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Reviewing the Behavioral Science Knowledge Base on Technology Transfer

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Introduction

Thomas E. Backer, Susan L. David, and Gerald Soucy

> Knowledge is of little use when confined to mere speculation" But when speculative truths are reduced to practice, when theories, grounded upon experiments, are applied to common purposes of life . . . knowledge then becomes really useful.
>
> Preface, *Transactions: The Journal of the American Philosophical Society* (1771)

THE CHALLENGE OF TECHNOLOGY TRANSFER

While there are currently many gaps in basic knowledge about drug abuse treatment and prevention (and about human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) related to substance use), there also are important gaps between the knowledge gained from research or community-based demonstrations and everyday practice in the field by individual practitioners, treatment and prevention programs, and communities. Getting access to the right information at the right time for the right purpose is often difficult. This is sometimes due to limited dissemination of research findings or new practices and sometimes to too much information, with no way to efficiently sort out what is relevant to meeting a particular need in the field. Faced with either prospect, practitioners, service institutions, and communities often choose to continue current practice.

But the difficulty does not end there. Even with relevant new knowledge, actually implementing a new program or practice is difficult and may take a long time. Potential users of drug abuse treatment or prevention innovations must overcome a host of financial, psychological, and organizational challenges to have new technologies implemented in their settings.

Traditionally, efforts to close the gap between knowledge and practice have focused on education, training, and dissemination of information through conferences, journal articles, and reports or brochures. These activities typically are directed at researchers and academics, the

developers of such knowledge. The National Institute on Drug Abuse (NIDA), which has central responsibility within the National Institutes of Health (NIH) for generating new knowledge regarding drug abuse and related HIV/AIDS treatment and prevention, has a long history of research dissemination activities. NIDA has enjoyed considerable success in this area during its 20 years of preclinical, clinical, and community-based drug abuse research.

However, while valuable, such dissemination-focused activities by themselves usually fall far short of producing the individual and systemic change that state-of-the-art knowledge makes possible. For the maximum chance of success in promoting improvement in drug abuse treatment or prevention practice, technology transfer activities must: (1) gather certain types of information in addition to knowledge about the technical aspects of an innovation, (2) do the gathering in ways that address certain characteristics of potential users of innovations and their environments, and (3) provide assistance to potential users in addition to simply making the new knowledge available.

The concept underlying these principles is that improvement in drug abuse treatment and prevention practices involves a *human process* which, if successful, leads to *individual and organizational change.* Gaps between knowledge and action in the adoption of worthwhile innovations occur for reasons quite similar to those that make it difficult to change individual behavior related to substance abuse and other types of health-related behavior. Incentives to change, resistance to change, and many other human factors significantly influence the outcome of efforts to change behavior. This is true whether the behavior is avoidance of street drugs by a teenager or adoption of a new prevention technology by a community-based program. This more comprehensive approach to technology transfer is driven by a set of empirically derived principles coming from several disciplines, including behavioral science.

Behavioral Science Knowledge and the Objective of the Technical Review

Over the last 70 years, a significant behavioral science knowledge base has developed about how to facilitate individual and organizational behavior change. This knowledge base has great relevance to technology transfer. But academic researchers in social and clinical psychology, and in related fields such as management sciences and communications, seldom have the chance to share this knowledge base with individuals

and agencies developing technology transfer programs designed to reach individual practitioners, service organizations, and communities.

NIDA convened a technical review meeting on November 17 and 18, 1993, in Washington, DC, to review and synthesize this behavioral science knowledge base. The technical review focused on four major topical areas:

- Communications-based behavior change,
- Organizational behavior change,
- Behavior change in substance abuse agencies and practitioners, and
- Individual and interpersonal behavior change.

Fourteen senior researchers in behavioral science prepared papers for presentation at this conference, and the final versions of their papers are contained in this monograph. The table of contents lists these researchers and the topics they addressed. A synthesis at the end of this monograph reviews the major concepts, principles, and issues derived from their papers, with implications for the future evolution and evaluation of NIDA's Technology Transfer Program.

The Knowledge Base On Technology Transfer

Comprehensive analyses of the literature on technology transfer (currently estimated to contain more than 10,000 citations; see Backer 1991; Backer et al. 1986; Dunn and Holzner 1988; Glaser et al. 1983; Havelock 1976; Rogers 1983; Zaltman et al. 1973) confirm from both an empirical and analytic perspective the validity of some basic principles necessary for effective technology transfer. Much of this literature comes from behavioral science. As summarized in Backer (1991), which describes technology transfer initiatives undertaken by several Federal departments and agencies, four fundamental conditions must be met in order for technology transfer activities to result in individual or systemic change:

1. Individuals and organizations must be aware that the new knowledge exists and have access to it (dissemination).

2. There must be credible evidence that behavior change (e.g., the adoption of a new prevention program) will lead to improved practice without either excessive costs or undesirable side effects. (Prior success in transferring the technology may be the best evidence.) In particular, evidence is needed about the readiness of the innovation to be transferred, the readiness of adopters and their communities to receive it, and the innovation's potential for continued success over time *(evaluation).*

3. The money, materials, and personnel needed to implement the new technology or practice must be available (resources).

4. Active interventions are required to overcome resistances, fears, and anxieties about change among the people who will need to implement the innovation, and these must be coupled with efforts to develop user involvement or ownership in shaping the new technology or practice, and to reward individuals and groups for adopting the innovation *(human dynamics of change).*

From these principles follow six key strategies, which also have been well validated in the aforementioned knowledge base:

1. *Interpersonal contact.* To get an innovation used in new settings, there needs to be direct, personal contact between those who will be adopting the innovation and its developers or others with knowledge about the innovation.

2. *Planning and conceptual foresight.* A well-developed strategic plan for how an innovation will be adopted in a new setting, including attention to possible implementation problems and how they will be addressed, is essential to meet the challenges of innovation adoption and sustained change.

3. *Outside consultation on the change process.* Consultation can provide conceptual and practical assistance in designing the adoption or change effort efficiently and can offer useful objectivity about the likelihood of success, costs, possible side effects, and so forth.

4. *User-oriented transformation of information.* What is known about an innovation needs to be translated into language that potential users can readily understand, abbreviated so that attention spans are not

exceeded, and made to concentrate on the key issues of "Does it work?" and "How can it be replicated?"

