk of overgeneralization and exclusion of important points. Nonetheless, the following mentoring suggestions for people of color might provide a glimpse of some of the considerations that are especially important. Some of the suggestions are applicable to all mentorship situations, whereas others are almost exclusively relevant for people of color.

- Do encourage mentoring. Make certain that doctoral students and recent PhD graduates from groups of color have a mentor who can facilitate their professional success and their careers as researchers. Again, remember that mentors and proteges need not be from the same culture!

- Do position proteges of color with key members of the old boy/old girl network. Nominate them and recommend them for placement on review panels and study sections. Introduce them and make their work known to journal editors and to leaders in the discipline—individuals that people of color rarely if ever get to meet and know at a personal level.

In my own career, for example, my department chair at the University of Michigan, Dr. Harlan Bloomer, and my dissertation advisor, Dr. Ronald Tikofsky, did just that. By the time I had graduated from Michigan, Dr. Bloomer had seen to it that I met all of the chairs of programs in communication disorders at the Big Ten universities. This helped me immensely when I began the search for my first post-PhD job, which, not coincidentally, was at a Big Ten university.

Dr. Tikofsky saw to it that I networked with the aphasiology research community by nominating me for membership in the Academy of Aphasia, the world's leading aphasiology research body, shortly after I completed my doctoral studies. Early in my career, I got to know most of the leading researchers in the world in this field—and they got to know me. This exposure helped to launch my early research career in aphasiology.

- Do not turn persons of color away from mentorship opportunities because of their lack of experience or their institutional affiliation. Don't assume that people of color have less research potential or talent because the institution from which they obtained their degrees or at which they work are not members of the research network, for example, historically Black colleges and universities. Many times, people of color have chosen these institutions because of their accessibility and nurturing climate, or because of discrimination and glass ceilings at predominately White or mainline research institutions.

- Do not assume that the student has an interest in cultural diversity. Do not, under any circumstance, assume that students or faculty of color have an automatic interest or expertise on topics pertaining to cultural diversity. As a mentor, encourage these individuals to focus on academic and professional areas of primary interest and competence. If the mentor is in a leadership role, do not limit the protege's teaching and co-curricular and committee assignments to topics and issues pertaining to cultural diversity.

- Do assist proteges of color to acquire start-up funds to launch research careers. It is a good idea to provide start-up funds for research for all new PhD recipients, especially at the university level. These funds are particularly important for persons of color, especially those who wish to pursue research programs on topics pertaining to cultural diversity, which are traditionally underfunded, or who are so heavily extended in service activities that they have little time to seek external funding to pursue scholarly interests. Funds for travel to professional meetings and

attendance at professional or continuing education seminars are also necessary to launch successful research careers.

- Do facilitate access to other persons of color. One of the biggest problems that persons of color typically face in predominately White organizations and campuses is a feeling of isolation. Mentors can help to reduce or eliminate this problem by facilitating access for proteges of color to other persons of color throughout the organization or academic community—and even at other institutions around the country. This is especially important since the paucity of other persons of color in the fields of deafness and other communication disorders often exacerbates these feelings of isolation.

- Do urge persons of color to avoid the minority-in-residence syndrome. Persons of color are often relegated to the role of minority-in-residence, either in fact or by perception. This role occurs in universities, for example, when faculty members of color are placed excessively on committees, expected to attend a myriad of social events to ensure "minority representation," and so on. This over-involvement is not only discriminatory in relation to the time demands placed on other faculty members, but it takes faculty of color away from other valuable pursuits required for promotion and tenure, specifically research and publications.

There are many cases in which very promising faculty of color fail to obtain promotion or tenure for these reasons. In such cases, the institution loses and the individual most certainly loses. Mentors must impress upon their proteges of color not to agree to being placed in such positions. They must also urge their colleagues not to place persons of color in these positions.

- Do urge colleagues to respect all publication sources. Many persons of color publish their works in peer reviewed journals or with publishing houses that have a particular interest in and commitment to topics pertaining to culture and communication. Sometimes these people find that mainstream journals and publishing houses have little or no interest in the topic of cultural diversity. Hence, the individual is caught in a Catch-22 situation, in which they either have no publications in mainstream sources or a publication record in sources about which traditional university departments and researchers know little or for which they have little respect.

Departments must be sensitive to this point and not discriminate against individuals who publish in lesser known, although peer reviewed journals or with publishing houses that meet professional publications standards, but are not known or accepted by the mainstream research community. Of course, the mainstream community must be encouraged to broaden its horizons to appreciate more qualitative and ethnographically oriented research that seems to have particular appeal to those who study many topics pertaining to cultural and linguistic diversity.

Some Final Thoughts

In closing, I wish to offer a few additional suggestions that might enhance the success of mentoring doctoral students from any racial/ethnic group who are preparing for research careers.

- Require research apprenticeships with seasoned researchers.
- Require participation in publication/writing projects with seasoned researchers, that is, journal articles, book chapters, convention papers, research posters, and so forth.
- Offer a leadership seminar along the lines of the one designed by one of my proteges at Howard University, Dr. Kay Payne. This seminar includes topics such as the following:
  - Philosophy of the PhD degree
  - The academic/research career
  - Academic institutions: How they differ, how they rank
  - Launching a successful academic/research career
  - Focusing doctoral activities toward your career goal
  - Publishing and research—what counts
  - Grantsmanship
- Teach "menteeship," for example, taking criticism, when to talk and when to listen, how to turn mistakes into learning opportunities, the language of the research community.
- Capitalize on "moments to teach" in reaction to real-life situations—for example, discuss reviewer's comments on successful—and rejected—grant proposals and papers submitted for publication.

In addition to these direct strategies to mentor doctoral students, there are others that might be thought of as indirect—though nonetheless important—mentoring strategies. They include the following:

- Take proteges with you as observers at research planning meetings and conferences.
- Arrange for proteges to shadow you at national professional meetings to see how you interact with other members of the scientific, publishing, and funding communities.
- Introduce proteges to key members of the research community that you know personally. Allow proteges to have the benefit of your conversations with these individuals.
- Share the downside of research careers with proteges so that they will obtain a complete perspective and learn that even successful researchers experience failures and frustrations, such as grant proposal rejections and publication rejections.
- Let your protege assist you in your research and publication activities as appropriate, for example, editing a chapter, co-authoring a publication, writing a proposal, or evaluating a publication.

Obviously, the final stage of a successful mentorship program is to wean the protege through the encouragement of independence. In the best of all worlds, the protege will pick up the mantle of leadership and become a mentor for the next generation of doctoral students and PhD recipients.

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5. Finally, there is little research to inform either ethical or other issues of relevance to research mentorship. Our views must rest on our personal opinions and values more than anything else. Consequently there may be an unusually strong tendency to make sweeping generalizations that really can't be supported by the data at present. Furthermore, it seems obvious to me that there is an extraordinary diversity and complexity to mentor/protege relationships. These relationships are as diverse as the humans beings who make them up. We must recognize that, like it or not, many ethical issues are not easily solved by a yes/no approach. Finally, most ethical issues involve a two-way street. The obvious power balance suggests that the mentor typically will have greater responsibility for ensuring that things are on the up-and-up ethically, but does that justify totally dismissing responsibility from, for example, a 35-year-old adult, when things go wrong?

With these observations in mind, I will now focus on the two main areas in which I believe ethical issues most frequently arise in mentor/protege relationships. Historically, these areas of human endeavor have been referred to by their generic terms—lust and greed. But we will be contemporary and refer to them as sexual exploitation and professional exploitation.

Sexual Exploitation

Let's get right to the good stuff. You can let the reporters from the *Washington Post* and the *National Inquirer* in the room now. Professional intimacy, such as what may go on in mentor/protege relationships to varying degrees, certainly can contribute to the development of personal intimacy—this is obvious. The rub in mentor/protege relationships is that the addition of power on the mentor side of the equation can lead to sexual harassment and/or sexual exploitation.

How serious a problem is sexual exploitation? Numbers-wise, I don't think we really know. My casual observation is that sexual exploitation/harassment probably goes on in only a very small percentage of mentor/protege relationships. But I certainly know of such cases over the years in my department and my university, which means there are undoubtedly lots of cases I know nothing about. I also know of many cases of mentor/protege relationships that have led to wonderful, productive, satisfying relationships and marriages. In sum, we know a little bit about the really bad outcomes, and a little bit about the really good outcomes (in a personal sense), and virtually nothing about everything in between. I think most of us would probably agree that to the extent that we can do anything about the bad outcomes, we (universities, society at large, whoever) should do everything within reason to minimize them.

Research Mentorship: Ethical Issues

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Ethical issues are the Achilles heel of mentorship. For all the good that mentorship can do to promote first-rate science and career development, much harm can also be done when mentor/protege relationships go awry.

Some Premises

Before I address the fundamental ethical challenges inherent in mentorship, I will put forward five premises that are basic to this discussion:

1. Mentoring is a living, changing, developmental process. Therefore, ethical issues may arise and fall away in the course of the mentor/protege relationship.

2. Certain kinds of ethical issues are predictable in mentoring relationships—particularly relationships that are hierarchical and directive in nature. This occurs because these relationships inherently involve power differentials and unequal roles, combined with the possibility of intimacy that may be facilitated by mutual interests and frequent contact.

3. Our implicitly capitalistic, high-pressure, high-stakes, "what did you do lately" research industry—a direct reflection of our American culture—may encourage abuses of mentor/protege relationships. We know that "publish or perish" is not a joke. Even more to the point, get that next grant or perish!

4. It is helpful to view mentor/protege ethical issues in the context of larger issues our society is struggling with. The issue of sexual harassment and appropriate professional relationships between the sexes is an obvious case in point to which we will return shortly.

Many segments of our society are currently considering policies aimed at reducing the incidence of sexual harassment and exploitation in the workplace. My university is presently in the midst of considering a specific policy, so I'll use Vanderbilt as an example. We already have a fairly strong policy on sexual harassment and it is being enforced. But now we are debating this proposed policy on consensual romantic or intimate relationships:

> Consensual romantic or intimate relationships are prohibited between a student and any member of the faculty (including teaching assistants) or administrative staff who teaches, supervises, evaluates, or otherwise is in a position to exercise power or authority over that student. Efforts by members of the faculty or administrative staff to initiate these relationships are also prohibited.
>
> Consensual romantic or intimate relationships between a student and a member of the faculty (including teaching assistants) or administrative staff who is not in a position to exercise power or authority over that student also are inherently suspect, and the appropriateness depends on the circumstances. Any member of the faculty or administrative staff who engages in such a relationship must accept responsibility for assuring that it does not raise issues of ethics or professionalism and, if called into question, has the burden of establishing the appropriateness.
>
> Faculty and administrative staff who violate these provisions are subject to disciplinary action in accordance with the procedures in the *Faculty Manual* and the *Staff Manual*.

I don't know if this policy will be adopted. The faculty senate doesn't like the tone of it, and the deans of the various schools at Vanderbilt are divided in their opinions. Many senate members would like guidelines for dealing with relationships when they do arise. These individuals view the ultimate issue as one of a conflict of interest, with the task to determine how such conflicts should be ethically handled. There is also much talk about constitutional rights, the natural course of human events, and so forth. The issue will probably be under discussion for many months or even years to come, as it will be at many universities.

I must admit that I feel particularly qualified to discuss the proposed Vanderbilt policy. My wife was at one time my doctoral student. I had known her, and mentored her, for approximately three years before our relationship began to develop beyond the bounds of mentor/protege. When it became apparent to my wife and to me that the intimate, romantic aspect of our relationship was of some importance to both of us, I went to my department chair and asked to be replaced as her major advisor and removed from her doctoral

committee. From my perspective, the conflict of interest vanished at that point. But one clearly existed for a two- or three-month period earlier. My wife and I hardly believe we did anything "wrong," yet the proposed Vanderbilt policy would attempt to prohibit the development of relationships like ours. Just to make this all a little more complex, neither my wife, who is now also a faculty member at Vanderbilt, nor I are necessarily opposed to the proposed policy. We justify this apparent contradiction (with some discomfort) because we think the policy might reduce sexual exploitation and provide some recourse and protection for students when things get out of hand. Furthermore, neither of us thinks it would have stopped our relationship from developing. If it were buttressed with some helpful guidelines, we might even have resolved the inherent conflict of interest we had much sooner, so that we could openly pursue our relationship. Still, I would be misrepresenting things if I didn't tell you that all of this leaves me as a mentor, and simply as a human being, a bit uncertain and confused about what really is the right and ethical way to proceed with this complex issue.

Back to the larger problem here: Sexual exploitation is a threat to mentor/protege relationships. What are the solutions? Should we educate, should we legislate, should we downplay the whole messy topic? Before addressing these questions, let's consider the other major form of exploitation.

Professional Exploitation

Professional exploitation of proteges may be a more insidious problem than sexual exploitation. It may occur much more frequently and may be harder to root out. That is, what one person might see as exploitation, another might see as simply a standard part of an apprenticeship model. This issue can quickly get confusing too. For example, when your protege is also your paid research assistant, is it exploitation for him or her to wash lab bottles? Is it exploitation for the student to conduct a study for you that was initially laid out in a grant application, but for which he or she made substantial conceptual contributions, and then for you to ultimately claim first authorship on resulting papers? We may face these and many other dilemmas regularly in our work with students, particularly when our research grants are supporting their work. Two categories of problems seem most likely to raise questions:

1. Inappropriately claiming credit for the work and/or ideas of our students—even perhaps claiming their work and ideas as ours.

2. Misusing protege time by having them engage in what might be called "scut work." By scut work, I mean tasks that in no way contribute to the student learning the craft of

research. If we assume that the mentor/protege relationship is a developmental one, then the definition of scut work will change over time. So I don't mean to say that a protege/research assistant should never be assigned to wash lab bottles or tediously code videotapes. But we should ask ourselves these questions: Where does this fit into their graduate training? What value does it have? Why are they doing it? I have known a couple of so-called mentors who purposefully gave students scut work because, they said, "I am just doing to them what was done to me." What an enlightened model of scientific training!

The temptation to exploit proteges may be intense at times. One can certainly see how our high-pressure, high-stakes academic research industry might lead mentors to feel that they have no choice but to exploit their students. Furthermore, if you were exploited as a student by your mentor, you may be more likely to carry on this "tradition." This brings us to one of the worst aspects of the exploitation of proteges: The values it may inherently teach to the student. "This is how the system works and this is how you get ahead" may be implicitly communicated to our proteges.

I would like to take this opportunity to acknowledge one of my mentors, present with us today. Don Baer modeled just the type of values I think a true mentor should display for a student. I was fortunate to meet him when I was an undergraduate at the University of Kansas. I entered into a mentor/protege relationship with Don in my junior year. Don served as my mentor for approximately five years. During that period, we were co-authors on six published papers. His name never appeared ahead of mine on any of those and it shouldn't have, even though I must admit that had he not assisted me, at least the first of those papers would never have existed. Shortly after I completed my doctorate, Don told me that he didn't think we should publish together anymore because if we did, people would tend to think that my ideas were his ideas—since he was senior, and distinguished, and famous (my descriptors, not his). Our mentor/protege relationship more or less ended comfortably at that point. To this day I feel fortunate to have benefitted from his enlightened approach. I hope that my own approach to mentoring reflects what Don and others at the University of Kansas, (Joe Spradlin, Francis Horowitz, Jim Sherman, Doug Guess, and Dick Schiefelbusch) modeled for me early in my career.

Perhaps the issues surrounding professional exploitation appear more complex than they really are. If we can justify the value of what we ask our proteges to do, and if we follow the old maxim of putting ourselves in the other person's shoes—sometimes referred to as "do unto others that which you would have them do unto you"—then maybe that is all that is required.

Solutions and Suggestions

I offer these solutions to the problems I've discussed:

1. The view of many writers in the mentorship literature (Brooks & Haring-Hidore, 1987; e.g., Swoboda & Miller, 1986), is that highly directive, hierarchical mentoring is the most likely form of mentoring to lead to serious ethical problems such as sexual or professional exploitation. Network mentoring, discussed elsewhere in these proceedings (see Haring, this volume), is likely to minimize these problems because it provides multiple sources of input, feedback, monitoring, and back-up for students. I am not, however, suggesting we do away with traditional mentoring. It has its pluses and may often be the best way to go depending on the specific mentor and the protege. What I am suggesting is that we work to find models of mentoring that combine the advantages of both approaches. Our traditional mentoring model traces its origins back thousands of years. Certainly, it is due for some serious examination and if deemed necessary, perhaps some renovation.

2. Mentorship is a very poorly understood concept, even in academia. Standards of good mentorship are virtually invisible. Obviously this needn't be the case. Why can't we develop general guidelines as to what students can and should expect from mentors (and that make it clear that an adviser is not automatically a mentor)? Why can't we also develop guidelines as to what mentors and advisers have a right to expect from students? We could include examples of ethically questionable behavior on both sides. These should be discussed and debated department by department, in my opinion. In short, I am advocating an initiative to educate (not legislate) as to what good mentorship is.

3. Finally, we don't actually know much about the extent to which ethical problems plague mentor/protege relationships. A good, empirical data base could help us decide just how far we need to go.