5. *Individual and organizational championship.* An innovation's chances for successful adoption are much greater if influential potential adopters (opinion leaders) and organizational or community leaders express enthusiasm for its adoption.

6. *Potential user involvement.* Everyone who will have to live with the results of the innovation needs to be involved in planning for innovation adoption, both to get suggestions for how to undertake the adoption effectively and to facilitate ownership of the new program or activity (thus decreasing resistance to change).

Furthermore, the literature on technology transfer reveals that the human dynamics of change must be addressed not only at the individual level, but at the community, organizational, and system levels as well. This means utilizing stategic planning, interorganizational networking, and other management science-based strategies for introducing change at the system level. Health communications research has helped to establish the importance of these organizational strategies (Backer and Rogers 1993). Adoption of innovations takes place within a large, complex environment, which must be carefully assessed if technology transfer efforts are to be successful.

There is a learning curve in this body of work. Studies in the 1960s and early 1970s established that information dissemination alone usually is not enough to stimulate sustained change in individuals or organizations. Studies conducted in the 1970s and early 1980s explored more active methods for promoting utilization and established the effective strategies that are presented here. In the 1990s much of the empirical work is concerned with consolidating these principles into programmatic strategies, examining the proactive role of the user in shaping technology transfer, and revisiting what works and what does not in these more complex, resource-poor times.

Also, recent empirical studies of major health communication campaigns in substance abuse prevention and other areas have extended understanding of how to influence both individuals and communities to adopt prevention-oriented behavior. At least one exploratory study also has

been done to confirm the importance of organizational and interorganizational factors in the success of prevention-oriented health behavior change campaigns (Backer and Rogers 1993).

A survey of State drug abuse treatment and prevention agencies (Lipton and Appel 1984) indicates that practitioners frequently have difficulty interpreting research findings so that they fit into programmatic applications. Often researchers or community program developers lack expertise or interest in promoting wider adoption of their findings or programs; publication in scientific journals (which research has shown are read by very few practitioners) and presentations at professional conferences are often assumed to be sufficient means of dissemination.

A 6-year study of the Job Seekers Workshop (see Sorensen et al. 1988 for an overview) also confirmed the importance of these principles in the drug abuse treatment and prevention field. The study was conducted in the 1980s and focused on a method for providing employment-related training for ex-drug abusers. The method was extensively studied and its efficacy verified through empirical research conducted under NlDA support by Hall and associates at the University of San Francisco (Sorensen et al. 1988). In the first of the subsequent utilization studies, Sorensen and colleagues (I 988) compared three methods for promoting the adoption of the Job Seekers Workshop for drug treatment clients. Their research found that dissemination methods employing personal contacts (site visits and conferences) produced significantly more adoptions than did printed materials alone.

There were also adopter site differences: Residential treatment programs were more likely to adopt the workshop method than were drug-free outpatient or methadone maintenance programs. This finding suggests that technology transfer activities need to be sensitive to the type of substance abuse treatment setting in which the practitioner works. In a subsequent study using the same innovation, Sorensen and colleagues explored the impact on technology transfer of involving State drug abuse agencies in designing and implementing the utilization strategy. The degree of involvement of the State agency, and the type of involvement strategy used, had a significant impact on the outcome of the utilization effort. The results empirically confirm the importance of involvement of State agencies in technology transfer activities.

Brown and Backer (1988) report a NIDA-supported empirical study regarding substance abuse treatment and prevention professionals'

receptiveness to learning about innovations through a variety of strategies. Among the 117 professionals in this study, live, team-oriented teaching was considered to be the most effective learning format, followed by videotaped learning packages, print materials, and audiocassettes. Findings from the research also identified the specific learning formats that practitioners prefer. For example, research respondents preferred the training approach that tells a story about real-life situations and problem solving.

NIDA's Technology Transfer Program

NIDA's Public Information Branch established the Technology Transfer Program in 1989. The program disseminates effective, research-based interventions and service protocols emanating from NIDA research to drug abuse treatment and prevention practitioners and encourages the application of these technologies in the drug abuse field. The goals of this program are to reduce demand for drugs by improving prevention and treatment practices and to enhance drug abuse-related HIV/AIDS risk reduction.

The program follows a systematic process for its activities. The process includes a review of literature on candidate technologies; a needs assessment conducted with practitioners and policymakers; assessment by researchers of the scientific readiness for transfer of identified technologies; review of the candidate technologies of the technology transfer study by the NIDA Technology Transfer Committee; and approval of the technology transfer study by the NIDA Director. Transfer activities and products developed through this process include:

- National conferences on research and practice. These conferences use a highly interactive, practitioner-oriented conference format to present NIDA's research findings to practitioners in the fields of drug abuse and HIV/AIDS treatment and prevention. Conferences have been held in 1991 and 1993.

- Videotape series. These series raise awareness about clinical applications of NIDA-sponsored research findings and motivate audiences to use NIDA's technology transfer materials. Topics include relapse prevention, dual diagnosis, and treatment issues for women.

- Technology transfer packages. These packages include sets of materials to describe an intervention protocol for a treatment or prevention approach found effective through research. The materials address administrative and other common implementation issues and provide inservice training materials for program staff. Current packages are focused on topics such as the Addiction Severity Index as an assessment tool and family dynamics and interventions related to substance abuse.

- Clinical reports. These are reviews of research on selected topics presented in a practical format and language to encourage adoption of intervention strategies. Current topics include the biological bases of addiction, family therapy approaches, and dual diagnosis of mental illness and substance abuse.

Since its inception, NIDA's Technology Transfer Program has become one of the most effective of the Federal efforts analyzed by Backer (1991) in a recent published review of several dozen such programs. Technology transfer activities for practitioners are part of a comprehensive program of research dissemination to scientists, policymakers, and the general public.

There are several reasons for the success of NIDA's Technology Transfer Program:

- Strategic planning methods have been used to develop an integrated system supporting this program's mission and activities, including establishing an ad hoc internal advisory group and obtaining input from a wide range of technology transfer experts (e.g., conduct of a planning workshop at the 1990 annual conference of the Knowledge Utilization Society, conduct of the technical review reported here).

- Program strategies are empirically based, coming from more than 70 years of research on technology transfer.

- Adequate resources have been made available to support the program's initiatives, and there has been effective endorsement of its importance by leaders such as NIDA's Director.

- Multiple interventions to promote technology transfer have been used, following empirical evidence that adoption of health-related

information requires multiple media and interpersonal methods (Backer et al. 1992).

- The program's placement in NIDA's Public Information Branch has encouraged an orientation toward education and systemic change as well as alliances with ongoing NIDA public affairs and professional/community education activities (e.g., the Community Education on Research and Practice Project).

In 1993 NIDA commissioned a 3-year empirical evaluation of its Technology Transfer Program to analyze the reasons for the success of these activities. As part of this effort, a literature review and telephone interview study concluded that this program is currently one of the few Federal efforts of its type undergoing significant program evaluation. Further information can be obtained from NIDA staff person Dr. Gerald Saucy (phone: 301-443-1124).

Seven years from its inception, NIDA's Technology Transfer Program is at a crossroads for the following reasons:

- NIDA is now part of the NIH. This move has increased its responsibilities for providing primary and allied health care practitioners with relevant substance abuse treatment and prevention information and placed the Technology Transfer Program into the larger setting of the numerous technology transfer efforts at the various Institutes (as reviewed in a recent telephone interview study conducted as part of the evaluation).

- Health care reform activities now being undertaken by the States and the private sector, plus new Federal initiatives being considered, will reshape drug abuse and HIV/AIDS treatment and prevention services significantly, affording important new opportunities for technology transfer.

- Technology transfer contained in clinical practice guidelines and their active dissemination is already reshaping health care through the activities of the Agency for Health Care Policy and Research and many other entities. More than 1,400 guidelines are already on file in the National Library of Medicine databank (Sechrest et al. 1994).

- Technology transfer activities are also being reshaped in other Federal programs, ranging from those at the Center for Substance

Abuse Prevention and the Center for Substance Abuse Treatment, NIDA's counterparts in the Substance Abuse and Mental Health Services Administration. to programs in other health-related agencies, such as the Department of Veterans Affairs.

- NIDA's diverse constituencies-communities of color, consumers of drug abuse- and HIV/AIDS-related services, the prevention and treatment service workforce, and others-require sensitive, culturally appropriate technology transfer activities (as seen in the work of the Community Education on Research and Practice Project and the NIDA Hispanic Research and Technology Transfer Work Group: see Alegria et al. 1994).

- The knowledge base on technology transfer is continuing to grow, stimulated by the Clinton administration's emphasis on the technology transfer activities of Federal laboratories and other defense-related entities, such as the Advanced Research Projects Agency (Wierengo 1994), and the emergence of support for these activities (e.g., use of the information superhighway for Federal-private sector technology transfer collaboration) (Technology Transfer Business 1994).

- Non-Federal funders of drug abuse and HIV/AIDS research and service demonstrations, such as private foundations, are taking an increasingly active role in promoting technology transfer (Backer 1994a, 1995; Backer and Koon 1995; Backer and Shaperman 1993).

- Federal policy on technology transfer has been significantly re-shaped by legislation (e.g., provisions for educational dissemination in the recently passed Goals 2000: Educate America Act; see Backer 1994b) and by congressional study (e.g., the 2-year Office of Technology Assessment study of health care technology assessment, which included an examination of medical information dissemination: see Office of Technology Assessment 1994).

- Reliable information about how NIDA's constituencies want technology transfer efforts tailored to them is emerging from the evaluation and experiences from NIDA's Research and Technology Transfer conferences and from many other activities.

Thus, this technical review monograph is intended to support the overall evolution of NIDA's Technology Transfer Program. Key factors or best

practices from behavioral science are reported in this volume. These best practices can be used to guide development of technology transfer strategies, setting them in the larger context of partnership efforts with NIDA's community constituencies and overall changes in health care and information technology. Approaching program transformation in this way will continue the integrated systems approach NIDA has used since the beginning of this effort in 1988.

AN OVERVIEW OF THE CHAPTERS

NIDA's interest in bringing together a group of scientists from different but related disciplines-communications, management sciences, and behavioral research-was to consider the relevance of their studies and experience at changing behavior in the individual, the organization, or the community. This group provides a broader perspective regarding technology transfer and research dissemination and possibly some theoretical and experiential guidance for NIDA's future efforts in this area.

As a research institute, NIDA seeks a scientific basis for all its activities, including those related to technology transfer. NIDA also seeks the ability to contribute to the literature with the results of the program's evaluation. The chapters in this monograph by eminent scholars and practitioners in their respective fields are a rich source of guidance for anyone interested in undertaking behavior change programs at any level.

Communications-Based Behavior Change

Chapter 1 by Dr. Thomas Backer, the coeditor of the monograph, emphasizes the importance of readiness as the key to change in organizations or the individual. Backer summarizes the research by saying that people (including groups of people in organizations) have to *believe* that change will make a difference, and that adopting a particular innovation will help, before they are likely to commit to change. They need to see the potential rewards before they will consider whether they will begin the change process. Backer provides guidance to program planners in developing effective interventions by helping them to (1) understand the need to assess readiness for change, (2) recognize that individuals are part of the organization and have their own perceptions of the need for change, and (3) develop approaches that can enhance readiness for change and at the same time overcome resistance to change.

Backer then reviews the wide-ranging literature on readiness for change in a variety of organizations and settings.

Chapter 2 by Dr. Kathryn Kavanagh posits that technology transfer must incorporate collaboration with the consumer and appreciation for diverse populations as one focus for change in drug abuse treatment programs. Kavanagh presents a broad definition of diversity among service consumers that incorporates ethnic, cultural, experience, age, gender, sexual orientation, and socioeconomic differences, which can further complicate the difficult job of behavior change in programs. The chapter discusses how these factors need to be addressed in designing and implementing technology transfer that works.

Kavanagh challenges traditional hierarchical approaches to drug abuse treatment and other health services by suggesting an interactive, bottom-up process. Kavanagh argues that "As the focus of intervention, the front line serves as the bottom line in technology transfer, for it is there that knowledge as technology is tested and either utilized or rejected." The front line includes providers and consumers (i.e., clients). "Effective drug abuse prevention and treatment require a climate of flexibility, openmindedness, trust, objectivity, and respect for diverse viewpoints. . [it should provide] a forum for participants to have a voice and to experience opportunities to build self-esteem and experience success." Kavanagh suggests that closure of the gap between knowledge and practice depends upon reducing process and content barriers to improve the applicability and acceptability of the technology generated. Collaboration among the leadership and the front line will be necessary for successful adoption of the innovation.