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Section 3

Research Mentorship and Training Strategies

Mentoring for Research: Examining Alternative Models

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This conference on research mentorship has dramatically underscored the challenge of fostering a new generation of researchers in the field of communication sciences and disorders. An important part of the challenge is to encourage larger numbers of professionals in audiology and speech-language pathology to become researchers. At the present time, ASHA is experiencing a decline in the number of researchers even as there is an increase in the number of practitioners. In addition, Shewan (1993, this volume) reported that women compose 90% of ASHA membership but only 65% of the researchers. Thus, a second part of the challenge is to attract more women in the field to research. (Because women form the largest group in the professions on which mentoring could or should be focused, the feminine "protegee" will be used throughout this paper.)

It is evident that mentoring a new generation of researchers in our fields must incorporate models that include many more protegees and are compatible with what may be different needs and styles of the desired cadre, that is, women researchers. The traditional models of mentoring have not been effective in meeting the challenge. Those models have focused on educating and grooming one newcomer at a time for a research career, and they have been derived largely from the male experience. Alternative models of mentoring are needed if we are to meet the present challenge.

In the comments that follow, I will focus very briefly on the development of mentoring and then explore how two traditional and two alternative mentoring models relate to hierarchy, power, and the status quo.

Development of Mentoring

From its beginnings in Homer's *Odyssey*, mentoring has been identified largely with a wise older man tutoring a promising younger man. In the Homerian epic, young Telemachus was prepared by the wise Mentor for succeeding his father as ruler. Although Mentor was really the goddess Athena in disguise, the practice of grooming a younger colleague is called "mentoring" and not "athening"! Thus, this helpful practice from its inception was identified with men.

More recently, the resurgence of interest in mentoring was stimulated by an examination of the lives of 40 white males in the upper middle class in *The Seasons of a Man's Life* (Levinson, Barrow, Levinson, Klein, & McKee, 1978). It is not surprising, then, that mentoring continues to be based on traditional models for helping that are especially congenial to men for schooling new professionals in old ways. The phrase "old ways" is used here to represent both the process of delivering mentoring assistance (i.e., a process in which hierarchy and power are emphasized in a dyadic relationship) and the traditional business (or research) in the organization where mentoring occurs. These old ways are the status quo. The topic of this conference suggests that we are attempting to overcome the status quo.

In discussing traditional and alternative mentoring models, it is useful to address two categories of models. The first category is based on an analysis of the expectation of flow of benefits between/among participants (i.e., from mentor to protegee in a top-down fashion or in a reciprocal fashion among two or more people). The second category is based on an analysis of the dominant type of mentoring assistance in the relationship (i.e., vocational or psychosocial). The alternative models that are suggested for meeting current needs are those that incorporate reciprocal benefits among networked professionals and psychosocial assistance that generally supports professional/personal development.

The Flow-of-Benefits Traditional Model—Top Down From Mentor to Protegee

The traditional model of mentoring emphasizes a dyad in which benefits flow from a mentor to a protegee. In this model, an experienced person schools a less experienced one in old, established ways. The model is heavily influenced by both hierarchy and a power differential. Within an organization, the more experienced person (mentor) is positioned much higher than the younger, less experienced one (protegee) and wields considerably more power. Their relationship assumes the ability of the mentor to sponsor the protegee in moving up the ladder, often by using the mentor's personal and positional power to the protegee's advantage.

Another aspect of power in this type of mentoring relationship, however, is that status differences are emphasized within the dyad, and the mentor may use power over the protegee. An example of this (mis)use of power is a protegee doing a mentor's work without receiving credit. Brooks and Haring-Hidore (1986) found this to be a significant problem in the mentoring relationships they studied.

This traditional model of mentoring, which emphasizes hierarchy and power for doing business in old ways, was called "grooming-mentoring" by Swoboda and Millar (1986). In grooming-mentoring, a highly promising person (protegee) is selected to the exclusion of others who might want to be mentored. The protegee then is sponsored and educated in the traditions of the organization by a well-placed, senior person. In a successful mentoring relationship based on this model, the protegee gains the knowledge, skills, and eventually the position of the mentor.

With this type of mentoring, there is a tendency to perpetuate the status quo, that is, groups that long have been insiders remain so because they consciously choose their own junior members as protegees and groom them. Also contributing to maintaining the status quo is the fact that established ways of doing business continue unchallenged because they are passed very carefully from one generation to the next. An additional contributor to maintaining the status quo is that longstanding institutional values are validated because protegees are selected partly on the basis of their being exemplars of an institution's closely held beliefs.

An Alternative Model—Reciprocal Benefits Among Networked People

An alternative approach to mentoring places little emphasis on hierarchy and power and the one-way flow of benefits associated with grooming-mentoring. Instead, mentoring assistance in the alternative model is offered to others with an expectation that there will be reciprocity. Inherent in this view is that each of the two or more persons in the mentoring relationship has something important to offer the others, for example, support, encouragement, sponsorship, knowledge. Because of this expectation, there is little emphasis on hierarchy (i.e., there is an exchange among people who are able and willing to assist each other, regardless of the positions they occupy in the organization or their tenure with it). In addition, there is emphasis on empowerment of all parties in the relationship rather than on the use of power exclusively on behalf of one person or over someone.

The alternative model of mentoring that has just been described was called "networking-mentoring" by Swoboda and Millar (1986). In networking-mentoring, groups of people join

together to exchange benefits in order to be successful within an organization. In terms of who participates in this alternative model of mentoring, Haring-Hidore (1987) noted that networking-mentoring seems particularly compatible with women's styles, experiences, and needs. Further, some of the participants in networking-mentoring are veterans—mature professionals who especially enjoy collaboration. Many, however, are newcomers who have not been selected as protegees for traditional mentoring. Perhaps their exclusion is because they are not like the prototypical professionals in their organization in terms of race, gender, style, background, or other characteristics, or they are not perceived as exemplars of the institution's values and beliefs. Whatever the reasons, these newcomers are not regarded as promising candidates for grooming-mentoring, so they seek others with whom to network.

Networking-mentoring groups are less likely to preserve the status quo than are traditional mentoring dyads. Instead, those who engage in networking-mentoring are freer to bring new perspectives, grounded in their personal and professional differences from those people who typified the organization in the past. These new perspectives, combined with the empowerment of networking with others, virtually ensure a departure from the organization's old business.

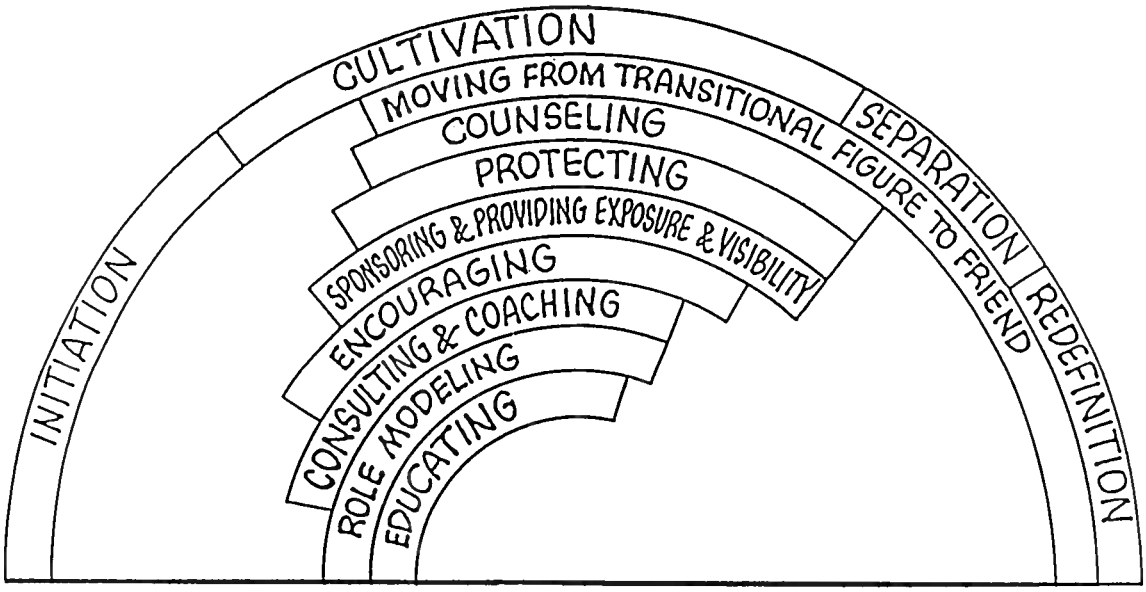
It appears, then, that networking-mentoring is consistent with ASHA's present challenge of bringing in a new generation of researchers that includes mainly women and people of color. Both Olswang (1993, this volume) and Taylor (1993, this volume) spoke to the new approaches this generation will bring in terms of qualitative methodology and more attention to the subjective as addressed in *Women's Ways of Knowing* (Belenky, Clinchy, Goldberger, & Tarule, 1988). In addition, at this conference the new generation of ASHA researchers were urged to work collaboratively (Jerger, 1993, this volume) to address a new research agenda that includes neuroscience and the etiology of disorders (Tallal, 1993, this volume). Again, networking-mentoring is compatible with these calls.

Models Categorized by Dominant Type of Mentoring Assistance

In 1983, Schockett, Yoshimura, Beyard-Tyler, and Haring developed a model of mentoring based on the extant mentoring literature (Figure 1). In that model, four typical stages of a mentoring relationship are depicted in the outer band of the rainbow; they unfold from left to right. In addition, the model depicts the kind of assistance that can develop in a mentoring relationship; these roles emerge in an order posited from the bottom arc of the rainbow to the top arc (i.e., from educating and role modeling to moving from transitional figure to friend). Further, Schockett and Haring-Hidore (1985) reported that the eight roles

Figure 1: A Model of Mentoring

Corresponding Set of Functions. The Initiation Phase begins as the mentor provides educating and role modeling for the protegee. The mentor's subsequent undertaking of the function of sponsoring involves the risk of greater commitment to the protegee which marks the onset of the Cultivation Phase. As mentor and protegee actively engage in the functions which emerge during the Cultivation their relationship grows stronger and correspondingly the overall width and breadth of the arc expands. As the mentor provides these later appearing functions, however, less time may be allotted to some of the earlier appearing functions such as educating. Thus, the width of some of the earlier appearing bands, which represent specific functions, necessarily will become narrower or disappear altogether. The waxing and waning of functions continues during the Separation Phase at which time ambivalence is experienced as mentor and protegee begin a process of psychological disengagement. As noted in the model, by the time the relationship has progressed to the Redefinition Phase, the primary function of the mentor is one of moving from a transitional figure to friend/peer.



clustered into two factors, based on research on preferences expressed by 144 teacher education candidates. The two factors and the roles associated with them are important to the discussion of a categorization of mentoring models according to dominant type of assistance offered.

Vocational assistance in a mentoring relationship aids a protegee in adjusting to and advancing in an occupation. Vocational roles include:

1. Educating—Teaching, challenging, and evaluating in order to enhance a protegee's technical skills or intellectual development.

2. Consulting and coaching—Acquainting a protegee with the political dynamics or informal power structures of a community, including the occupation's values and norms, enabling a protegee to develop a set of personal and professional standards.

3. Sponsoring—Providing "good press," visibility, and exposure.

4. Protecting—Shielding a protegee from negative publicity or from potentially damaging contacts with influential people.

Psychosocial assistance enables a protegee to clarify her sense of identity and develop a greater sense of competence and worth. Psychosocial roles include:

1. Role modeling—Providing an opportunity for the protegee to observe the mentor dealing with conflict and meeting personal and professional demands.

2. Encouraging—Building a protegee's self-confidence by providing emotional support and positive feedback.

3. Counseling—Discussing a protegee's fears, anxieties, and uncertainties regarding personal and career-related issues.

4. Moving from a transitional figure to a friend—Assisting a protegee in achieving a sense of being valued as a peer.

The richest mentoring relationships incorporate a large number of these vocational and psychosocial roles, but it is not necessary for each role to be present in a mentoring relationship. In designing mentoring programs and doing mentoring research, frequently I am asked whether a person's major professor qualifies as a mentor. The genesis of this question seems to be a belief that a person who is in an important educational role in a person's life and fulfills that role very well should receive special recognition, that is, should be called a mentor. In that sense, a mentor is "super educator." I usually respond to such an inquiry by elaborating on the rainbow model of Schockett et al. (1983) and suggesting the myriad of roles and assistance that can be present in a mentoring relationship, not just educating.

Also, it is useful to respond to inquiries about major professors by giving the definition of mentoring that I use in my research:

> Mentoring is significant career and/or personal assistance given by more experienced professional(s) to less experienced one(s) during a period of transition.

In this definition, it is the protegee who must judge if assistance is "significant" in the context of successfully negotiating a transition (when the outcome is in doubt). The definition assumes that experience, not age, is the salient factor in being able to offer mentoring assistance. It also assumes that the assistance could be either career (vocational) or personal (psychosocial) or both.

In fact, however, mentoring programs and mentoring relationships often emphasize either the vocational or the psychosocial roles, but not both. For the purposes of the present discussion, it is useful to conceptualize mentoring models according to whether the vocational or the psychosocial roles are dominant.

Traditional Model—Vocational Assistance Is Dominant

When mentoring stresses the vocational roles discussed previously, it is quite easy for old ways of doing business to prevail. The rationale for this statement includes the following:

1. By their nature, the vocational roles are oriented toward a traditional goal of facilitating a protegee's career advancement. Presumably, that advancement is up a well-established ladder.

2. The most basic vocational role, educating, lends itself especially well to grooming, when a mentor possesses knowledge that a protegee must acquire in order to succeed.

3. Consulting emphasizes learning the political dynamics and power structure of a community, not necessarily changing them. Thus, a good mentor will help a protegee "learn the ropes" in order to operate effectively within the existing system.

4. Protecting is based on hierarchy and a power differential and gives the mentor particular say in who the next generation of professionals will be. Often, this means that the next generation looks, acts, and believes like the previous one.

Doing business in the established ways is not inherently bad, and it would be unwise to label mentoring that is conducive to such practice as being somehow misguided. In cases where change is desired, however, emphasis on the vocational roles of mentoring does not seem likely to develop a new generation of professionals who will lead a transformation. For that purpose there is a better alternative.

Alternative Model—Psychosocial Assistance Is Dominant

Because the psychosocial roles address an individual's personal development (competence and self-worth), there is considerable latitude to mentor a person generally to be the best she can be. Although this can be related to career advancement, it certainly is not the only (or even the main) goal of psychosocial assistance. Further, in each of the four psychosocial roles there is focus on professional/personal development rather than on achieving success within an organization. For example, encouraging is intended to foster self-confidence, but the resulting self-confidence may or may not be used to climb a traditional career ladder. Even counseling is not focused on how to succeed in a career, but instead addresses a protegee's fears and anxieties in order to support her.

Mentoring assistance that stresses the psychosocial roles, then, is not prescriptive of what an individual must do, know, or be for the purpose of succeeding in the established ways of an organization. Nor does such mentoring assistance rely on hierarchy or power; rather, it eschews them. Very simply, mentoring based on psychosocial assistance enables protegees to develop in their individual ways. As a result, they are more likely to bring their differences to organizations as strengths, and to bring innovation and change.

In terms of meeting the challenge of mentoring for a new generation of researchers, a strong focus on psychosocial roles is highly desirable. Although incorporating vocational roles into the mix also is important, emphasis on psychosocial assistance will be more helpful in supporting the continued presence of newcomers and in producing change. An additional reason for emphasizing psychosocial assistance is that there is evidence these roles are desired more by protegees (Schockett & Haring-Hidore, 1985). Finally, psychosocial roles such as encouraging, counseling, and moving from transitional figure to friend are especially conducive to the reciprocal relationships fostered in the networking-mentoring model, which was discussed previously and recommended for our purposes.

Emergent Issues—A Final Comment

Throughout the course of this conference, as mentoring has been discussed in considerable detail, related issues have emerged. Those that seem to me to demand our attention revolve around the following questions:

1. Can we afford to perpetuate a mentoring model whose strength is the intensive preparation of one new professional at a time?

2. Can the communication sciences and disorders professions afford a model of mentoring that in the past has excluded, intentionally or not, large numbers of women and people of color, who represent the largest potential for adding new researchers?

3. Do we have the collective will to pursue a new science and research agenda?

4. Should the old system that has brought us to our present point remain intact?

5. Do the experienced researchers in our fields desire mentoring that can enliven their present pursuits?

For each of these emergent issues, the mentoring models that are favored in the future will influence their resolution greatly—just as the mentoring models of the past contributed significantly to the development of the issues. Using the alternative models of mentoring suggested in this paper will require a certain amount of determination, but they hold strong promise for addressing the emergent issues, as well as the central challenge of producing more researchers.

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The Mentoring Environment: Comments on Dr. Haring's Presentation

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Dr. Haring has laid out for us very carefully the personal conditions that make for successful mentorship. For all of us who mentor, I am sure her talk has made made us more conscious of our own behavior in this delicate relationship. Studying mentoring itself makes us realize that our behavior shapes our students as scientists and makes them more or less effective in their careers after they have finished formal degree schooling.

My colleagues have fleshed out her talk by describing some aspects of their own styles and their departmental programs that can make training more effective. Although I'm sure we can all benefit by further exploration of our personal experiences and by considering what we can do to improve our department's performance, I would like to use my time to explore the structure of external conditions that make for successful careers in science.

I believe that success of research mentorship is measured by the generation of the scientists of the future in communication sciences. I will discuss four external conditions affecting successful research mentorship. These conditions are

- research support during training
- financial support during training
- research support after training
- appropriate jobs after training

These remarks are aimed particularly at speech, language, and hearing departments, but I will try to address a broader perspective in conclusion.

Research and Training Support

It is generally agreed, on the basis of both formal and informal studies, that participation in research during graduate training is a very important, if not the most important, factor in developing the scientists of the future. According to the 1990-91 National Survey (Creaghead, Bernthal, & Gilbert, 1991), in 1991 there were 237 graduate programs in speech, language, and hearing, with little change over the years of the survey. What proportion of these programs have a significant research enterprise as an important aspect of their structure? One approach is to ask how many substantial grants exist in the field, and ask what proportion are housed in training programs.

For this investigation, I turned to another professional publication, *The Grants Directory for 1991* (ASHA, 1991). Most of the listed grants are federal, although there are listings for the March of Dimes, the Deafness Foundation, and the American Speech-Language-Hearing Foundation. In spite of valiant efforts, it is difficult to make such a directory complete. Some of the states make research funds available for projects of particular local concern. Some national private societies, like the National Down Syndrome Society, fund research fellowships. Some universities give small research grants, usually for equipment or as seed money for a hoped-for future federal grant. However, all of the private grants tend to be smaller than the federal grants. Therefore, in my own inspection of the *Grants Directory*, I tabulated only federal grants. Also, I relied on hand tabulation, although some percentage figures were given me by Andrea Blake. Any mistakes are mine, not hers.

In 1991, a total of 1,033 federal grants were identified by the ASHA Research Division in the area of speech, language, or hearing, of which 27% were in the hands of ASHA members.

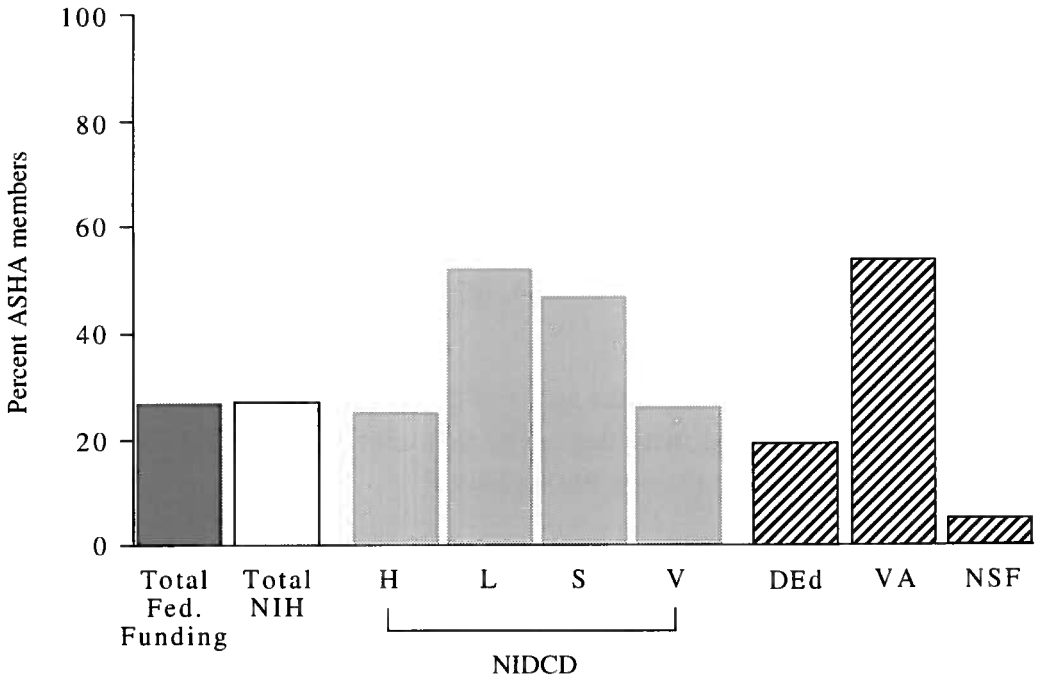
In looking at the grants, I was interested not so much in ASHA membership per se, but in how many grants were housed in speech, language, or hearing departments, or were tightly tied to such departments. Grants lodged in training departments can provide important support for graduate students in many ways. They can learn to do research by apprenticeship, while the research assistantships provide direct financial support as well. Grants buy state-of-the-art equipment and provide programming support for research software. Furthermore, departments with one or more research grants are more likely to be able to get direct research training grant support.

In the *Grants Directory*, the department where the research is housed is not listed. The only clue is the membership status of the principal investigator. It is not a perfect guide.

Some ASHA members do their research in institutions or departments other than speech, language, or hearing departments, and some researchers who teach in those departments are not ASHA members. On the assumption that these groups roughly balance, we can estimate that about a quarter of these research grants are housed in departments with training programs.

Some results of the analysis are graphed in Figure 1. For information purposes, some percentages are broken down by institution. For example, it is interesting to note that the

Figure 1. Percentages of federal grants from various agencies with principal investigators who are ASHA members. Total Fed. Funding = Percentage of all federal grants. Total NIH = Percentage of all ASHA member grants with the National Institutes of Health. NIDCD = Percentage of all ASHA member grants with the National Institute of Deafness and Other Communication Disorders (H = Hearing grants; L = Language grants; S = Speech grants; V = Voice grants). DEd = Percentage of all ASHA member grants with the Department of Education. VA = Percentage of all ASHA member grants with the Veterans Administration. NSF = Percentage of all ASHA member grants with the National Science Foundation.



percentage of ASHA-member-led grants within NIDCD for the subfields of language and speech is about double the levels for hearing and voice. NIH institutes other than NIDCD have small numbers of grants with ASHA-member principal investigators, but they are included only in the NIH total. The figures for the National Science Foundation and the Department of Veterans Affairs (VA) form an interesting contrast. The VA funds a great deal of communication research, particularly in areas of service delivery. The National Science Foundation attempts to avoid what are considered to be health-related topics; the grants it funds tend to be in relatively nonapplied areas of linguistics.

Given the limitations of my methodology, I estimate that 250 federal grants are housed in speech, language, or hearing departments, probably most of them in the 56 programs offering doctoral degrees. Of course, grants are not equally distributed; some programs have several grants, whereas many departments have none. Thus, some departments can provide a better environment for research training than others. The federal research climate is quite bleak at present, because competition for grants has never been keener. Any change in the granting environment that increases the total number of grants awarded would probably increase the number of grants housed in speech, language, and hearing departments. Meanwhile, departments might consider the initiatives that would increase research opportunities for their students.

Research Support and Job Opportunities

According to the 1990-91 National Survey of the Council of Graduate Programs in Communication Sciences and Disorders (Creaghead, Bernthal, & Gilbert, (1991), there were 182 doctoral-level positions available in 1991-92, whereas programs graduated 152 in 1989-90. Thus, the supply of PhD positions seemed at that time to be in line with the demand. However, the frequency counts in the specialty areas exceed the total number of anticipated positions, because the respondents could mark more than one specialty area for a given position.

A question can be asked about the nature of the programs that generate the academic positions. How large are they, what degrees do they offer, and what kinds of research opportunities do they offer to the new PhD graduate?

To get some insight into this question, I turned to another ASHA publication, the *Guide to Graduate Education in Speech-Language Pathology, 1991-1992* (ASHA, 1992). For each accredited program, the guide lists the names of the faculty and the number of full- or part-time students in speech-language pathology and audiology. I took a 50% sample of the listed

programs by tabulating every other one. In the guide, the programs that did not respond to the questionnaire that generated the *Guide* were listed by name only. For such programs, I tabulated the program that was listed next in the *Guide*. To the extent that the smaller programs were more likely to fail to respond, these programs are under-represented in the sample. For each selected entry, I tabulated the number of named faculty, the number of master's-degree (MA) students, without regard to the full- or part-time status or field of the student, and whether the program offered a doctorate in any area, regardless of the number of students.

This procedure yielded a total of 56 MA programs, with 488 faculty members and 2,095 MA students, and 25 MA/PhD programs, with 306 faculty and 1,068 MA students. Thus, the mean number of faculty members for MA programs is about 8, whereas the number for MA/PhD programs is about 12; the mean number of students in MA programs is about 37, whereas it is 43 for MA/PhD programs. These numbers are not in any way equivalent to faculty/student ratios, because no account is taken of the number of PhD students (generally small) nor the number of undergraduate majors, but rather indicate differences in the character of the programs in which MA training takes place. The distributions of MA and MA/PhD program sizes overlap, both with respect to number of students and faculty.

After making the initial tabulation, I examined the cumulative distribution of faculty and students by program type. Figures 2 and 3 show the results. In both graphs, the abscissa shows the number of faculty in the program, whereas the ordinate shows the cumulative percentage of the total faculty or students in programs with faculty of a given size. The difference in numerical character in MA versus MA/PhD programs is quite obvious. Finally, I looked at the proportion of total faculty in MA programs. In this sample, the proportion is almost two thirds. Thus, the graduating PhD student is more likely than not to move, on receipt of a PhD, to a smaller program, often without fully developed research opportunities or the inevitable focus on research that a PhD program should bring.

Some Possible Consequences

Since most ASHA members are engaged in service delivery, the primary concerns of ASHA as a professional organization have necessarily been to ensure that the graduates of MA programs, and those holding CCC, are well qualified to deliver such services. Thus, there are stringent ASHA requirements for supervised contact hours, number of graduate course hours, and faculty/student ratio. However, there are no requirements with respect to the research opportunities available to faculty or students.

Figure 2. Percentage of total faculty in programs of a given number of faculty.

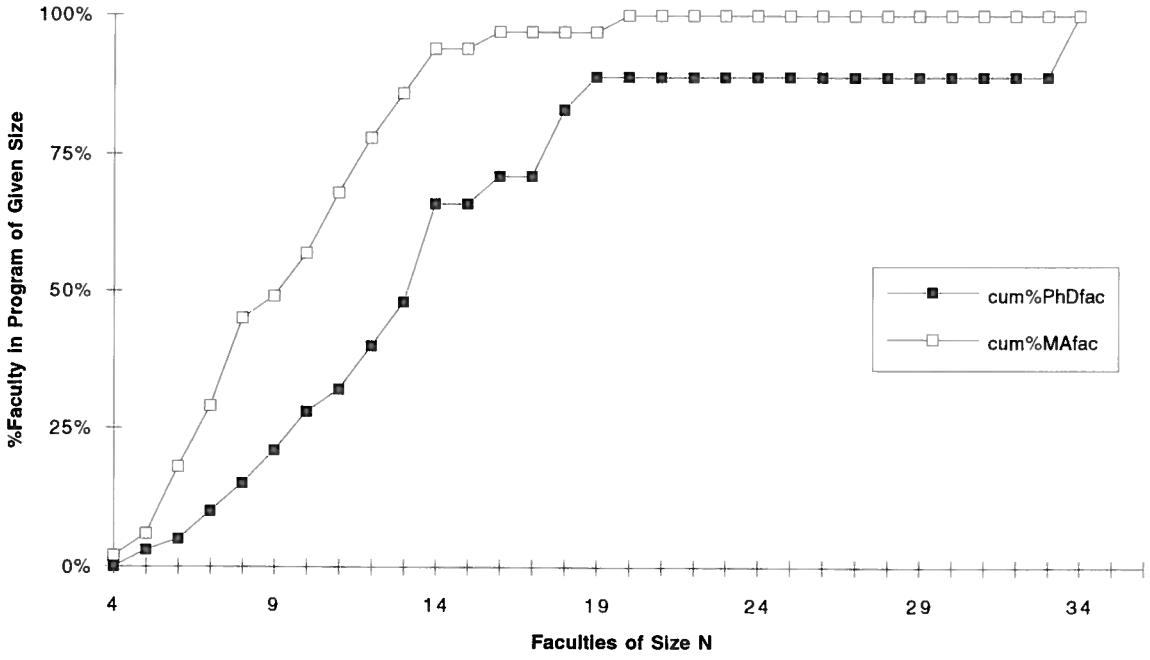
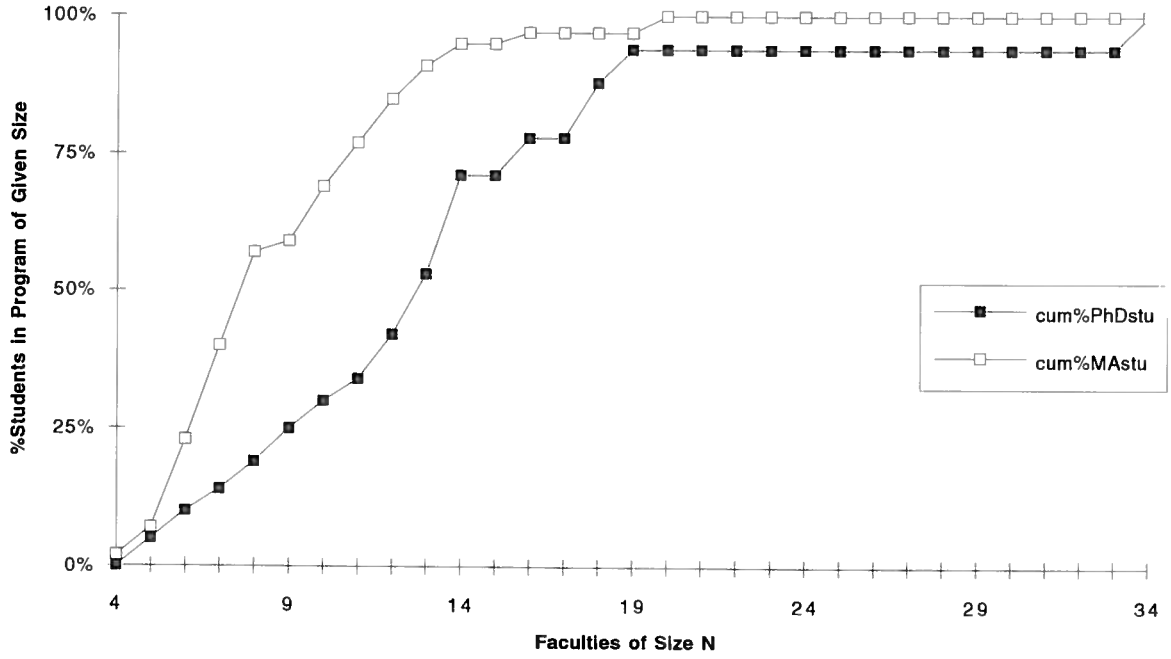


Figure 3. Percentage of total MA students in programs of a given number of faculty.



There are several indications of a trend away from research in MA programs. Indeed, from 1981 to 1987, the number of MA theses dropped (1990-1991 Survey). An encouraging trend is the increase of theses from 1987 to 1990. However, most speech-language-hearing MA graduate students do not write theses. From the point of view of new faculty, probably only a small pool of MA candidates is interested in collaborating in research and helping the new PhD candidate with studies that can be published.

Teaching loads are generally becoming heavier, both in number of students in a course and in number of courses taught by each faculty member. This trend is true for all academic fields. Further, ASHA clinical requirements have tended to load departments so that they may require the CCC so that every faculty member can supervise, adding a hidden agenda to the curriculum of a student seeking a research degree.

On the other hand, there are no formal technical requirements in the ASHA accreditation agenda, although an alert ESB site visit team may make recommendations that a department improve its technical status in hardware, software, or both.

The result of these trends taken together may make it very difficult for the new faculty member to do research and to publish. In many, if not most, institutions of higher learning, regardless of eminence, there is some kind of publication requirement for tenure. It is destabilizing for a department to constantly put its new faculty through a revolving door. Furthermore, it is difficult for the new faculty member to change to a different institution if the first post-doctoral job provided no opportunities for publication.

More important than the consequences to the individual are the consequences to the field. There has been concern among some members of ASHA that the scientists are leaving the organization. It might also be said that the research investigation of communication disorders might leave ASHA. At present, about 25% of grants are in the hands of ASHA members. Communications research is extremely important for the health of our nation. If it is not done in speech-language-hearing departments, it will be done outside them.

Training in communications sciences is important in the study of communication disorders. The clinical background that ASHA members share make them highly sensitive to the really crucial problems of the field, in a way that perhaps other researchers, such as engineers and experimental psychologists, may not fully share. As a field, we need to protect our young researchers so that they can make the scientific contribution they are capable of.

Acknowledgments

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Advising for Research Productivity

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Doctoral students can be advised in a variety of contexts. First, advising can be an individualized mechanism for imposing the adviser's values on a few future members of our profession, and those values can range from conservative to revolutionary. Second, advising can be a societal mechanism for imposing a standardized set of values on most of the future profession. The values range widely, from merely discovering the truth to how we apply that truth to our society, and our goals for societal application can range from conservative to revolutionary. Third, advising can be a way to increase the variety of people who will define the future profession in ways that we do not try to predict, other than that a wider range of people will have contributed to it. Or, fourth, advising can concentrate intensely on imparting the skills of teaching, the skills of research, and the skills of teaching research. This last option requires some research into how behavior works and into how to apply what we learn about how behavior works. If we apply what we learn, then we need more research into what happens when we apply what we know in all the ways we could apply it. If we did that, we would not be trying to determine future policy now and directly; instead, we would graciously allow it to emerge as an interaction between what we discover about application and the values of the people who teach that application.