In chapter 3, Dr. David McCallum provides an overview for developing risk communications programs based on the development of national environmental public awareness campaigns for the Environmental Protection Agency. McCallum argues that individuals cannot change without knowledge of the alternatives and consequences and without the motivation, skills, and support systems to do so. McCallum describes the following steps for the design and implementation of risk communication campaigns: (1) establish clear goals and objectives; (2) understand the target audience's perception of risk; (3) understand target audience's attitudes and behaviors to determine motivators for change; (4) develop effective, tested messages; (5) use credible spokespeople; (6) use mass media, which is the primary channel to reach an audience with health

risks; (7) reinforce messsages and behaviors; and (8) use evaluation methods at each stage of the process.

In chapter 4, Dr. Everett Rogers describes real-world examples of technology transfer, including planned program diffusion, spontaneous diffusion without planning, the media's role in setting the national agenda, and reinvention, which is the adaptation of an innovation by adopters for their own use. As an example of planned diffusion, Rogers describes the spread of Project DARE (Drug Abuse Resistance Education), a curriculum taught by uniformed policemen, which began in Los Angeles in 1983 and in less than 10 years reached over 5 million children. To explain spontaneous diffusion. Rogers describes how the very successful communitywide drug abuse prevention program, Project STAR, spread from its original site in Kansas City to other parts of Kansas and Missouri without any actions on the part of the developers. These other sites simply heard about the program and adopted it. Rogers also describes how diffusion benefits from and contributes to agenda setting by local and national media. If daily news coverage convinces the public that the issue is important, then they will want and support prevention programs. Finally, Rogers describes reinvention as the degree to which an innovation is changed by adopters. Rogers raises the issue of whether reinvention makes the program more, less, or equally effective as the original.

Organizational Behavior Change

The next four chapters look at organizational change and how it can be implemented. In chapter 5, Dr. Howell Baum presents the importance of having a psychodynamic view of the meanings of organizational structures when implementing new programs. Baum points out that research has shown that one must address the organizational culture and the individuals who are part of that culture, and warns against an oversimplification of the relationship between organizational meanings and organizational members. This research assumes a single, coherent culture and passive members who internalize and react to the culture. It also posits that organizational meanings that matter to members concern conscious and rational needs and are consciously understood.

In contrast, the psychodynamic view posits that individuals "experience unconscious as well as conscious aims and needs . . . and act both consciously and unconsciously to achieve their aims and satisfy their needs." Paying attention to organizational participants' perceptions,

social incentives, and internal psychological conflicts can help in the process of organizational change.

Baum details a case in which these psychodynamic principles were ignored-the reorganization of a city's social services system. The city's government established local human services coordinating councils to improve service delivery to the neediest populations. Despite the positive goals of the program, which many in the system felt were appropriate, there was no clear-cut description of what these councils would do, the authority and responsibility of the council members was ambiguous, the human services director was autocratic and related poorly to others, and there were few incentives to adopt the new approach. Consequently, the new program was a failure. Baum recommends ways to improve the adoption of this and other new organizational approaches.

Chapter 6 describes the attempted installation of an advanced computer system in a State government agency. The overarching problem in technology transfer, Dr. Michael Diamond argues, is the fact that most technical managers ignore the underlying psychological dynamics of organizations when they try to institute new systems in an organization. Diamond makes four points in the chapter. First, technology transfer is often based on the notion of the technician as expert authority. Thus, training is not an interactive, collaborative effort, but rather top-down learning. Second, technology transfer ignores the normal employees' resistance to change, which is often a conflict between cognitive learning and emotional security. Third, technology transfer similarly denies the organizational psychodynamics of change. Employees need to develop ownership of and endorse the rationale behind the technology transfer. Fourth, technology transfer often ignores the organization's culture, which can be receptive or resistant to change. Technology transfer must have a "transitional space," which allows time and opportunity for the individuals who need to change to work through the emotional and other psychological reactions to making the change.

Dr. Alan Glassman in chapter 7 underscores the need for "learning organizations" that are capable of adapting to everchanging conditions and managers who must be able to manage conflict and ambiguity. If organizations are going to survive and prosper. a new paradigm is needed-one that embraces the notion of bounded instability, which allows the inherent tension and conflict of instability to provoke innovation. Glassman also describes the need for organic organizations, which encourage and promote innovation, as opposed to bureaucratic

organizations, which strive for stability and thus discourage innovation. Glassman feels that most attempts at bureaucratic reorganization result in only marginal changes rather than wholesale restructuring that would make a difference.

In chapter 8. Drs. Ramkrishnan Tenkasi and Susan Mohrman call for a fundamental reorientation of thinking on technology transfer. Their approach is based on a different set of assumptions about the nature of knowledge. one that appreciates that knowledge is subjectively constructed and subjectively consumed, requires contextual adaptation, and is incomplete without a synthesis of the perspectives of all of the adopters who will use the knowledge. This synthesis results in the creation of new knowledge through a collaborative and mutual learning process. This is particularly important in the area of soft technologies, which can be primarily procedural (i.e., how something is done), where the adopter must be part of the innovation process. By involving the adopter, the new approach rejects traditional information transmission approaches, which are often one-way communications from the developer to the user, and accepts technology transfer as a collaborative learning process.

Behavior Change in Substance Abuse Agencies and Practitioners

The next three chapters in the monograph focus specifically on technology transfer in the substance abuse treatment and prevention field. Dr. Barry Brown in chapter 9 describes a unique and unprecedented outreach effort sponsored by NIDA to educate injecting drug users about HIV risk reduction outside of the institutional setting of the drug abuse treatment clinic. Brown summarizes six elements derived from the literature that are essential to research utilization: relevance, timeliness, clarity, credibility, replicability, and acceptability. Brown then describes how the program attempted to maximize these principles in its implementation. The outreach models were summarized in manuals that were made available to States and other organizations. Extensive training and technical assistance were provided to assist in replicating the most effective methods. A newsletter publicized the positive outcomes and annual meetings of program administrators and other practitioners kept professionals in the substance abuse field informed of research results and ways to use the results effectively. Brown also suggests that research grants incorporate a technology transfer component to assist in the

dissemination of research results and to offer an incentive to researchers to focus on the practical application of their findings.