We might adopt this fourth approach as an act of apparent liberalism, generously freeing the future to be what it will as it uses what we discover. Or, we might see it as a realistic acknowledgment that we are not powerful enough to control much of our future and had better teach adaptability to whatever turns up.

I take the latter stance. I advise graduate students in ways that may impart the skills of research and reinforce the consequences of acquiring those skills. I assume that my students will do research not only into how behavior can work, but also into what happens when we

apply that knowledge in the various ways that we can. My purpose is to advise people who will become ardent researchers, and who will continue to do and publish research throughout their professional careers.

There are two great paradigms for getting students to acquire the skills you want: teach them, which requires that you know them and understand teaching, or select students who are likely to develop those skills no matter how little and how poorly you teach.

I teach my students very little—mainly what they ask me to teach. Some of my students become independent, enduring researchers and publishers, largely because the selection process that lets them be my students favors that kind of student. In my opinion, the people to select are those who show strong signs that they are already in contact with the natural reinforcement communities that support independence and curiosity. (Finding a natural community of reinforcement to maintain and elaborate skills is indeed the best programming for generalization and maintenance that I know; it is so good that the results do not even deserve the label "generalization," because they are directly supported.)

I select partly by necessity, partly by design. Consider how the University of Kansas Human Development Graduate Program finds students likely to work with me. It has no admissions committee to decide who has the proper credentials for our research-training programs; instead, the applicant must name a handful of potential advisers. Faculty read the applications of only those applicants who named them as the potential adviser. An applicant is admitted only if one or more of us decides to advise that applicant (after consulting with the other potential advisers), recruits an advisory committee for the student-to-be, and communicates that offer to the applicant. Thus applicants who accept arrive already in interaction with an adviser they chose prior to applying. Different advisers are free to, and of course do, use different criteria in accepting their students. I will describe only my own procedures.

My usual first reply to the applicants I like tends to eliminate all but the fiercely independent: My first letter usually reports that although I like their application well enough to offer admission, I have no financial support for them. That suddenly eliminates me as a potential adviser for a large proportion of the applicants who had nominated me. No doubt I lose a considerable number of people who would have become independent research publishers, but I also lose anyone not willing to improvise financial support for years of expensive graduate training. Only a strikingly independent applicant will continue with me beyond that point. Or a financially independent applicant—but there are very few of them.

Those applicants who persist with me then face an even more severe test. My next letter describes my style of graduate advising, which should horrify any but the most independent applicants. The key passages state the following:

> ... you must understand my style of advising. I don't plan a well-structured program for any of my students, nor do I specify a series of experiences for each student to encounter in some programmatic order. Instead, I expect you to know roughly what you want from graduate school, to use me and the department as a resource to accomplish that, and to design most of your graduate program yourself, most likely as you go along.... In more specific terms, I don't choose your courses, I don't choose the areas in which you'll be examined, I don't choose your research and scholarship problems or tactics, and I don't set your pace; either you do each of those or it doesn't happen. Any time that you ask me for advice about any of your possible choices, I'll give it—I'm full of opinions, and eager to state them in detail—but I won't make the choices for you. ... Students who like to take initiative do very well in this situation; but students who wait for me to direct their study find that nothing happens, which is not to their advantage in this program. ... Considering all of that, and your own style of work, shall we go any further in this question of whether you're interested in being my advisee? If I don't hear from you that you're still interested, I'll assume that you're not.

If an applicant gets past those two letters, then I have either a very independent applicant or a serious case of self-delusion. Almost surely we will meet then, or have a very long telephone call, and perhaps I will find out. In that third encounter, I make at least the following points:

1. Graduate school will be much more difficult and demanding work than the student has ever done before; the Kansas program will tempt rather than coerce most of that effort, and students will find themselves desperately overworked with only themselves to blame. Their personal relationships—with spouse, lover, children—will be greatly stressed. How that stress is managed will make some relationships stronger and will weaken or break others; one or the other of those outcomes is sure to happen.

2. I am offering advising, not behavior management. Behavior management is a dance; it does not work unless each partner commits an equal amount of behavior to it, all of it tightly and predictably interactive with the other's behavior. I will not dance with my students; I hope to train independent researchers, not a chorus line. I would find it unpleasant to micromanage their professional development, and the students I want, the independent, durable researchers-to-be, should find it equally unpleasant to be micromanaged.

3. I will describe an occasional drama that I see: A student works exceptionally hard for many semesters, is brilliant during the subsequent two-hour oral exam, and at the end of that exam is congratulated calmly by adviser and committee for perhaps 30 seconds, whereupon we all note that we are due elsewhere and leave. The student is left suddenly alone in the examination room to clean up the committee's mess. At that moment, a few students ask themselves, "Is this all I get? I worked so hard, and this is all I get?" It is important to know now that the answer is yes, and that they should be the kind of applicant who would not ask that question. Some of my past students have remarked that of the various social consequences I offer, which range from sympathy and encouragement through approval to frowns, the best reinforcer is a cocked head, raised eyebrows, and a vocal expression of pleased surprise about their argument, data, or design. That is the best reinforcer I ever mean to give, because that is the best behavior I could want from them: something pleasantly, significantly surprising, not something exactly repetitive of what they have seen modeled in their training program.

4. My co-authorship policy hinges on the premise that any data produced by the student for a thesis or dissertation, whether or not the student is paid by my research funding, belong to the student, because those data are the basis for the student's degree. Then publication practices must follow from that premise: Only the student can decide if those data will be published, and where, and in what forms, and with what conclusions, and the student must take the initiative to make any of that happen.

If an applicant likes those four conditions, then I will offer acceptance as my advisee. If that is the way graduate students can come to work with me, it seems very likely that they are indeed already independent—that much of their behavior is already in contact with the natural community of reinforcers that supports scientific curiosity and research. The rest—the transformation from independent, curious student to enduring research publisher—is quite likely, if they have access to a good curriculum, a good library, some research facilities, some competent professional models, and a few accurate informants—in other words, a university.

But there is one other essential ingredient: an adviser who will take the graduate student seriously, face-to-face, one-on-one, as often as the student wishes. I will consider any proposal, proposition, argument, design, or analysis with complete and genuine seriousness. If I think it correct or incorrect, logical or illogical, reasonable or unreasonable, I will say why as fully as I can, and proceed to an equally thorough discussion of what could prove that it is correct or incorrect, or could clarify its logic or reasonableness; if I know, I will say to

what extent that proof or clarification already exists in the literature, and where the student can read about that, and how to find more of it than I know about. If I cannot say whether the student's idea is correct or incorrect, I will say why I cannot tell, and discuss what a rational scientist would need to decide, and, if I know, what the literature might have to say about that. If the student returns with evaluative comments or counter-arguments on the literature or on our previous discussions, I will take those comments just as seriously, and deal with them in the same way, as often as it happens.

I will also respond with equal seriousness to any personal problem the student brings me, and I will use much the same tactics, essentially by trying to outline all the student's options that I can see, and all the consequences I can see of each of those options.

I will also invest a great deal of time in improving the clarity with which the student speaks and writes, by questioning and by modeling alternatives.

I am not likely to offer effusive praise for good discussion, clear expression, careful research, or hard work; if I like its quality, I probably will display a cocked head, raised eyebrows, and a quiet expression of pleased surprise. In my experience, the natural community of reinforcement at which I am aiming my students' behavior does not often praise good behavior, or guarantee success by giving precisely detailed instructions to follow and requirements to meet; therefore, I should teach survival in that environment, which means that as soon as possible, I should not give much praise or direction. I am the last environment between my students and that imminent set of terminal contingencies; I should teach them in my nonfatal setting how to survive in that deadly future one, in part by often modeling its lack of thorough direction and support. Independent researchers should have research behavior that is supported mainly by what it finds out; my job is to program that arrangement as best I can.

I do teach a little. Of that little, a small proportion deals with how to think about behavioral science, a somewhat larger proportion is about how behavior can work, and a very large proportion is about how to prove or support any proposition about how behavior works and how to communicate it. I do not require that my students listen to me; if they ever do, most of what they hear will be about proof in a context of disbelief, and about clarity in a context of incomprehension. In my opinion, the perfect motto for an independent, durable behavioral researcher is,

> I will believe anything you or I can prove and describe clearly, and nothing we cannot; the price of proof and clarity is high; when it is too high, the admission of

> ignorance is good science, and the game of conceptual analysis will become an attractive and occasionally useful alternative, if it is recognized for what it is.

I do not always succeed in modeling that motto, but I try, and I always recommend it. However, if I am effective in that, it may well be only because most of my program colleagues similarly espouse the importance of proof. Of course, a thoroughly independent student could rebel against us all—but not easily. And if I have characterized our implicit selection mechanisms correctly, our students did not come to rebel.

I will also teach some professional skills: how to write a vita, a thesis, a review paper, a journal article, a research proposal, an editorial review, a request for human-subjects review, and a constructive letter of rebuttal and revision to an editor; and how to give a paper at a colloquium or convention; and how to chair a paper session or a symposium; and how to be interviewed—as best I know.

The content of what else I teach is not a long list; it is always offered as a matter of argument, because any part of it may eventually prove incorrect or ineffective. After a discussion of at least eight criteria for what can make research important, I will state the first two laws of research review:

1. Anything worth doing is worth doing well.

2. Anything not worth doing is not made worth doing by doing it well.

Then I will offer 12 theses, one every now and then, when it seems to fit the student's current experiences and problems:

1. Clear speech and writing is a learnable skill without which the opportunity to do good science is unlikely.

2. Proof of the nature of a relationship requires experimental analysis; correlational analysis is insufficient.

3. The fundamental strategy of experimental analysis is to compare behavior in two conditions that vary in only one relevant feature; the fundamental skills of experimental analysis are to examine those two conditions to see if they do indeed vary in only one relevant feature, and to understand what can be relevant.

4. The Solomon four-group design exemplifies wonderfully well how to think about whether two conditions vary in only one relevant feature.

5. There is a distinction between functional and actuarial analysis, and a corresponding distinction between group and single-subject designs. You should know which kind of analysis you want to pursue before you choose a design strategy.

6. A fundamental question for single-subject design users is how these designs do, do not, or can be made to control for the confoundings made explicit by the Solomon four-group design.

7. Knowing the difference between empirical propositions, researchable propositions, and tautologies is crucial to good science.

8. Knowing the difference between negative and positive definitions is crucial to good science.

9. No measure should be taken as a measure of anything but itself, and not even that unless it is reliable, valid, and precise. Anyone who values science must understand measurement.

10. We call <u>science</u> whatever is shown to be reliable, but we rarely evaluate its generality. Anyone who values generality must understand sampling.

11. There is no such thing as the thorough, objective, and correct evaluation of an applied program. It is not possible to measure every result of any program. What is called evaluation research is the result of what the researcher chooses to measure, and how, and when, and how often, and in whom; that is always less than the whole truth, and can be managed to allow any conclusion a political evaluator wishes.

12. In science research, there are always two strategies to choose between. One is to attack a problem because it is important, no matter how weak the available research methods may be, because for important problems even ambiguity is better than ignorance. The other is to attack only those problems for which powerful research methods can convey unambiguous answers, confessing ignorance with the remainder, because confessions of ignorance are better than ambiguous assertions, especially with important problems.

Given that my students are going to be independent, durable research publishers, I would like them to debate those 12 problem areas forever. The rest is detail.

Research Mentorship: A Special Needs Approach

Arlene Earley Carney
Boys Town National Research Hospital

In January 1990, the National Institute on Deafness and Other Communication Disorders announced a request for applications for a number of multipurpose Research and Training Center (RTC) grants. The description of these new centers was complex. They were to contain research projects, as in traditional Program Project grants; research training components, similar to those in predoctoral and postdoctoral training grants; and core projects for administration, technical support, and/or clinical purposes. In addition, these RTC grants were to be designed with unique sections that focused on continuing education and information dissemination.

It was clear to the research and clinical staff at Boys Town National Research Hospital that competition for these grants would be strong and that we needed to be creative and innovative in our thinking. In planning the application for one of these RTC grants, we decided to propose a program that fell into a category between traditional research training models for predoctoral and postdoctoral fellows and traditional continuing education for clinicians. We designed a program that we hoped would be a model for extending research training to practicing clinicians. We called it the Clinical Research Mentoring Program and included it under the Continuing Education section of the RTC proposal entitled the Center for Hearing Loss in Children.

Program Rationale

The impetus for the Clinical Research Mentoring Program came from within our own institution. Because of the unique clinical population that we serve at Boys Town National Research Hospital, both locally and nationally, and because our practicing clinical staff works closely with clinical researchers, our staff members with master's degrees in audiology and speech-language pathology have become actively involved in research. In general, clinicians

have, at first, participated as research associates in projects designed by PhDs. They became second, third, or fourth authors on published papers. They repeated this experience many times over, moving up in independence and authorship, until they proposed projects of their own and wrote manuscripts independently, with PhD staff serving in a much reduced role. Many of our clinical staff with master's degrees have impressive publication records and are invited as speakers around the country because of their research and clinical expertise. Our goal was to see if we could design a program that would disseminate this research training model to practicing clinicians at other facilities.

We had been involved in the continuing education area for a number of years. Even before our application for an RTC grant, we hosted a number of conferences: an annual conference for several years called Issues in Language and Deafness, inreach conferences that were intensive week-long workshops focusing on a clinical topic of interest, sign language workshops, and conferences on auditory evoked potentials and vestibular measures. However, as we analyzed the conferences we had held, we noted several limitations of continuing education in its traditional form as a vehicle for research training. Continuing education more closely focuses on the clinical practitioner and his or her clinical activities. It tends to be information-oriented only. Traditional continuing education tends to employ a variety of speakers and media (slides, video, audio, etc.) to capture the attention of the audience. Because these tend to be group events, there is a certain impersonality to them. Audience members and speakers rarely get to know each other well. As a general rule, research issues are not the strong focus of these conferences, even when papers presented report on research findings. We wanted to continue and expand these activities to provide new information and ideas to practicing clinicians. However, we believed that a different approach was necessary to implement our research training model for clinicians who were not in residence at Boys Town National Research Hospital.

Because our new program focused on practicing clinicians rather than on those who intended to have research careers, we included our Clinical Research Mentoring Program under continuing education but greatly expanded its focus from our more traditional models. We envisioned a mentorship dyad that paired a researcher with clinical interests with a practicing clinician who had research interests in the same area. This dyad did not need to be located at the same facility. This necessitated establishing techniques for long-distance monitoring of projects at remote sites.

In our first conception of the model, we incorporated a networking approach in the Center for Hearing Loss in Children along with the mentorship dyad. In effect, we were not

simply offering the guidance of a research mentor but also access to the rich and varied support services that exist at Boys Town National Research Hospital. Because the participating clinician would not be able to access these support services on an ongoing basis, as our own clinical staff might, we incorporated times when the clinician could visit Boys Town National Research Hospital and experience short-term intensive input from a variety of sources.

We wanted to design a program that did not fit a university-based model in which the mentor is a professor and the protege a student or postdoctoral fellow. Rather, the mentor and staff in the Center for Hearing Loss in Children at Boys Town National Research Hospital would have a collegial relationship with the practicing clinician rather than a hierarchical one. We also felt that this collegiality might encourage clinicians to pursue additional research opportunities, both with our own staff and with others.

In our view, there were clear advantages to the formation of this mentorship dyad for both parties. The practicing clinician has an active interest in clinical assessment and treatment efficacy and is often highly motivated to discover new or more informative approaches to delivering clinical services. He or she may also have access to interesting clinical populations and settings that may not be available to many individuals engaged in research. For example, it is not always possible for outside investigators to carry out research projects within school settings. These types of studies may be accomplished more readily by clinicians working inside the system. Practicing clinicians come to the research process with considerable skills and experience in the assessment of and intervention with clinical populations, which become particularly important in the study of difficult-to-test populations in which tester experience should not be an experimental variable. Finally, these clinicians have a set of well-developed clinical impressions that can be critical in the formulation of relevant and testable hypotheses regarding clinical populations.

The role of the mentor in the Clinical Research Mentoring Program was to serve many of the same functions that mentors have always served. Schockett and Haring-Hidore (1985) and Schockett, Yoshimura, Beyard-Tyler, and Haring (1983) described two general sets of functions in mentorship—vocational and psychosocial. Vocational functions are those that assist "...a protege in adjusting to and advancing in an occupation" (Schockett & Haring-Hidore, 1985, p. 627). Psychosocial functions "...enable a protege to clarify his sense of identity and develop a greater sense of competence and self-worth" (Schockett & Haring-Hidore, 1985, p. 627). In introducing clinicians to the research process, we wanted to

provide them with both research skills and research drive. We wanted to include the important aspects of vocational and psychosocial mentoring from the start.

In the Clinical Research Mentoring Program, clinicians might require a great deal of what Schockett and Haring-Hidore (1985) call vocational input in the areas of traditional education. That is, it was likely that they would need information about research design, statistics, and data analysis and reduction. Many clinicians had coursework in these areas as graduate students but may never have applied the skills they learned. Some clinicians would require input about the process of recruiting human subjects, including writing applications to their own institutional review board for use of human subjects, obtaining appropriate informed consent, and record keeping. Others might require assistance in the use of software for data analysis and graphical presentation of data. Most of this information would be obtained through consulting and coaching, rather than through didactic classroom activity. This again differentiated our program from more traditional university-based approaches.

The majority of clinicians who might participate in the Clinical Research Mentoring Program would also need assistance and support in the publication process, including writing and submitting papers, revising manuscripts, and persevering through what might be an extended process. Clinicians would receive guidance about which journals might be most appropriate for their manuscripts, what style was required by the journal for manuscripts, and what kind of acknowledgments should be made in a paper, particularly one sponsored by a funding agency such as the National Institute on Deafness and Other Communication Disorders. These activities might come under the heading of sponsoring the protege in the research process.

We also planned to incorporate the type of psychosocial input described by Schockett and Haring-Hidore (1985) for participants in the program. The mentor and staff in the Center for Hearing Loss in Children at Boys Town National Research Hospital were active role models because they were engaged in both clinical and research activities. In particular, we felt that the involvement of our own master's-level staff who had become successful researchers in their own right would provide a valuable type of peer mentoring in addition to the more hierarchical mentoring from a PhD to a master's level clinician. The program was designed to provide both encouragement and counseling for practicing clinicians, including providing reassurance about the importance and relevance of the research ideas, offering guidance through the usual problems of clinical research (e.g., subjects who became ill or did not show up for appointments, equipment failures, etc.), and giving sufficient encouragement to participants so that they realize that clinical research is difficult even for those who do it on

a regular basis. Most importantly, we needed to provide positive feedback about the work that was done as part of the project. We recognized that most of the clinicians who would participate in this project would not be receiving specific release time from their home facilities to carry out their projects, even if there was strong administrative support. They would need assurance from us that the importance of their research project justified all the extra work and time they would commit.

Program Design

In September 1990, Boys Town National Research Hospital was awarded an RTC grant for the Center for Hearing Loss in Children and began the implementation of the Clinical Research Mentoring Program. We advertised the program at professional meetings such as the American Speech-Language-Hearing Association and the Academy of Rehabilitative Audiology and mailed announcements to clinical programs around the country. We focused on the population of clinicians who work with children with hearing loss because of the focus of the RTC and the research expertise of those who would serve as mentors for this program. Since the start of the RTC, we have recruited three clinician researchers for our program, all of whom are working in the area of hearing loss.

We have evolved a series of stages for clinician researchers. In Stage 1, a clinician applies to the RTC committee (specifically, the Director of Continuing Education) with a research idea. Depending on the clinician and the area, this idea may be well developed or it may be in a more rudimentary stage. The application includes a curriculum vitae and a letter of endorsement from the clinician's supervisor or administrator to demonstrate institutional support of the project. A committee of researchers and clinicians reviews the idea and application to ensure that there is an appropriate mentor for the proposed idea and that the idea falls within the scope of the Center for Hearing Loss in Children. If a specific mentor is not requested, one is then assigned by the review committee. Upon committee approval, the clinician is contacted by the mentor by phone and/or letter. For some applicants, Stage 1 includes a visit by the mentor to the clinician's facility to meet with other clinical staff who may be participating in the project or to meet with administrators who want clarification of the Clinical Research Mentoring Program itself as they commit to it. This initial visit was considered necessary for two of our three clinician researchers. Additional visits have occurred when the mentors make trips that take them near the location of the participating clinician's home facility.

Stage 2 begins after the preliminary visit and/or application approval. The clinician refines the proposed problem with input from the mentor and provides a written draft of the

plan, similar to the prospectus for a thesis. At this point, contact between the mentor and clinician is by phone or letter. The research plan includes the hypothesis of the study, its design, including subjects and procedures, and expected outcome. When this plan is completed and sent to the mentor for review, the clinician visits Boys Town National Research Hospital for several days for final, comprehensive planning. The research plan is made available to all those in the mentorship network so that the visiting clinician will have the most informed input from the staff of the Center for Hearing Loss in Children. For example, in one case, we provided transportation for two clinicians who were working jointly at one facility on the same project. In addition, the institution provided transportation for a third clinician to join them.

On the visit to Boys Town National Research Hospital, the clinician is introduced to a mentor network that includes one or more PhD mentors who themselves are engaged in clinical research, any other interested research staff, clinical staff who have become involved in research themselves, a statistician, and software staff. Final changes are made to the research plan. The mentor and other research team members review the procedures for the project and determine what unmet needs the particular clinician has. For example, in one case, the clinician needed some software to complete a project. Boys Town National Research Hospital negotiated with the home institution and the software was purchased jointly by the RTC and the local educational district. A second clinician needed a large data set entered into a database but did not have the time or personnel to carry out the preliminary stage of the project. In this case, personnel from the Center for Hearing Loss in Children designed an appropriate database format for the clinician and entered the data provided. As the clinician collected more data, she and her co-workers were to handle the addition of this new information to the database so she could complete her project.

Stage 2 is finished with a wrap-up meeting at Boys Town National Research Hospital. At this meeting, the specific responsibilities of the mentor and the clinician are determined to avoid confusion. Time lines are negotiated and set so that the project will be finished in a timely fashion.

In Stage 3, the clinician begins the project at the home facility. During this stage, which can last for months, the clinician and mentor maintain contact through whatever medium is best. They mutually determine the frequency and type of contact necessary. The data for the project are collected and may be partially or fully analyzed, depending upon the expertise, experience, and time commitments of the clinician.

In Stage 4, the mentor provides assistance with data analysis, statistical calculation, and data interpretation. The clinician will visit Boys Town National Research Hospital once again during this stage. When the data are in final form, the project is written up for publication. The mentor is able to provide guidance in writing from organization through execution. Upon completion of a manuscript, the paper will then be sent through the Internal Review Committee at Boys Town National Research Hospital for pre-review for the author. This gives the author a preview of the types of comments and corrections that may be requested by reviewers once the manuscript is actually submitted. The mentor can provide guidance in the selection of a journal that is most appropriate for the topic and data collected. When the manuscript is reviewed, the mentor can also provide assistance in the interpretation of reviews and the subsequent revision of the manuscript.

Current Status

At the present time, three clinicians are participating in the Clinical Research Mentoring Program. One is an audiologist at a large hospital/clinic who has designed a project in the area of cochlear implant mapping in children with hearing loss. She is also a team leader for other audiologists in her facility. Through her, the other clinical staff are participating in this project as well. The second participating clinician is a teacher of the deaf who is a team leader for a group of teachers, audiologists, and speech/language pathologists in a large school cooperative that covers both semi-urban and rural areas. This clinician has developed a project on classroom listening skills as they relate to hearing aid characteristics, a project that necessitated a team research approach. The third clinician is a clinical supervisor at a university program. The Clinical Research Mentoring Program has allowed him to expand his research expertise and to work with other mentors in a different facility. This clinician has designed a project addressing issues of appropriate hearing aid fitting.

At present, all three clinicians are in the third stage of the project, moving quickly into Stage 4 and completion. One clinician has reported preliminary results of this project at both ASHA and the Illinois Speech-Language-Hearing Association. We have been able to implement the project much as it was designed. One variation occurred in the team nature of the research process at the clinician's home institution. We had built a mentorship team at Boys Town National Research Hospital in the Center for Hearing Loss in Children. We did not expect the participating clinician to build a research team at his or her own facility. This appears to have happened for all of our participants. A second change was observed in the continuing interest in clinicians in completing more research. We had hoped that this program would allow clinicians who had done little or no previous research to become

involved in a new process. We expected that participating clinicians might want to complete one research project and then exit the program. To date, participating clinicians have expressed a desire to continue to a new project based upon the first one. This expansion into more programmatic research goals was an unexpected but welcome outcome. It suggests that practicing clinicians can develop long-term research goals that are compatible with their clinical practice. It also reinforces the notion that there was a need and a place for a program such as the one we designed.

Our current plans include a thorough evaluation process to determine any weaknesses of the current design and to implement ways to improve the program for future clinician participants. We will also guide our current participating clinicians through the successful completion of the publication process. In addition, we hope to provide some type of research forum for them to present their work and their experiences with the Clinical Research Mentoring Program.

Acknowledgments

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Research Mentorship and Training Strategies

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I would like to provide a few comments concerning research training of PhD students. Some of the ideas expressed reflect current policy in my department, the Department of Audiology and Speech Sciences at Purdue University. Other comments reflect personal preferences that have evolved over time in my work with PhD students. I cannot claim that my views are accurate; probably they are most appropriate for the model student, requiring modification for others. In fact, I have had the good fortune of working with a number of exceptional students and sometimes get the feeling that I could better serve them by simply getting out of their way.

Some Views on Research Training

My first comment pertains to a step that probably predates entrance to the bands of the mentoring model presented by Dean Haring, although it relates to one of her own points: A mentor should explain to prospective students the type of training that he or she can and cannot provide. I am referring not only to subspecialty areas, but also to overall orientation. For example, I would be a more appropriate advisor for someone interested in an academic career with a major research component (indeed all of my former doctoral students have assumed positions of this type), than for someone interested in, say, being the director of speech-language pathology services in a hospital for children, even though both of these individuals may have a keen interest in child language disorders.

My next few comments probably fit the traditional grooming-mentoring model described by Dean Haring. I have found it helpful to have two complementary goals for my doctoral students. The first is to instill in the students an interest in and respect for long-term programmatic research, in which the bigger question is paramount and the methods merely a means to an end. The second is to support the students' occasional excursions into related

areas where they may pursue some narrower question and in the process become familiar with a new method, speech or language behavior, or subject group. The proper balance between programmatic research and research dabbling must also be taught and kept in mind at all times. Obviously, we can meander our way through a range of fascinating paradigms to the point where we have lost direction. On the other hand, major advances in answering the big question can sometimes come about through the recruitment of a new subject group or application of a new method.

A good starting place for many doctoral students is to serve as a research assistant in one or more studies that are part of a program of research. In this way, the student can learn how the current study followed from the prior one and leads logically to the next one. In addition to the intellectual benefits that such a system might offer, there are also opportunities to provide the student with tangible benefits. For example, even though a student's activities on a project might be limited to following clearly prescribed procedures, I often try to solicit sufficient feedback from the student on the substance of the work to justify adding the student as a co-author on the write-up.

As the student is completing the first year of participation in the project, I look for portions of the project that can be appropriately isolated for analysis and write-up and for which the student can have major responsibility. This need not be one of the main experiments of a long-term project, but rather, some tasks or measures obtained from the subjects at follow-up, or a detailed case study of certain subjects. (I emphasize follow-up because care should be taken that this write-up does not jeopardize publication of the main experiment.) I believe the extra effort required to identify a useful question for the student to pursue is justified because opportunities for the student to serve as a first author of an article should come well before the dissertation phase.

Whenever work has reached the point of being written up for presentation or publication, it is good to discuss the various options with the student, including pros and cons of each outlet. The student should hear the mentor's long-term plan so that he or she can see the logic behind any short-term decisions that are made. This will not only give the student additional exposure to programmatic research thinking, it will also give him or her valuable exposure to the process of choosing among the many journals that are available.

As noted by Dean Haring, it is a good idea for the mentor to allow students to see examples of peer reviews of some of his or her previous work, preferably before the mentor and student receive reviews of their own collaborative work. The mentor should provide the

student with his or her impressions, but try to acknowledge those places where the reviewers' criticisms were in fact helpful and valid. The mentor should discuss the various options that might be taken in preparing a revision. The same applies to grant applications. Although preparation of comprehensive applications for funding might be sometime in the future for the student, seeing the submitted application and subsequent peer reviews can help the student develop an appropriate mind set.

Once the student has had exposure to peer reviews, and after he or she has developed some sophistication in research, the mentor should look for opportunities for the student to serve as an ad hoc reviewer of one or two manuscripts. This is easily done if the mentor is an Editor or Associate Editor. Alternatively, if the mentor is asked to review for a journal that invites student reviews as well—such as *Child Development*—the mentor might ask the student if he or she would be willing to prepare a review. One can also suggest the student's name to Editors and Associate Editors.

The mentor should consider accepting an invitation to write a chapter for a contributed volume if he or she can include the student as a co-author or even first author. Because practice in writing is valuable in any case, the topic need not be the specific area in which the student is working. Of course, it would be good to avoid topics so far outside the student's area that his or her development of programmatic research will suffer.

As the student obtains additional opportunities to be first author, mentors must gradually reduce the amount of their own writing that appears in a paper on which the student is first author, especially on matters of style. Of course, this can be painful. But it also sends an important signal to the student that the relationship of teacher and student is changing. This suggestion also applies to any collaborative projects undertaken after the student has left the mentor's institution. The beginning assistant professor needs to develop confidence to function in his or her new environment.

Finally, I can provide a few observations that best fit the networking-mentoring model described by Dean Haring. The mentor should encourage his or her doctoral students to work with other productive faculty members. This is easily arranged within a system that requires an advisory committee for every student. For example, comprehensive examinations can take the form of the student conducting a discrete, small-scale research project with each committee member, or two slightly larger projects done with two subgroups of the committee. This will give the student working experience with new paradigms, instrumentation, and research styles. It can also lead to additional opportunities for the student to publish, in

collaboration with other faculty members. It also creates a situation (noted in Dean Haring's remarks) in which the doctoral student might have acquired expertise in a subarea that the mentor does not possess, which can bolster the student's confidence and ease his or her transition from student to colleague.

This next point relates to the preceding one, but does not depend on it. The mentor should encourage the student to identify and develop academic skills in a secondary area of expertise. For example, a student with language development and child language disorders as a major concentration might develop skills in one of the following: adult aphasia, phonological development and disorders, augmentative and alternative communication, multicultural aspects of language behavior, speech acoustics, speech perception, or traumatic brain injury in children. I refer here to developing sufficient familiarity with the content and research methodology of a second area to enable the student to teach a solid master's-level course in the area. This not only makes the doctoral student more marketable, but also provides him or her with other avenues for future growth.

Students learn from each other, and therefore the mentor needs to consider the number and composition of other doctoral students that he or she will recruit. The right number and mix of students will vary according to many factors. In my experience, two to three students at different points in the program constitute a good balance. One sign that the system is working well is when one of the mentor's second-year doctoral students conducts and publishes a study with one of the mentor's more senior doctoral students, and consults the mentor only for feedback on the rough draft of the resulting manuscript.

Summary

I cannot pretend that these suggestions constitute a comprehensive list of the ingredients necessary for a successful research training experience. For example, the list emphasizes activities and gives less attention to relationships. Furthermore, it is clear that these activities cannot compensate for scholarly/academic weaknesses in either the mentor or the student. However, I believe they represent experiences that can significantly enhance the research training enterprise. It is to this end that they are offered here.

Section 4

Promoting Collaborative Research in Communication Sciences and Disorders

Across Settings and Disciplines

Research Mentoring for Clinicians in a Health Care Setting

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The explosion in technological bases underlying clinical practice, together with an expanding scope of practice, have been increasingly evident during the recent past (Wiley, 1988). The American Speech-Language-Hearing Foundation (ASHF) addressed these factors by sponsoring a Conference on Treatment Efficacy (Olswang, Thompson, Warren, & Minghetti, 1990) to highlight both the accomplishments and gap areas in research directed at evolving clinical management practices with communication disorders. Such needs were also reflected in the report of an American Speech-Language-Hearing Association (ASHA) Task Force on Research (ASHA, 1988) containing recommendations for clinical research forums and guidance to neophyte researchers through a mentoring process.

The Department of Veterans Affairs (VA) has emphasized the balance among clinical, research, and training resources in the decades of program growth in audiology and speech-language pathology (Spuehler, 1987). A decade ago, this balance reflected nearly equal numbers of doctoral-level and master's-level VA staff. In 1990, the former had slipped to approximately one third of the total. The need for a strong research base to this large clinical program was clearly evident. Recruitment of research-trained individuals into VA was threatened, as decreasing numbers of doctorally trained professionals were graduating (Creaghead, 1991). This diminishing research presence was further evident through internal department reports (Fausti, 1990) showing that only 5% of medical research funds and 7% of rehabilitation research and development funds within VA were being allocated to projects in audition, speech, and language. Among the various actions initiated by VA to reverse this trend, one initiative was launched to hold and strengthen the research skills of existing VA clinicians (Wofford, 1991). A continuing education initiative was launched that focused on research mentoring.

This paper describes a unique approach to research mentoring that involved a series of steps for two groups of VA clinicians over several years, beginning in early 1990. This initiative comprised a merit review process of identifying proteges, providing workshop guidance, and supporting them with a continuing network as they developed research grant proposals. Group 1 met in late 1990 and Group 2 was convened in early 1992.

Identifying Proteges

Initial notification of this continuing education initiative was provided in a national conference call to all VA Audiology and Speech Pathology Service Chiefs. Subsequent notification and a complete description of application procedures was distributed in writing. Potential applicants were encouraged to develop a research proposal, adhering to the VA's established format for grant applications. Guidelines were accessible through regional or national offices for the VA's three sources of research funding: Medical Research, Health Systems Research and Development (HSR&D), and Rehabilitation Research and Development (RR&D). Applicants were informed that the selection of participants would be competitive. Application was limited to those individuals without extensive research and subsequent publication experience. Arbitrarily, a cutoff of three publications was specified. Letters of support from hospital management on behalf of the applicant were considered favorably in selection of the proposal. Applicants were advised that perfection was not expected, but that the conceptual merit of the proposal would be considered carefully. Also, the proposals were to correspond to published VA research priorities used by the three VA sources of research funding in merit review. Originality of the author's approach to the solution of the research question and the project's potential for completion of grant application within a one-year period were additional considerations for acceptance.