In chapter IO, Drs. James Sorensen and Wayne Clark describe the integration of technology transfer activities into a drug abuse research center. The research center provided community liaison, policy, and dissemination functions. Activities included conducting small colloquia between clinicians and researchers, developing policy analyses relevant to treatment practitioners and policymakers, convening a large annual dissemination forum on research results, offering an instructional videotape to assist in staff training, and employing a science writer to develop articles about the center's research for newsletters aimed at clinicians. The authors describe some of the limitations in accomplishing all of these efforts, but agree with Brown that research centers should take on this important dissemination responsibility.

In chapter 11, Dr. Paul Gendreau points out some of the barriers in transferring technology and knowledge across the related fields of criminal justice and substance abuse. Gendreau explains that there is little communication of research results across these fields, despite the fact that both deal with the same population-substance abusers. Gendreau summarizes the principles of effective (and ineffective) interventions with offenders, which could improve offender rehabilitation from both drug abuse and criminality. Some of these include (1) intensive services, primarily behavioral in nature; (2) program contingencies and behavioral strategies enforced in a firm but fair manner; (3) proper matching of offender/client, therapist, and program; (4) properly trained therapists: (5) program structure and activities that disrupt the delinquency network; (6) relapse prevention training to prepare the offender to integrate into the community; and (7) a high level of advocacy to find adequate community support services when the person leaves the institution.

Individual and Interpersonal Behavior Change

The final three chapters review the scientific literature on individual and interpersonal behavior change to identify effective methods to change drug abuse and other health-related problem behaviors in individuals. In chapter 12, Dr. Richard Petty describes the Elaboration Likelihood Model of Persuasion, which attempts to distinguish two different ways individuals develop attitudes about situations: the central route and the peripheral route. The central route focuses on cognitive activity whereby

the person draws upon prior experience and knowledge to carefully scrutinize and evaluate the issue-relevant arguments presented in the communication. In contrast, the peripheral route uses simple cues to either elicit an affective state (such as happiness) associated with the advocated position (as in classical conditioning) or trigger a simple inference that a person can use to judge the validity of the message (e.g., a message from an expert fits the person's judgment that experts are generally correct). Petty points out that while peripheral messages can be powerful, centrally processed messages tend to endure longer and become more integrated into the person's behavior. This chapter presents examples that show that it is important to understand whether a change in attitude or behavior occurs through a peripheral or central process in order to assess whether a program will have a long-term impact.

In chapter 13, Dr. William McGuire presents the well-known Communication/Persuasion Matrix as a process by which the vast scientific literature on persuasive communication can be translated into a form usable by practitioners. The Communication/Persuasion Matrix is composed of 12 dependent variables involving the person who receives the message and 5 independent variables involving the communication sent-source, message, channel, audience, and target. McGuire shows how this matrix can help program developers review each component in a campaign or information program and relate it to the perspective and context of the potential receiver (e.g., do they understand the message? have they acquired the necessary skills to effect the change?) to maximize its effect on changing attitudes or behavior. McGuire also strongly urges program developers to conduct formative research to learn about their audience and to test their communication vehicles before releasing the campaign.

The last chapter provides an overall review of lessons learned about behavior change from behavioral science research, with a specific focus on HIV and AIDS prevention programs. Dr. Martin Fishbein summarizes eight variables that appear to account for most of the variation in any given behavior: intentions, skills, environmental constraints, attitude, norms, self-standards, emotional reactions, and self-efficacy. The first three factors are viewed as necessary and sufficient for producing any behavior. That is, for behavior to occur, one must have a strong positive intention to perform the behavior in question, one must have the skills to perform it, and the environment must provide the opportunity or be free of constraints. The remaining five variables are viewed primarily as factors influencing the strength and direction of intention. For instance,

one will not form a strong intention to perform a given behavior unless one has a strong positive attitude toward performing that behavior. Fishbein summarizes this theory by stating that intentions are most proximal to behavior: thus, to produce the best results it is critical to measure intentions prior to developing an intervention. Fishbein also underscores the importance of developing communications that address the differences in attitude and behaviors among different populations.

CONCLUSION

Each chapter in this monograph provides a unique perspective about changing behavior in communities and society in general, in organizations as part of innovation and improved productivity, and among individuals, whose unique personality and psychological makeup must be understood and addressed in effective programs. Technology transfer involves all of these areas because it requires people to change their own behavior, usually in an organizational environment, which also must change. This leads to uncertainty and considerable anxiety. New technologies must offer encouragement and positive rewards (e.g., better outcomes for clients, improved salaries, educational credits) that outweigh the negative costs of learning new ways to perform. Effective technology transfer involves strong, targeted communications that respond to potential barriers and encourage support for more effective individuals and more productive organizations.

REFERENCES

Alegna, M.; Amaro, H.; Backer, T.E.; Diaz, E.; Mata, A.; Rodriguez, G.M.; and Villa-Barton, *C. Policy Report: AIDS and Drug Abuse Research and Technology Transfer in Hispanic Communities.* Rockville, MD: National Institute on Drug Abuse, 1994.

Backer, T.E. *Drug Abuse Technology Transfer*. Rockville, MD: National Institute on Drug Abuse, 1991.

Backer, T.E. Replication may be the sincerest form of philanthropy. *Chronicle of Philanthropy*, March 8, 1994a. pp. 54-55.

Backer, T.E. *Readiness for Change, Educational Innovations, and Education Reform.* Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education, 1994b.

Backer, T.E. *Adding Value to Grantmaking: Dissemination and Utilization Strategies for Foundations.* Kansas City, MO: Ewing M. Kauffman Foundation, 1995.

Backer. T.E., and Koon, S.L. Sharing the wealth of ideas. *Foundation News and Commentary* 36(2):28-34, 1995.

Backer, T.E., and Rogers, E.M., eds. *Organizational Aspects of Health Communication Campaigns.* Newbury Park, CA: Sage, 1993.