The applications were reviewed by three seasoned VA clinical researchers using the criteria stated above. For Group 1 (1990), 21 applications were submitted for consideration, 12 in speech-language pathology and 9 in audiology. Those selected for mentoring included four from each group. The group was represented by five with PhDs and three with MAs. This group size was judged to be ideal for both individual attention and optimum group process (Wells, 1990). For Group 2 (1992), five were selected in speech-language pathology and three in audiology, based on 11 total applications. This group contained four with PhDs and four with MAs.

Authors whose proposals were not selected were encouraged to revise their proposals in line with reviewers' comments and submit them to their facilities' research service for approval and implementation. Authors whose proposals were selected were advised to begin

making review-driven revisions in preparation for the workshop. They were also provided copies of the other proposals to be mentored for familiarization and discussion at the workshop.

Role of Mentors and Coordinator

Mentors were invited to participate in this initiative during the developmental stages, seeking their input before the methodology was finalized. Two of the reviewers agreed to serve as mentors, along with three additional seasoned clinical researchers. Among the five experts, three were from VA and two were outside consultants. The latter represented university and National Institute on Deafness and Other Communication Disorders (NIDCD) perspectives. The role of the mentors was to provide guidance to the group of proteges before, during, and after the workshop as they prepared research grant proposals for merit review.

A unique coordinator role was carried out by one of the co-authors of this paper. During the workshop, notes were kept regarding action plans of each protege. Following the workshop, the coordinator stayed in touch with the proteges to encourage and guide them to their mentor or other resources locally as barriers to progress on their proposals were identified. This role proved to be key to the successes that will be identified later in this paper.

Mentoring During the Workshops

Participants and mentors were asked to establish short- and long-range goals at the outset of the workshop, so that the organizers could be sensitive to their expressed learning needs. Those for Group 1, representative of both groups, are contained in Table 1. Short-range goals reflect more of the proteges' interests, with long-range goals influenced by input from mentors.

The plan for Group 1 called for brief reports from each of the proteges during an initial session of the workshop with all mentors. The unintended result was a long discussion of each proposal among audiology and speech-language pathology proteges and mentors. The discussion focused on research design, equipment, test selection and validation, and specific needs of each proposal. Some of the most helpful questions came from the alternate profession, as audiology mentors and proteges engaged speech-language pathology proteges, and vice versa. This spontaneous, highly interactive, and apparently satisfying activity reflected the proteges' enthusiasm for constructive feedback and the organizers' efforts to

structure a supportive climate. With Group 2, the same open and productive exchange evolved.

In the next segment of the workshop, participants separated into two specialty groups (audiology and speech-language pathology) to address in detail the remaining problems within each proposal. With two mentors in each group of four proteges, major individual time could be devoted to each proposal together with group learning experiences. The two-and-one-half day workshop was divided, with much of the first day spent in the large group, the second day in small group and individual consultation, and the third half-day in the large group for reports from the proteges regarding their action plans. Mentors helped their proteges in responding to additional questions and suggestions from the large group. Again, the atmosphere of acceptance and involvement in others' work appeared to produce an esprit de corps among participants. This supportive relationship would be seen during the year to follow, through frequent phone contacts among participants regarding their research efforts.

Outcome of the Workshops

The only result of the workshops that was easily measured was the evaluation provided by participants. For Group 1, an overall rating of 4.8 on a possible 5.0 scale was generated. For Group 2, the rating was 4.85, indicating that the format and objectives were perceived as very helpful to participants. Other measurements of outcome will extend over the next several years. Some of those results can be discussed in terms of actions taken by proteges. Some are reflected in success at obtaining research grants and their corresponding funding levels.

First, it is helpful to look at an analysis of the problems observed in the original proposals, with a subsequent view of success factors that actually led to effective outcomes. For both groups, a review was conducted of conceptual, technical, and statistical issues that were noted in the proposals by reviewers and mentors. They are aggregated in Table 2. Not surprisingly, most of these items are commonly seen in proposals submitted to funding agencies. Most mentored clinicians had difficulty selecting proper methods of data treatment, determining sample size, and clearly communicating their research plans. Information about experimental conditions, procedures, and test stimuli were often omitted from the original proposals. The most common problem was difficulty in limiting the scope of the study, a problem characterized by inability to focus on a single, well-defined, investigative question.

Each of the mentored clinicians in Group 1 was monitored by the workshop coordinator for approximately two years following the workshop. These contacts were guided by the

action plan dates set by each participant. As illustrated in Table 3, five of the mentored clinicians revised their original proposals in line with mentors' recommendations within four months. Four of them now have formal collaborative agreements established with others who can enhance the quality of their research and with facilities where equipment not available in their own VA medical centers can be used to carry on their projects. Two proteges have been very productive, with spin-off projects approved. Other important action steps involved the acquisition of equipment specified in the mentored proposals, together with assignment of research space and protection of at least several hours of research time each week in the individual's clinic schedule. There was a significant relationship between hospital management support and progress with research space, equipment, and time among the mentored clinicians. At the two-year mark and beyond formal data collection, five of the eight participants in the workshop had received some type of funding, with two of them receiving merit reviewed grant support.

For Group 2, monitoring has been in place for almost one year. During that time, six out of eight had revised their proposals and submitted letters of intent within the first four months following the workshop. To date, one participant has received full merit reviewed research funding. A major goal of each workshop was for the participants to acquire funds for their research. One must remember, however, that there are many steps between a first-draft proposal in need of extensive revision and the end product of a funded, completed, and published research project. One must realize even the best proposals may go unfunded in times of limited allocations. It is important to look at the process that evolved among these proteges and their mentors in both groups.

Their achievements were not easy or fast since all remained involved with heavy clinic schedules. Certain trends emerged from these two workshops that seemed to provide predictive value in who would progress with their research efforts. These trends are illustrated in Table 4. Clearly, those who maintained proactive contacts with mentors and seemed to find inventive ways to move forward with some aspect of their projects were the ones most likely to progress with their research interests. Early signs of this productivity were evident in their application proposals. It was also apparent that support from their medical centers helped reinforce such progress, although it was not always a major determining factor.

Conclusions

Based on experience with the two groups of mentor/proteges, it appears that a process involving merit reviewed applications, workshop activity, and follow-up mentoring on an

individual and group basis over an extended time produces positive results for a system like VA, with clinics and staff placed throughout the nation. Using telephone and computer mail linkages, much can be accomplished through group and individual networking. Experience with this process suggests that those with research degrees and some experience in generating proposals are in a position to benefit most by the process described in this paper. Future research mentoring workshops should be structured to maximize the amount of time for reworking proposals. Groups with two mentors and four proteges appear to be the optimum mix to accomplish the objectives of the workshop. It appeared helpful to mix audiologists and speech-language pathologists for didactic sessions on proposal writing and generic discussions regarding issues of research design and statistical management. Individuals with substantial evidence for successful grantsmanship, publications, and teaching skills best fit the roles necessary for mentoring. Post-workshop follow-up involving a coordinator working with the mentors and proteges is considered essential to keep the process moving forward. Proteges benefit by someone who can guide them through the inevitable succession of barriers and delays.

Other models for research mentoring complement the one described in this paper. For example, members of the nursing profession in graduate training programs in 13 midwestern states have built a solid research network that has had federal grant support and demonstrated significant research productivity of its members (McElmurry, 1986). Beginning with annual regional research meetings, participants first identified individuals who had unique areas of research expertise, then outlined areas of theoretical interest among their membership. They met regularly to discuss these common interests, to map out collaborative research projects, and to plan ways of getting around the missing elements in their projects—personnel, equipment, and money, among others. Twenty-one groups evolved out of this effort, each with its own principal investigator and two or three less experienced members.

In conclusion, other professions similar to our own have met the same problems we have faced in stimulating scholarly activity and have overcome them to some extent. Good researchers may be born, but good researchers can also be shaped with the right kind of nurturing environment and mentoring relationships. The mentoring model described in this paper has successfully supported clinical researchers in a health care network in which the primary focus is on patient care. It also offers a model for retaining and strengthening existing research resources within large health care systems.

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Table 1. Goals of Group 1 (1990) workshop participants.

SHORT RANGE
Review and revision of proposals
Identification of sources of funding
Acknowledgment of need for collaboration
Improvement in proposal writing skills
Recognition of strategies for meeting research and clinical workload requirements on the job
Drafting letters of intent
Establishment of action plans and deadlines
LONG RANGE
Communication of workshop outcome throughout VA
Publication of workshop outcome and strategy
Presentation of initiative at professional meetings
Development of additional research workshops
Transfer of format to other specialty areas in VA
Stimulation of interest in proteges' co-workers
Maintenance of research momentum
Development of a climate of support for research among VA colleagues in communication disorders
Increased number of successfully competing applicants for research funds

Table 2. Problems by percentage of the total for Group 1 and Group 2 participants (N=16) in original proposals.

CONCEPTUAL	
Inadequate limit to the scope of the study	38%
Incomplete literature review	38%
Weak rationale	38%
Basic concepts violated	50%
Use of nonvalidated measures	25%
Research question already answered	13%
Nonsensitive procedures proposed	13%
Underutilization of collaborators	13%
Procedures that do not address research question	13%
TECHNICAL	
Standard research proposal format not followed	13%
Absence of provisions for interjudge reliability	25%
Absence of formal collaboration agreements	13%
Outdated instrumentation included in design	25%
Budget inaccuracies	38%
Terms not defined adequately	50%
Priorities not addressed	25%
Equipment not available	63%
Lack of familiarization with complex equipment needed	25%
Omission of tables, graphs, and other illustrations	75%
Noncurrent literature review	13%
Insufficient detail in describing procedures	88%
Pilot data not provided	75%
STATISTICAL	
Absence of clearly stated rationale for tests needed	88%
Total lack of statistical treatment planned	13%
Difficulty in determining proper number of subjects	38%

Table 3. Action steps of Group 1 mentored clinicians.

ACTIONS ACCOMPLISHED	MENTORED CLINICIANS 1	2	3	4	5	6	7	8
Mentored proposal revised	4*	1	2		4	3		
IRB** application	4	1			5			
Data collection started	2	I			5			
IRB application approved	5	5						
Spin-off proposal approved	4	2						
Equipment approved	4	2						
Spin-off study started	4	4						
Equipment received	5	4						
Research space assigned	5							
Clinic schedule reduced	5	1						
Research time assigned	5	1						
Collaborative agreements made	5	I			4			
Letter of intent/collaboration written			8					
Pilot project begun		5			5			
Pilot project completed			12		7			
Letter of Intent submitted	5	8		5				
VA Merit Review Proposal sent	6	14	12	6				
Proposal reviewed by Merit Review	10			10				
Proposal revised and resubmitted				12				
VA Merit Review approval	10							
Study funded	12							
Funded study begun	12							

* Interval (months) following workshop
** VA's Institutional Review Board

Table 4. Characteristics of protege behavior with application, workshop activity, and workshop follow-up: predictors of success.

POSITIVE PREDICTORS	NEGATIVE PREDICTORS
APPLICATION	
First author on previous research or publication activity	Never a first author
Regular and recent publications	No publications in several years
Previous grant applications funded (even if only small)	No previous grant applications approved
Proposal is easily read and understood by other discipline	Other disciplines have difficulty with logic in proposal
WORKSHOP	
Clinician is willing to revise proposal	Clinician is not willing to revise proposal
WORKSHOP FOLLOW-UP	
Clinician shows rapid, specific responses to post-workshop monitoring efforts	Responses to monitor activities are nonspecific—progress difficult to assess
Clinician initiates additional contact with monitor and mentors	Monitor activities are avoided
Clinician never stops moving on the project, even with delays other spin-offs move forward	Problems and delays stall the project, with no other aspects addressed
Evidence of progress is seen with every mentoring contact	Extended periods of no progress occur
Clinician initiates and maintains contact with research personnel in own medical center	No ties are formed between clinician and facility research personnel even when recommended
Clinician is innovative and aggressive in locating nontraditional sources of funding	When dead end is encountered, no further steps are taken
Clinician carries out a manageable portion of the original, too-broad proposal	Clinician is unable to limit focus on a manageable part of original proposal
A finite period of time—an afternoon a week—is set aside	No protected time has been set and other activities prevail

Promoting Collaborative Research in Communication Sciences and Disorders in the Hospital Setting

Alex F. Johnson
Henry Ford Hospital

Just over four years ago I was hired to develop a new speech-language pathology program at Henry Ford Hospital in Detroit. I was given a budget, approval for eight positions, clinic and laboratory space, and tremendous support for innovation in the development of an integrated clinical, research, and educational program. This paper describes one aspect of this program, a two-year post-MA fellowship experience, which exemplifies our model of mentorship.

Background Information

Henry Ford Hospital and Health Sciences Center is a regional health system serving southeast Michigan. It includes a 900-bed tertiary care hospital, a strong history of research activity, a large outpatient clinic, and several large satellite centers in the community.

The Division of Speech-Language Sciences and Disorders is organized as a component of the Neurology Department, although patients are referred from sources throughout the institution. The division staff currently consists of two PhDs, six MA experienced clinical specialists, and three clinical fellows.

Assumptions

Before proceeding to describe the fellowship in more detail, it is important to present the assumptions that have been considered as this program has been developed. The assumptions are as follows:

Research activities belong in a clinical setting. Although a case can be made for separating basic research activities from those that are more clinically focused, it is important

to emphasize the role that research activity can play in a clinical setting. Likewise, the value of a strong clinical program to the development of focused, valuable, and relevant research should be acknowledged. Not every clinical program is suited for a formal research emphasis. Nevertheless, it is difficult to conceptualize an active clinical research program outside the context of the clinical setting.

Clinicians can do research. There has been considerable debate in academic and clinical settings as to whether clinicians can (or should) participate in research activities. This question can certainly be argued from a number of perspectives, but for the purposes of our own program we have simplified the issue by defining the role of most of our clinical positions to include research.

Most MA-level clinicians are not prepared to do research in the clinical setting. Most of the serious training in research activity occurs at the doctoral training level. MA-level clinicians may have completed a master's thesis or assisted a faculty member with a research project, but rarely have they participated in a project from the conceptualization stage through culmination. Thus, if clinicians at the predoctoral level are to become involved in active research, they must have an opportunity to learn about the research process to develop necessary skills and competencies.

Clinical research advances practice. This may be obvious to those active in research careers. However, practicing clinicians often comment that they do not see the link between research activities and clinical processes, programs, and outcomes. It is important for persons involved in research to help make explicit the bridge between information generated by research activities and clinical innovations.

Clinical observations advance research. Just as clinicians must acknowledge that professional practices are advanced by research, so must researchers recognize that the most relevant clinical questions become most obvious in the "real" clinical world.

Given these assumptions, our fellowship program has been designed to develop strong clinical specialists in medical speech-language pathology who are prepared to provide specialized care to teach, to do research, and to lead clinical programs. As a secondary goal, the program has been designed to provide a bridge between the master's curriculum and doctoral study for those who are not sure that they are ready for a full-time research program, but wish to consider doctoral study in the future.

In today's clinical world it is unreasonable to expect master's programs to develop clinical specialists in any area of professional practice. We have designed the HFH clinical fellowship program to address the need for specialization within an integrated framework of intensive clinical experience and collaborative practice with experts in speech-language pathology as well as outside professionals, emphasizing a scholarly approach to solving clinical problems.

In the subsequent discussion, I will emphasize some of the specific aspects of our fellowship program and then explore these activities in detail from a mentoring perspective.

Fellowship Content

The HFH fellowship replicates the medical model of education. Extensive teaching activity occurs incidentally as patients present themselves for diagnosis and treatment. In many ways our approach can be considered as a formal residency in speech-language pathology.

Intensive inpatient experience serves as the basis for clinical teaching activities. Each fellow spends six months on the inpatient service developing a core set of clinical competencies for consultative practice and treatment. One of our senior staff conducts regular teaching rounds at which fellows, along with graduate student interns assigned to the inpatient service, present cases emphasizing both the traditional speech-language diagnostic process and the integration of information from various medical specialties and tests.

Throughout the two-year fellowship, these clinicians participate in approximately four hours of didactic coursework per week, taught by our own clinical staff, neurologists, pediatricians, otolaryngologists, psychologists, and other professionals.

Laboratory experience includes extensive participation in the speech physiology laboratory. Fellows are also given the opportunity to participate in other labs within the institution. Next year we will begin a program with our neuroradiology research group focusing on techniques for neuroimage analyses and brain-behavior correlational analyses.

In addition to the research exposure and participation included throughout the entire two-year program, each fellow is given the equivalent of three months release time during the second year to engage in an applied research project.

The two-year program is divided as follows. In the first year, the fellows complete their inpatient rotation and complete two formal courses. The advanced diagnosis course,

which lasts for six months, emphasizes cause-effect relationships between disease processes and their effect on speech, language, cognition, and communication. This course also includes a six-week segment taught by a behavioral neurologist. The clinic research course involves experience in designing and carrying out an experimental protocol, with subsequent preparation of an abstract for submission to a scientific meeting. In this first year, all of the requirements for the ASHA Certificate of Clinical Competence are completed.

The second year of the program focuses on specialization, leadership development, and expanded research opportunity.

Specializations available are in neurogenic communication disorders, general pediatric communication disorders, infant communication, dysphagia, and voice disorders. These areas are defined by the expertise of our clinical staff, availability of committed staff from other disciplines, and the technology available to support clinical and research endeavors. Note also that these areas of specialization are in current demand in the job market in medical speech-language pathology. Development of expertise in these areas by our fellows makes them attractive candidates for clinical leadership positions once they have completed the fellowship.

In year two, then, the fellows focus on clinical and research development in the context of their clinical specialty area. All of their activities are developed with a mentor and a written plan for the second year is formulated. Although each plan is individualized, the key components of the second year are experience in teaching other fellows and graduate students, extensive clinical practice in their specialty, additional research experience, and preferably submission of at least one article for publication.

We are now in the third year of this endeavor. Three fellows have completed the program and three more are in the first year. Assessment of the efficacy of our approach is challenging because there are no data for comparison purposes. At this time we have only anecdotal information for evaluation purposes.

The clinical performance of the clinicians who have completed the program has been excellent. Upon completion of their program they were independent, productive, efficient, and respected by our own staff and by outside referral sources. Two have enrolled in PhD programs and one has joined our regular staff. She is serving currently as the manager of my research project in acute aphasia evolution. Each one has presented at a scientific meeting, and two have papers in progress that will soon be ready for submission. Their research

projects have been clinically focused, as might be expected. Examples of the diverse research activities of the HFH Clinical Fellows include

- a study of the relationship between perceptual and acoustic speech characteristics and severity of dysphagia in acute stroke,
- sensitivity of visual analog scaling in measurement of functional communication change in aphasia, and
- efficacy of home-based programming for improving parent-child interaction in children with bronchopulmonary dysplasia.

Future Directions and Challenges

In the information that was sent to me by the conference planning committee, I was asked to identify problems of the program. Although we have not experienced any significant difficulties with our fellowship to date, I am able to identify a potential problem. Our program is not for everyone. Its success depends on our ability to attract motivated, mature new graduates who are interested in and committed to the development of specialized expertise in medical speech-language pathology. This fellowship experience is designed specifically for the individual who wishes to pursue rigorous training and also wishes to obtain a structured bridge experience between MA studies and either a permanent clinical position or initiation of a PhD program. The challenge lies in our ability to continue to identify and attract the individuals for whom the program is designed. Our inability to do so would clearly undermine the intent of our program and its efficacy.

We anticipate adding two first-year fellows next fall. We also anticipate development of a collaborative program with a university to expand the research experience in our fellowship to accommodate PhD students.

In summary, the key charcteristics of our post-MA clinical/research training paradigm are full two-year fellowship experience, focus on specialization, allocated time for didactic instruction and research, committed available mentors, and strong interdisciplinary participation.

The development of this program has been challenging and rewarding. We believe that we have demonstrated that post-MA individuals can combine the traditional ASHA Clinical Fellowship Year with other experiences to accomplish specialty expertise, research capability, and leadership potential for our field. We are eager to see this model replicated in other health institutions and in nonmedical clinical settings.

Developing Expertise for Tomorrow: Mentoring Young Researchers in Clinical Settings

Patricia J. Krantz
Princeton Child Development Institute

Since 1975, I have conducted research and mentored young researchers at the Princeton Child Development Institute, an intervention program for children and adults with autism. I would like to begin by addressing a question about contingencies. Why do I, an administrator and practitioner, engage in research and mentor students? My answer is that I cannot afford not to do so. In my experience, the quality of human service programs is seriously compromised in the absence of ongoing research programs. In my applied setting, research questions typically emerge from practical problems, and research results are quickly implemented to improve services and to enhance clinical outcomes.

The topics of research in applied settings are many, but they can be organized into several broad areas, regardless of the specific mission of the human service program. Research in clinical environments may address specific intervention procedures and client outcomes, staff training and measurement of staff performance (and, of course, the relationships between staff training and client performance), and administration (that is, on organizational behavior and systems analysis). Thus, in clinical settings of any size, a host of research questions await investigation by people from a variety of different academic backgrounds. Clinical settings that provide services to people with autism, deafness, or aphasia all present the same broad areas of research opportunity—research on intervention, research on staff training strategies, and research on service delivery systems.

But opportunities do not automatically arise to do research in all or even one of these areas. What makes a clinical setting an attractive and potentially productive research setting for mentors and proteges? I preface my answer to this question by noting that my mentor advised me never to "run the shop," and perhaps I could have escaped a considerable amount

of administrative pain by heeding his advice. Nevertheless, I believe that "running the shop," or assuming administrative responsibility for an applied setting, has a very significant effect on a broad array of issues pertaining to successful mentoring.

It is my understanding that "running the shop" means developing a system in which each system component—administration, staff training, client intervention, evaluation of staff performance, and evaluation of client outcomes—regularly exchanges data with every other system component. To the extent that we are successful in designing such systems, we have already arranged important setting events that contribute to proteges' successful completion of early research experiences. Let me specify some of the reasons that I believe this to be the case.

First, the existence of a system that emphasizes and values data is conducive to research. Administrators who are scientist-practitioners can establish staff expectancies about the ongoing nature of research and about the ways in which research can influence clinical practice. Such effects are especially pronounced if participation in research projects (as a teacher, observer, or reliability checker) results in extra attention from supervisors and peers. My experience with intervention agents consistently indicates that most of them want to advance their careers by continuing to develop new skills, and participation in research offers such an avenue. Thus, it is not only pre- and postdoctoral students and senior researchers who do research—research is integral to the continuing work of many members of the organization. Young researchers entering such settings are not viewed by clinicians as outsiders, but as colleagues who can contribute to ongoing programs. This organizational receptivity is an important gift that a mentor who is a scientist-practitioner can give to a protege.

Mentoring young researchers in applied settings that are administratively controlled by scientist-practitioners can prevent a lot of pain. Proteges need not jump through myriad hoops in order to obtain approval for specific projects (as long as the proposed projects are ethical, socially important, and follow guidelines), because research is not the province of a few persons in a separate department, but is widely recognized as a critical activity of many persons who occupy a variety of roles in the organization.

Further, given the recognized social importance of the research, complaints from intervention agents about "pull out" research are irrelevant. And the administrator-scientist-practitioner-mentor can help to prevent potential confounds by ensuring that intervention schedules, therapy times, clinicians, and settings remain constant.

When research issues emerge from real and ongoing problems in human service systems (e.g., John hasn't yet developed adequate voice volume; Mary, who has learned to respond to many questions, does not initiate interactions with others), intervention staff in a scientist-practitioner model are receptive to implementation of research findings that solve clinical problems. We are often dismayed about the time lag between publication of university-based research results and their application in clinical settings. But when the potential consumers of research are participants in the research process, research findings may be put into practice much more quickly. And it is important to note that rapid application of new research results not only improves clinical practice, but also serves as an important reward for novice researchers, who have opportunities to observe the social impact of their investigative efforts.

Because this may sound a bit idealistic, I must comment on the level of effort required to create such a system and on some necessary system components. Although we have replicated such systems a large number of times, we have noted that some replications quickly go to rack and ruin under administrations that do not use a scientist-practitioner model.

In my view, yoked outcomes for personnel in all parts of an applied program is an essential system component. That is, trainers are recognized as successful only if new staff members acquire relevant skills, staff members' rewards are linked to clients' documented progress, and administrators' outcomes are contingent on data that substantiate staff members' acquisition of intervention skills and clients' progress in achieving treatment goals. In such a system, research is much more likely to be nurtured and supported, and research results are much more likely to be implemented, because the human service agency is outcome-oriented, and everyone's rewards and recognition are tied to intervention effectiveness. Further, in this environment, novice researchers are likely to be rewarded for early research experiences, because mentors' successes are yoked to the quantity and quality of their proteges' research endeavors.

Of course, young researchers focusing on intervention tactics will not be accepted or acknowledged if they do not have the prerequisite skills that enable them to systematically deliver intervention procedures that may be called for by specific types of research. The same data-based staff training procedures that are necessary to effective human service delivery must be available to our research proteges, so that their early research projects represent fair tests of the effectiveness of new procedures. One reason for the early failures of some young researchers is their lack of clinical skills, in comparison with well-trained intervention agents. Academic assignments do not inevitably result in expertise in clinical practice, but clinical skills may sometimes be essential to the conduct of specific research

projects. In such cases, mentors have a clear obligation to provide ongoing training and supervision to ensure that proteges acquire the intervention skills that are prerequisite to some clinical investigations.

Another key system component that promotes young researchers' success is system-wide training that addresses those behaviors identified in the staff training literature as "feedback skills." In a responsive human service system, all of the actors must be explicitly taught how to give and receive positive and corrective data-based feedback. Such instruction is preventive; it makes it possible to circumvent the myriad problems that our proteges may otherwise face—problems that relate to the interaction of the protege and his or her research with the existing clinical program (e.g., subject selection, scheduling of observations, research space), as well as problems that may arise in the mentor-protege relationship (e.g., authorship agreements and rights to research data). Training in feedback skills creates dependable and constructive problem-solving strategies. The resultant expectancies on everyone's part support novice researchers, include them as members of the intervention team, and ensure that their research findings will receive attention and, when appropriate, acceptance. Another advantage of mentoring in an applied setting is that research has meaning because everyone sees the results implemented, replicated, and extended or modified, and there are existing tracking systems that confirm or deny the long-term effects of specific procedures. Young researchers are positioned to enjoy not only the rewards of research and publication, but also the positive responses of colleagues and clients. Everyone has the opportunity to see research affect practice.

In the scientist-practitioner model that I have described, a contingency structure that yokes the successes of administrators, clinicians, and clients (as well as the successes of mentors and proteges) provides an organizational environment that is favorable to research. Mentoring in two specific areas—teaching feedback skills and teaching relevant intervention skills—helps to underwrite the acceptance of the young researcher and the attainment of research goals. And the protege's opportunities to see research results integrated into ongoing clinical practice generates rewards for his or her investment of time and effort, and helps to identify new research questions.

Although there are many advantages of mentoring in applied settings, in a slow economy, serious difficulties may arise. Operating budgets may decline, with the result that resources for research are compromised, and exacerbated competition for research grants may mean that grant monies are ever more likely to go to academic rather than clinical settings. Nonetheless, in an accountable scientist-practitioner system, responsibilities for support of

research continue to lie with the administrators, even in a troubled economy. During times of economic difficulty, long-term support for ongoing research may need to come from the governing boards of private, nonprofit human service agencies. Thus, the administrator-scientist-practitioner-mentor is responsible for educating the governing board about the importance of applied research and for helping board members to recognize that ongoing research, and implementation of research findings, is a critical mission of a clinical program. Administrators who fail in this task will ultimately lose opportunities to mentor.

Twenty years of mentoring young scientists in applied settings leads me to the following recommendations. Mentoring programs should not be "add on" or "extra" activities, but should be developed as integral and ongoing components of intervention programs. And those of us who mentor young researchers in clinical settings may want to focus on an additional dimension of mentoring—educating proteges about the importance of creating new intervention environments that will broaden the opportunities to shelter, facilitate, and promote research and to encourage new scientists.

At the very least, research should guide clinical programs. Better still, research should grow out of difficult clinical problems, and research findings should be quickly implemented to solve problems and improve intervention. Some of the most effective human service systems use a scientist-practitioner model in which socially significant problems give rise to research, and results are immediately put into practice. But it is unlikely that skilled young investigators will materialize in clinical settings in the absence of systematic and ongoing mentorship programs that are an integral part of an agency's agenda. Often, competent new investigators who can bridge science and practice cannot be purchased—they must be grown.

There are at least two mechanisms for creating new scientists. First, collaborative relationships with universities bring young people with strong academic backgrounds to intervention programs where they gain first-hand views of human problems, and through mentoring, acquire the skills that are necessary to applied research. Second, mentoring enables young people with strong clinical skills to develop research interests and research expertise. Ultimately, these two groups of young scientists display similar competencies and enjoy a collegiality that, of itself, bridges research and practice. With sufficient mentoring, they will be the research mentors of tomorrow.

Promoting Collaborative Research in Communication Sciences and Disorders Across Settings and Disciplines

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A research training program in communication sciences and disorders is described here from the unique perspective of a hearing science researcher and faculty member in clinical departments of two major medical schools: the Division of Head and Neck Surgery, Department of Surgery, at the UCLA School of Medicine, and the Department of Otolaryngology and Communicative Sciences at the Medical University of South Carolina (MUSC). At these institutions, I have been involved in research training and, at UCLA, served as an administrator, research trainer, and trainee on an Institutional Training Grant (National Research Service Award, T32 DC00008) from the National Institute on Deafness and Other Communication Disorders (NIDCD). The research training program at UCLA was established and developed primarily through the support of the NIDCD training grant, which has been under the direction of Vicente Honrubia, MD, for more than 17 years. Currently, research training is also supported by the Center for Vestibular Disorders at UCLA, which is one of five national multipurpose Research and Training Centers funded by NIDCD. Dr. Honrubia and other UCLA faculty are largely responsible for implementing and nurturing the training model described below.

The development and continued improvement of the training program is accomplished by considering the needs of several groups. First, of greatest importance are the needs of people who receive training. Second are the needs of the faculty and the training institution, and third, the current and long-term requirements of the broader community of researchers in communication sciences and disorders. It is important to review the needs of each of these groups to provide a perspective for the design of the training program.

In this clinical department/medical school setting, there are three levels of trainees. The largest number of individuals receiving research training are otolaryngology/head and neck surgery resident physicians. Trainees also include residents from other clinical departments, including neurology and, occasionally, ophthalmology. The next largest group of trainees are postdoctoral fellows, including some individuals who have received a PhD in communication sciences and disorders, as well as medical school graduates who receive research training prior to entering a residency training program. Finally, the smallest group of trainees are students enrolled in PhD programs. Because neither UCLA or MUSC has a graduate program in communication sciences, predoctoral students have been recruited from departments of anatomy and cell biology, electrical engineering, experimental pathology, experimental psychology, and linguistics. Typically, these students' interest in communication sciences research developed from courses offered in their home department or from a mentor who had established a collaboration with researchers affiliated with the training program.

The research experience and capabilities in these three groups of trainees vary widely, as does their knowledge and training in communication sciences and disorders and their dedication and commitment to research. This diversity necessitates the development of a less structured, more individualized training program to satisfy most optimally the needs of each trainee.

The primary needs of faculty members and the institution (in this case, a medical school) may be summarized for the purpose of this review as conducting research, educating students, and providing patient care. The research training program is undoubtedly consistent with the scientific and educational mission of the institution. The faculty represents a broad range of specialties, including otolaryngology, neurotology, neurology, ophthalmology, audiology, speech-language pathology, linguistics, experimental psychology, engineering, anatomy, physiology, and experimental pathology, each of which is scientifically independent and self-sustaining. Nevertheless, a common interest in communication disorders that relates to each of these disciplines provides a central focus for the faculty and fosters a multidisciplinary approach to research and research training. Although it is assumed that a medical school's mission of health care delivery is indirectly served by the research training program, this complex issue will not be addressed, as it is beyond the scope of this paper.

In addition to the needs of trainees, faculty, and the institution, the long-term research training and research personnel needs for communication sciences and disorders have been carefully considered. Critical needs were reviewed by the NIDCD in their National Strategic Research Plan (1989), and four may be summarized as follows. First, there is a need to

recruit outstanding graduate and postgraduate students to research careers in the communication sciences. Second, clinically trained individuals (such as otolaryngologists, neurologists, speech-language pathologists, and audiologists) should be encouraged to focus on research related to communication disorders. Third, individuals trained in new technologies and disciplines should be encouraged to apply their knowledge to communication sciences research. Fourth, collaborative research between basic scientists and clinicians should be fostered. The medical school setting of the research training program affords a unique opportunity to address each of these needs.

After considering the needs of each of these constituencies (i.e., trainees, faculty, the scientific community) and the resources available at the host institutions, three principal goals for the training program emerged. These are (a) to provide research training focused on the broad discipline of communication sciences; (b) to provide education and training in the prevention, detection, treatment, and rehabilitation of the wide range of diseases that underlie communication disorders; and (c) to prepare scientists and clinicians to be productive, independent researchers.

To achieve these goals, the optimal training program should consist of at least four key components. By carefully selecting these components, a unique training plan may be formulated, based on each trainee's education and research and professional experience. The first and most important component is trainees' direct participation in research. Other components include a variety of education and training opportunities, formal coursework offered by other university departments, and specialized training in selected topics or techniques. The following sections describe each of these four components in greater detail.

Practical laboratory experience is an important supplement to both academic and clinical training. Trainees take part in a broad range of research in communication sciences and disorders, conducted in laboratories with extramural support. For trainees who are resident physicians, a 6- to 12-month period is devoted exclusively to laboratory research. Five to six months prior to this time, residents meet with faculty, formally select a mentor, prepare and submit a written proposal, and make arrangements for funding and acquiring equipment, if necessary. Upon approval of the proposal, residents enter the laboratory for six months and have no clinical responsibilities. Residents may ask to continue in the laboratory for an additional three to six months; such requests are considered by the entire faculty, and approval is contingent on documented progress, need, and funding.