Backer, T.E., and Shaperman, J. Knowledge utilization activities of foundations supporting health research and demonstrations. *Knowl Creat Diffus Util* 14(2):59-67, *1993.*

Backer, T.E.; Liberman, R.P.; and Kuehnel. T. Dissemination and adoption of innovative psychosocial interventions. *J Clin Consult Psychol* (1):111-118, 1986.

Backer, T.E.; Rogers, E.M.; and Sopory, P. *Designing Health Communication Campaigns: What Works?* Newbury Park, CA: Sage, 1992.

Brown, V.B., and Backer, T.E. The substance abusing mentally ill patient: Challenges for professional education and training. *Psychosoc Rehabil J* 10:14-19, 1988.

Dunn, W.N., and Holzner, B. Anatomy of an emergent field. *Knowl Soc* 1(1):3-26, 1988.

Glaser, E.M.; Abelson, H.; and Garrison, K.N. *Putting Knowledge to Use.* San Francisco: Jossey-Bass, 1983.

Havelock, R.G. *Planning for innovation Through Dissemination and Utilization of Knowledge.* Ann Arbor, MI: University of Michigan, Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, 1976.

Lipton, D.S., and Appel, P. The state perspective. In: Tims, F.M., and Ludford, J., eds. *Research Analysis and Utilization System.* Rockville, MD: National Institute on Drug Abuse, 1984.

Office of Technology Assessment. *Identifying Health Technologies That Work: Searching for Evidence.* OTA-H-608. Washington, DC: Supt. of Docs., U.S. Govt. Print. Off., 1994.

Rogers, E.M. *Diffusion of Innovations.* 3d ed. New York: Free Press, 1983.

Sechrest, L.; Backer, T.E.; and Rogers, E.M.; Campbell, T.F.; and Grady, M.L., eds. *Effective Dissemination of Clinical and Health Information.* Rockville, MD: Agency for Health Care Policy and Research, 1994.

Sorensen, J.L.; Hall, S.M.; Loeb, P.; Allen, T.; Glaser, E.M.; and Greenberg, P.D. Dissemination of a job seekers' workshop to drug treatment programs. *Behav Ther* 19:143- 155, 1988.

Technology Transfer Business. NII: Information superhighway. Spring: 22-34, 1994.
Wierengo, D.E. "A Convergence Model Approach to Technology Transfer and Inter-organizational Communication: Federal Laboratory-Industry Communication Masters thesis, University of New Mexico, 1994.
Zaltman. G.; Duncan, R.: and Holbek. J. *Innovations and Organizations.* New York: Wiley, 1973.

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Assessing and Enhancing Readiness for Change: Implications for Technology Transfer

Thomas E. Backer

INTRODUCTION

Many of the challenges of innovation and change reflect complicated human dynamics. People need to feel rewarded for changing and to be involved in planning for changes that will affect them. They need to work through their fears, resistances, and anxieties about change. When ignored, this human dimension often causes technology transfer efforts to fail or to have a reduced impact (Backer 1991), because successful technology transfer requires individuals and organizations to change. *Readiness for change* is one of these challenges-one often neglected in planning and implementing technology transfer.

In this chapter, concepts and practices concerning readiness for change are discussed as part of the larger frame of technology transfer interventions. Methods for assessing and enhancing change readiness are presented as part of this discussion, followed by an analysis of applications to drug abuse and human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) treatment and prevention.

The behavioral sciences literature addresses readiness for change both at the individual and organizational levels. Schein (1979, p. 144) asserts that "The reason so many change efforts run into resistance or outright failure is usually directly traceable to their not providing for an effective unfreezing process before attempting a change induction." Beer (1980, p. 80) states that the failure to analyze and deal with readiness issues "can lead to abortive organization development efforts." Woodman and Tolchinsky (1985) observe that change interventionists usually do not measure and incorporate expectations-a central component of readiness-in organizational change interventions. Fullan (1982), writing in the field of education, asserts that successful change has distinct stages, the first of which is "initiation," defined as making the decision to change and beginning to think about how it will occur.

DEFINITION AND IMPLICATIONS OF READINESS FOR CHANGE

In a recent comprehensive review, Armenakis and colleagues (1993) define individual and organizational readiness for change as involving people's beliefs, attitudes, and intentions regarding the extent to which changes are needed and their perception of individual and organizational capacity to successfully make those changes. Readiness is a state of mind about the need for an innovation and the capacity to undertake technology transfer; it is the cognitive precursor to behaviors of either resistance or support for the actual transfer effort. Readiness (referred to as "unfreezing" behavior) is the first part of the natural cycle of change in the model advanced by Lewin (1947). Defining readiness for change in this way has six important implications, discussed below, for the design and implementation of technology transfer interventions in drug abuse treatment and prevention.

Readiness Can Be Enhanced

Readiness for change is not a fixed element of individuals or systems. It may vary due to changing external or internal circumstances, the type of change being introduced, or the characteristics of potential adopters and change agents. Thus, interventions to enhance readiness are possible and can increase the overall success of technology transfer. Change can occur under conditions of low readiness. of course, but behavioral science research indicates that the probability of success is reduced when low readiness leads to low motivation to change or to active resistance.

Readiness Can Be Assessed

Even though readiness is a cognitive state that leads to overt behavior only later in the cycle of change, it can be measured using a variety of behavioral science approaches. Interventions can be designed based on assessment results. In some cases. change agents may decide to forgo technology transfer efforts because assessed readiness for change is low.

Assessing readiness is particularly important for what Kanter (1983) calls the proactive change agent. Traditionally, internal or external change agents have responded to challenges that the environment already presents. The proactive change agent seeks out potential problems, such as low readiness for technology transfer, and intervenes before this cognitive factor results in active resistance to change. Intervening means

attempting to influence the beliefs, attitudes, and intentions of drug abuse agency staff, community leaders, or others who must participate in the change technology transfer requires.

Individual Readiness and Organizational Readiness

This discussion treats individual readiness for change as part of organizational readiness for three reasons. First, substance abuse prevention and treatment services typically are provided by service agencies or systems, so that the organizational context is always relevant. Second, the interventions discussed here emphasize assessing and enhancing individual readiness using organizational strategies, such as surveys or organization development (OD) interventions.

Third, behavioral science knowledge indicates that creation of readiness for organizational change goes beyond individual cognitions. For instance, Griffin (1987) and others who study social-information processing assert that individual readiness is shaped by the readiness of others, as perceived and discussed in a group setting such as a drug abuse agency.