Predoctoral and postdoctoral trainees may participate in a "laboratory rotation" soon after beginning training, in which they spend a brief time in each laboratory in the training program. In addition to allowing faculty members to meet each of the trainees, this introduction to the research program of each investigator often guides the trainee's choice of an area of interest. Moreover, it permits the trainee to survey a variety of approaches to research questions related to communication sciences.

Postdoctoral trainees are responsible for every aspect of their research project. Working under their mentor's direction, they formulate the goals of the experiment and its design, and collect, evaluate, and disseminate the results. For predoctoral trainees, specific research activities are often guided by the requirements of the degree-granting department. Trainees may elect to fulfill these requirements and conduct their dissertation research in the department's laboratories. In their role as mentor, faculty members from the training program serve on the doctoral candidate's dissertation committee. It is recommended that all trainees (including residents) present the results of their research project at scientific meetings, and participate in the preparation of manuscripts that are submitted for publication.

In addition to direct involvement in funded research projects, a variety of education and training experiences provides a stimulating, scholarly milieu for both faculty and trainees. This element of the program undergoes continuous modification, and periodically items are added, revised, updated, or deleted as a result of ongoing program review by faculty, residents, and trainees. Examples of education and training experiences available to trainees are described below.

Weekly clinical and research seminars are conducted by faculty, residents, students, or visiting scientists, and are attended by everyone. Faculty members may lead a discussion of a current topic or a controversial issue. Residents may report the outcome of experiments conducted as part of their required research. Predoctoral students may review the results of their dissertation research. Postdoctoral trainees may present a seminar in preparation for a presentation at Student Research Day or at a national meeting. More informal interaction among trainees and faculty members takes place during regularly scheduled meetings of research groups. For example, faculty, trainees, students, and staff involved in research focused on a particular topic meet on a regular basis to review progress, plan new experiments, and develop future goals.

Other educational opportunities combine classroom and practicum experiences. These include (a) one-on-one supervised practicum in audiology for otolaryngology residents during

their first year; (b) a month-long course offered each July, designed to introduce critical information to new residents early in their training; and (c) the Basic Science Lecture Series, a two-year, weekly course taught by faculty in otolaryngology and other departments, covering a broad range of topics.

In another component of the training program, predoctoral and postdoctoral trainees are encouraged to enroll in courses offered by other university departments. In addition, predoctoral trainees are required to complete the degree-granting department's requirements regarding curriculum and comprehensive examinations. Because biomedical research is becoming increasingly complex and specialized, and because communication sciences research is interdisciplinary and requires the integration of basic science and clinical information, trainees are often left with gaps in their knowledge. Even without the resources of a graduate program in communication sciences and disorders, both UCLA and MUSC offer many courses that are well suited to trainees. A sample of departments (and course offerings) that would be appropriate for individuals in research training in communication sciences includes the following: Anatomy and Cell Biology (seminar in neuroscience); Biology (anatomy and physiology of sense organs); Biostatistics, Epidemiology, and Systems Science (multivariate methods in biology and medicine); Engineering and Applied Science (digital signal processing, computational neuroscience); Experimental Pathology (neurobiology of aging); Linguistics (experimental phonetics); Physiology (neurophysiology of sensory systems); and Psychology (perceptual development, language and communication).

In the program's fourth component, mentors may recommend in-depth instruction or training in selected topics or techniques. With the addition of rapidly advancing technologies, a strength of the training program is the opportunity given to trainees to master new techniques in related disciplines. For example, training relevant to communication sciences research available in the medical school setting includes biomedical image processing, cytochemistry and histochemistry with light and electron microscopy, electronics for neuroscientists, methods in molecular and cellular biology, practicum in phonetics and phonetic data analysis, and techniques in molecular genetics.

Three critical aspects of the training program should be noted here, although they will not be described in detail. First, in every component of the program, in laboratories and in the curriculum, mentors are responsible for ensuring the highest level of scientific integrity. Second, in the training program's recruitment efforts, special emphasis is placed on identifying and recruiting candidates who are members of minority groups that are

underrepresented in scientific research. Third, detailed plans are in place for monitoring trainee activities and progress and assessing program quality.

In summary, the following section reviews several of the program's strengths. First, it is multidisciplinary both in its faculty and trainees, appropriately representing the broad spectrum of basic and clinical sciences that are fundamental to communication disorders research. Second, the medical school/graduate school setting supports and encourages collaborations among researchers and practitioners, interactions that are facilitated by long-established working relationships, as well as the close proximity of laboratory and clinical facilities. Third, trainees are exposed to programmatic research focused on an array of topics related to communication sciences and disorders. Fourth, the program's flexibility allows it to meet the needs of the individual trainee, and its resources, available through several university affiliations, support a variety of research activities. Finally, and most importantly, the training program helps to fulfill the long-term research training and research personnel needs of communication sciences and disorders.

Although the program has many strengths, a research training program does not operate in today's medical, political, and economic environment without concerns about its future. Of primary concern is the uncertainty of funding for research training. The lack of a stable funding base has a direct effect on current training, but also indirectly affects the recruitment of new researchers. An additional concern is the expanding clinical responsibilities of both faculty and prospective trainees, which directly compete with research training. Moreover, as programs grow and become increasingly specialized, there is a risk that they will become less interactive and clinically focused, and more scattered and isolated. Finally, a most serious concern for the future scientific base of communication disorders is the erosion of research training in their graduate programs, which substantially reduces the number of outstanding candidates for postdoctoral training. Unfortunately, in a medical school setting, communication sciences researchers alone do not have the capability to reverse this trend. Nevertheless, it is critical that training programs in the medical school setting continue to provide outstanding opportunities for research training for graduates of programs in communication sciences and prepare them to become productive, independent researchers.

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Section 5

Training the Next Generation of Researchers

Research Mentorship: A Personal View

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I'm not sure whether it is because of my own idiosyncratic history or a reflection of a difference in generations, but I don't recall discussions of "mentoring" when I was growing up in this profession and I don't believe I would have been familiar or comfortable with the term. Now that I look back, I suppose my first mentor was my Uncle Meyer. As a teenager I was a delivery boy in Uncle Meyer's grocery store on Cropsey Avenue in Brooklyn. He showed (not taught) me mechanics—the proper way to bag groceries, how to rotate the stock on the shelves, how to organize the deliveries in the pushcart—and also creativity—how to change the labels on the milk bottles so that Monday's milk would miraculously become Tuesday's. Uncle Meyer's corner grocery store was really a social service center where people congregated before and after they went someplace else, where Meyer dished out wholesome advice along with half-sour pickles from a wooden barrel, where half the customers bought "on the book," and half of those eventually paid the bill. The grocery store was the center of Uncle Meyer's life. He arose at 4:00 a.m. twice a week to go to the market so that he could handpick quality fruit and vegetables. He laid these out with loving care, concern, even passion. He treated his customers with respect and humor and knew all the intricacies of their lives. All I ever needed to know about mentoring I learned from Uncle Meyer—except for the part about the milk bottles, of course.

Until recently it never occurred to me that I had a mentor in any formal sense, although I have had many fine teachers who deeply influenced me. They did so in ways I've almost taken for granted. Like Uncle Meyer, they were committed to their own work. They praised mine when it was worthy and, perhaps even more significantly, they took me seriously enough to criticize my work when it wasn't worthy. I suppose all of this was mentoring, but I have the feeling that perhaps the most significant things they did for me were not especially for me at all. The most important things I learned from my best teachers were to honor and

to delight in the enterprise, to labor over the questions, and to experience the exhilaration of getting something right, of solving a problem, of having a good idea, of testing that idea, of reporting all of that in good prose that would capture a reader's interest, of publishing an article that just might create a hint of that excitement in someone else—someone remote who knew nothing about me but would care about my ideas.

In many respects, the most important thing my teachers or mentors did for me was to do what they themselves felt compelled to do—to engage in the research for their own rewards, not out of regard for me, but because of their own drives and curiosity, their own intellectual compulsions.

It has been made abundantly clear at this conference that students need models so they can see what the business of scholarship is about, and so we mentor well when we perform those very tasks we want our students to perform. I enjoy doing research. I enjoy writing. I admit it, I love to see my work in print. I think I serve my students best, I mentor them best, when I practice those professional activities I love the best. I seek out collaboration because it helps me to think creatively and to extend myself. I enjoy working with students because it is satisfying to see them grow and to experience their excitement in the process of research and to know I've had a hand in that process. I persevere in the face of dwindling resources, obstreperous human subjects committees, and metastasizing administrative responsibilities because the research is a sanctuary where I can still find fulfillment and regeneration.

We have heard formal models of mentoring articulated at this conference. A mentor provides encouragement, advice, nurturing, and understanding to students and colleagues. All of these are important, but if we are to deal with the crisis in research that motivated this conference—the shrinking proportion of our colleagues who make research part of their professional identity—perhaps the most important thing we can do for our students is to put our own passion and commitment on display, to do the research, conduct the studies, maintain the program, publish the results. And revel in the process.

I obtained tenure in a simpler time, when the requirements were not so formidable and departments were not so demanding. I've always heard the expression "publish or perish," but in those earlier years it was not so terrifying a slogan and didn't hang so heavily over my hopes and fears as it does today for young faculty. And yet I'm guided more by that slogan now than I was early in my career. I need to do research and to publish because that's how I know that I haven't perished, because that is how I've defined my professional and personal

well-being. I suspect that's true for most senior researchers. We carry out and publish research because we have to, for our own self-respect—not out of especially noble impulses.

One of the things young faculty members need to learn is that they serve their department, their university, and their profession best when they do what they have been educated and really want to do—when they do the research they've been aching to accomplish, when they get their work in print, to the delight of their families, their colleagues, and their former teachers. One of the great privileges of a research career is that we are most successful when we are most self-indulgent.

A department that truly cares for its young faculty will make that lesson patently clear, by shielding young faculty from time-consuming administrative obligations, by providing these young faculty with the time and resources to get their research going, by expressing interest and enthusiasm in their developing research programs, by welcoming them into the research community.

There are many ways to conceive of mentoring. I think of it as a set of behaviors that have especially fortunate and fulfilling consequences and are maintained by those consequences. For one thing, as mentors, we model the research role by designing and carrying out research and following through to publication. For me, this is the most important part of mentoring, and the most gratifying. If we are to succeed in this most important aspect of mentoring, we need to support and promote the research activity of our profession by providing time, money, and resources for research, and by creating professional environments in which professionals—especially new graduates—are not so overwhelmed with other time-ordered responsibilities that research necessarily becomes the last item on their daily menu.

We are mentors when we conduct research in collaboration with our students and young colleagues. I do so because they help me with new technology and challenge my ideas. They help to get the research done in more interesting ways. It is no sacrifice. I enjoy having someone share in my enthusiasms and interests and I enjoy being able to display the skill and knowledge I've built up over the years of doing research. I enjoy the success and accomplishments of my students at least partly because I am personally honored through their accomplishments, and because it reflects favorably on my department and on me.

There have been many reflections on mentoring at this conference and its importance for the vitality of our profession. Mentoring is a special relationship that is carried out in the context of research. If there is anything different about my personal view of mentoring it is

the focus on that context. The relationship is also clearly important and has been the main concern of this conference, but I submit that equal attention needs to be paid to the context, to the research enterprise. I believe that for mentoring to succeed, those of us who are cast in the role of mentors need to persist in just those behaviors that promote and sustain research.

Since he gave up his grocery store, my Uncle Meyer has diverted his passion to gardening—even in Brooklyn, and that is a proper metaphor for the way I think about mentoring and research. To grow a garden, one needs sun and rain and seed, but these are of little value unless there is a field to be planted and cultivated. Mentoring provides the sun and the rain; the questions that compel and attract us provide the seed. But it is a vital, ongoing research commitment that provides the field. If we are to succeed in enticing the next generation of professionals into active pursuit of research, it will be because we have tended to our own field, and kept the research enterprise alive and thriving so that others will find the work rewarding and the opportunities challenging. That is my special and particular view of mentoring: do the work, tend the field, revel in its rewards, and welcome others to join us.

Section 6

Conference Recommendations

Conference Recommendations

Conference Steering Committee

Throughout the two-day conference, participants were encouraged to examine issues and identify priorities for research mentorship and training in communication sciences and disorders. In small interactive groups and one program session entitled "Audience Counterpoint," these participants provided verbal feedback regarding research mentoring needs. Outcomes of these discussions and written evaluation findings are summarized in the following recommendations. Priorities clustered into four major areas: awareness, education and training, mentor/protegee opportunities, and interagency collaboration. Suggested strategies follow in the four corresponding areas.

Readers should note that these recommendations come directly from the conference participants and, as such, may describe an action that could be addressed by a variety of sources. For example, in some cases, responsibility for implementing a recommendation may be more appropriate at an institutional or organizational level, while other recommendations may be undertaken as individual initiatives. Whenever a particular agency is named (i.e., ASHF or NIDCD), organizational representatives from the Steering Committee will pursue discussion with appropriate personnel.

The Conference Steering Committee encourages and supports widespread dissemination of research mentoring and training information. We hope that these recommendations will encourage others to consider initiatives and perhaps set an agenda for addressing research training needs of the professions of audiology and speech-language pathology.

Goal I: To increase the awareness of research mentoring, the need for such mentoring, and available mentoring strategies

Strategies:

a. Participate in dissemination efforts through various mechanisms, such as publications, symposia and panel discussions at local, regional, and national meetings.

b. Encourage dissemination of descriptions and evaluations of model programs (diverse and effective models suitable for different populations of mentors and proteges).

c. Dedicate a special section of *Asha* magazine to the issue of research and clinical mentoring.

d. Conduct miniseminars, informal discussion sessions, and so forth, on mentorship at the annual ASHA Convention.

e. Pursue opportunities for including research mentoring on the program of future meetings of the Treatment Research Group in Communication Sciences and Disorders.

Goal 2: To expand training experiences in academic training programs and to provide research mentorship and training opportunities throughout the professional career.

Strategies:

a. Renew efforts to foster scientific curiosity and research skills in undergraduate and graduate students and practicing clinicians, with special emphasis placed on nurturing interest and involvement among women and minorities.

b. Encourage directors of graduate programs to conduct mentorship training sessions for their faculty and graduate students.

c. Encourage principal investigators of NIDCD research training grants to engage in mentorship awareness and training activities.

d. Initiate a discussion with NIH about adding a requirement for research training grant applicants to ensure appropriate mentorship as part of their proposal application.

e. Extend the continuum of research education and mentoring to the undergraduate as well as to the postgraduate levels.

f. Encourage postdoctoral education.

g. Develop models of research training that foster programmatic research, flexibility in research approaches, and interdisciplinary research efforts.

h. Develop fellowship opportunities in communication sciences and disorders (NIH).

i. Conduct a survey to determine the scope of research training in speech and hearing science (ASHA-sponsored).

j. Be more aggressive in recruiting and mentoring minorities in the professions, especially at the graduate and postgraduate levels.

k. Address mentoring across ethnicity starting in undergraduate years so that these students will be aware of research opportunities.

l. Encourage gathering and dissemination of information on mentoring across ethnicity.

m. Encourage graduate students to publish papers with each other and with faculty.

Goal 3: To provide linkages between potential mentors and prospective proteges

Strategies:

a. Encourage dialogue among potential mentors and prospective proteges to help develop individualized and innovative means of producing competent researchers who value programmatic research on interesting and important problems and who are equipped to participate in interdisciplinary research endeavors.

b. Explore possibilities for obtaining matching funds to enhance opportunities for undergraduate and graduate students, and for practicing clinicians, to become involved with research, perhaps through joint funding from multiple sources, that is, investigators, universities, sponsoring agencies, and students.

c. Encourage the American Speech-Language-Hearing Foundation to pursue funding for a national research mentoring program, a plan that targets two closely linked needs of the professions: the need for an expanded knowledge base and the need for more researchers. The proposed program provides new and/or less experienced scholars the opportunity to work with senior scientists on specialized research projects.

d. Set up vehicles similar to the NIH National Research Service Awards (T32) for institutional training grants that could match beginning researchers with more established researchers in order to achieve the kind of mentoring that would allow the continued growth of our science.

e. Establish electronic bulletin boards to encourage follow-up communication with conference participants and perhaps all researchers in ASHA.

f. Create "boot camps"—that is, intensive one- to four-week sessions to learn new technologies and new information.

g. Hold informal meetings at the annual ASHA Convention for senior scientists and doctoral students to interact and perhaps establish mentoring liaisons.

Goal 4: To increase collaboration among federal and nonfederal agencies whose missions include communication sciences and disorders.

Strategies:

a. Establish a vehicle to allow a continuing dialogue between the Foundation and NIDCD and other agencies or foundations that have an interest in improving research training.

b. Encourage consideration for establishing interactive research projects grants at NIDCD so that two different researchers at two different institutions can work together and have their ROIs coordinated or have a FIRST award paired with an ROI.

c. Encourage agencies represented on the National Institute on Deafness Interagency Coordinating Committees to address some of the issues brought up at the conference.

Section 7

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CONFERENCE SPONSORS

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