Readiness Is a Cognitive Characteristic

What counts in assessing readiness for change is what people believe. Readiness for change involves people's perceptions of whether they (or their colleagues or organization) have the financial support, the well-defined mission and leadership structure, the cohesive work team, or the technical skill level needed to adopt a particular innovation. The actual existence of these resources, however, is a matter separate from readiness. Perceptions may relate either to a specific innovation being considered for transfer or to change in some more enduring aspect of the organization, such as its overall management style.

As used in this chapter, readiness for change does *not* refer to the readiness of the innovation to be transferred (e.g., the degree to which it is readily adaptable to different environments of use, the nature of the innovation) or to the readiness of the innovation developers or other change agents to deliver the innovation into new settings (e.g., the degree to which innovation developers have the time available to offer technical assistance to potential adopters). These types of readiness are important to the process of technology transfer, but they are not part of the focused definition of cognitive processes of adopters used here. These

distinctions are crucial, lest readiness for change include every aspect of the complex process of technology transfer.

Thus, readiness is only part of the overall cycle of innovation and change. This larger cycle includes determining the relationship between the perception of readiness and the true reality. In many cases, failure to achieve technology transfer results because, although people have a high readiness, the resources to implement change do not exist.

Readiness Is Not the Same as Resistance

According to Armenakis and colleagues (1993), a number of researchers have discussed the importance of readiness, but few have recognized it as distinct from efforts to reduce resistance to change. Intervening to counteract resistance to change has a long history in the behavioral sciences (Kotter and Schlesinger 1979), beginning with Coch and French's (1948) classic experiment in reducing resistance, which demonstrated the value of encouraging people to participate in designing the change that they will undergo. However, successful efforts to enhance readiness can prevent active resistance from occurring in the first place. Resistance reduction is not the same as readiness.

Needs Assessment Is Not Readiness Assessment

Organizational and community assessments typically have focused on the needs of various individuals and groups related to a particular innovation. While assessing and interpreting these needs may be critical for successful technology transfer, needs assessment is not the same as readiness assessment. In fact, there may be a very high level of perceived need, yet very little readiness to engage in the changes necessary for effective technology transfer. Innovations in the prevention of AIDS and drug abuse are frequently subject to this need-readiness gap.

BEHAVIORAL SCIENCE KNOWLEDGE BASE

In "The Change Masters," Kanter (1983, p. 281) asserts that "Organizational change is stimulated not by pressures from the environment . but by the perceptions of that environment and those pressures held by key actors." Moreover, the felt urgency and energy required for change are emotional issues. People and organizations develop the energy to change when faced with real pain (Armenakis et al.

1993), whether the nature of change is personal or work related. Thus, a range of behavioral science fields, including social psychology, organization development, organizational transformation, and planned change, are relevant to assessing and enhancing readiness.

The concept of readiness for change has some of its origins in social psychology, especially in work on the human dynamics of change among individuals and groups and work on resistance to change and methods for overcoming it. Lewin (1947) developed force field analysis, which argues that change is not an event but a dynamic balance of forces working in opposite directions. Readiness assessment and enhancement methods have drawn heavily upon such work.

There is an extensive literature on individual readiness for change (e.g., the importance of expectations and other cognitive factors, the significance of behavioral rehearsal and other skill-based components of developing readiness). For instance, Bandura (1982) has conducted extensive empirical work supporting self-efficacy theory as an interpretive framework for cognitive change. Bandura defines self-efficacy as the individual's judgment of his or her ability to perform certain tasks, and notes that groups have a sense of efficacy and that both group and individual efficacy must be considered in strategies for enhancing change readiness.

A recent synthesis of research on behavioral variables associated with behavior change (Bandura et al. 1991) reveals eight key factors: intention, environmental constraints, ability, anticipated outcomes, norms, self-standards, emotion, and self-efficacy. Intention and the latter five factors (all assumed to influence intention) are cognitive factors tied closely to the concepts of readiness for change presented in this chapter.

Many methods for promoting adoption of innovations in education and other fields reflect the significance of these cognitive factors. For instance, one of the most widely used frameworks for educational innovation, the Concerns Based Adoption Model of Hall and Loucks (1978), posits that different levels of innovation adoption reflect differing cognitive concerns of educators that result in differing levels of readiness for educational change.

Six major reviews have been published since 1974 in the "Annual Review of Psychology" on the fields of organization development, organizational transformation, and planned change. In the most recent

review, Porras and Silvers (1991, p. 51) indicate that, while there are many intervention methods and case studies, these fields are still in an early stage of development: "Planned change that makes organizations more responsive to environmental shifts should be guided by generally accepted and unified theories of organizations and organizational change-neither of which currently exists."

Porras and Silvers (1991) present a tentative model for planned change that emphasizes the importance of both cognitive and behavioral change of individuals within the organizational setting. Targets of change efforts are organizational visions and work settings, and the ultimate desired outcomes are both improved organizational performance and enhanced individual development.

Another model for types of organizational change (Nadler and Tushman 1989) suggests that change can be classified on two dimensions: anticipatory versus reactive and incremental versus strategic. As table 1 shows, four types of change interventions result, ranging from low to high intensity in this order: fine-tuning, adaptation, reorientation, and re-creation. Nadler and Tushman argue that readiness for change may be more limited for the more intense levels of change, and they advocate diagnosing readiness as part of planning for change at all four levels.

TABLE 1. *Model for organizational change.*

	Incremental	Strategic
Anticipatory	Fine-tuning	Reorientation
Reactive	Adaptation	Re-creation

SOURCE: Nadler and Tushman 1989.

Readiness concepts also appear in many behavioral science-based interventions for managing planned change. For example, the four basic elements of organizational diagnosis (Levinson 1972) constitute a

well-developed method for assessing organizational dynamics prior to instituting change:

- Recognition and interpretation of the problem and assessment of the need for change,
- Determination of the organization's readiness and capability for change,
- Identification of managers' and employees' resources and motivations for change, and
- Determination of the change strategy and goals.

Information needed for diagnosis of readiness for change may be gathered by questionnaires, interviews, and observation; from the organization's records: or by a combination of these. Moreover, organizational diagnosis practitioners such as Levinson recognize that the information-collecting process itself increases awareness of change and, if done properly, can help increase readiness.

MODEL FOR ENHANCING CHANGE READINESS

Armenakis and colleagues' (1993) conceptual model for enhancing change readiness has been adapted here (figure 1) to guide discussion about assessment and enhancement interventions. An overall analysis of readiness assessment is followed by the presentation of specific assessment techniques taken from the recent behavioral sciences literature and social marketing methods that can be used for strategic planning of readiness assessment. Then the elements defining efforts to enhance change readiness are discussed. These include contextual factors, message characteristics, and communication approaches that can be used to deliver them; attributes of change agents; interpersonal and social dynamics of the organization in which change is to take place; and specific enhancement interventions, including those rooted in the broader behavioral science knowledge base on technology transfer.

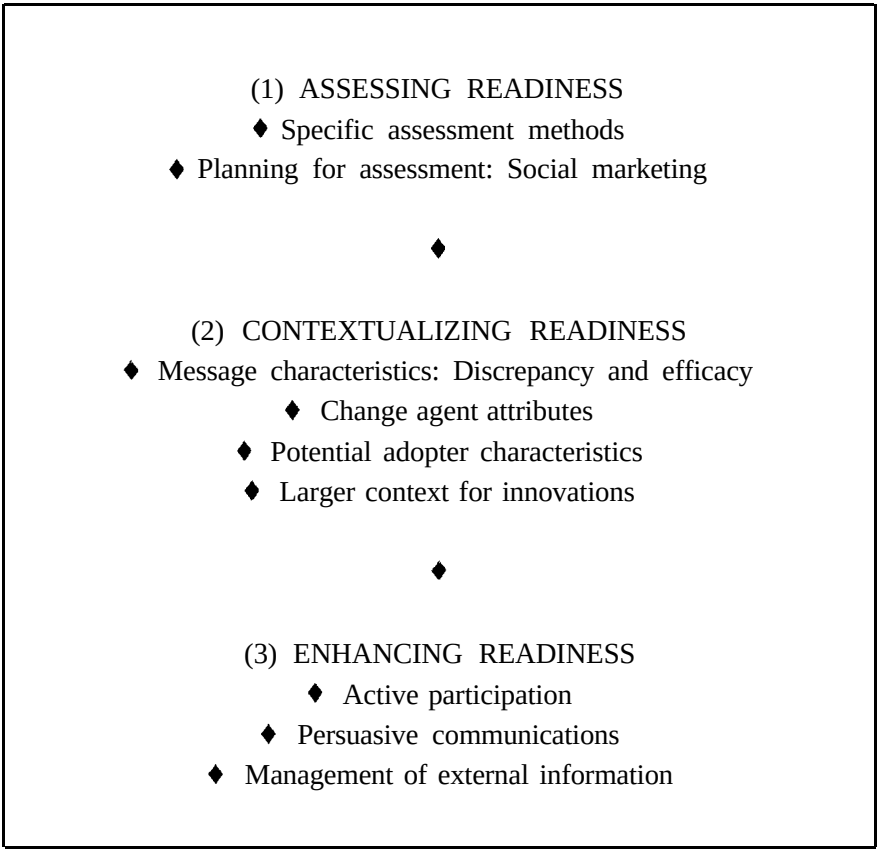

FIGURE 1. *A model for enhancing change readiness.*

Assessment Methods

A number of behavioral science-based methods have been employed for assessing readiness for change:

- Survey instruments,
- Focus groups,
- Clinical interviews.
- Site visits, and
- Community profiles, leading to a comprehensive community assessment.

Seven applications of these assessment methods are presented below.

A VICTORY. A VICTORY is an 8-factor model for assessing readiness for change (Davis 1978) converted into a 75-item rating scale. The eight factors are ability (resources), values, information (about the innovation), circumstances and timing, obligation (felt need to change), resistances, and yield (rewards that can come from implementing the innovation). This assessment can be administered through interviews or self-administered to develop a profile of attitudes and beliefs both for individuals and the organization as a whole. Davis recommended obtaining independent ratings of change readiness by an outside consultant as well, as part of a four-step intervention process called Decision Determinants Analysis, which includes planning interventions needed to elevate low-readiness factors on the initial profile, implementing the change, and following up to evaluate success in technology transfer.

A VICTORY has been used for readiness assessment in mental health, correctional, social service, and general health care settings. In addition to Davis' rating scale, at least two other instruments have been developed for assessing readiness for change using this framework. Javorek and colleagues (1979) created a questionnaire for use in mental health settings, Strommen (1985) developed an instrument with 20 subfactors based upon an analysis of responses from surveys taken in 191 service organizations; the resulting instrument has been applied to mental health and social service organizations, colleges, and youth-serving organizations.

A VICTORY also has been used in the business world. For instance, Barabba and Zaltman (1991) suggest applying the A VICTORY framework as part of an inquiry center, a method for addressing market strategy questions in business firms. The A VICTORY factors help determine how information can be used to ask fundamental questions about the services or products a firm provides and about the ways in which innovations are introduced into the organization and into its customer environment. This approach has been applied in a number of traditional business organizations.

School Context Analysis Form. D'Amico and Corbett (1988) developed the School Context Analysis Form to measure the readiness of schools to participate in planned change. The form includes items measuring eight contextual factors: resources, incentives and disincentives, linkages, priorities, factions, turnover, current practices, and prior

projects. This instrument has been used to assess the readiness of teachers and administrators to engage in systemic reform of educational systems.

Clinical interviews for America 2000 Educational Reform. Peterson (1992) used unstructured interviews with teachers and administrators in a Nebraska school district to measure readiness for educational reform conducted as part of the America 2000 program. The interview process measured (1) reactions to changes that had been undertaken recently, (2) general attitudes of the respondent toward change, and (3) desire for specific changes under the new initiative. The culture (i.e., beliefs and values) of teachers and administrators was the focus of these interviews.

Results were synthesized and presented to the local school board and other decisionmakers to use in designing the change program. Findings indicated that teachers desired a greater voice in decisionmaking and wanted better coordination and articulation of change at the school level. The study concluded that making these changes would increase readiness for change.

Georgia School Change Survey. In a similar study, Roberts (1991) assessed readiness for change in 42 Georgia schools, using a written survey that measured (1) ability to implement the innovation (e.g., need, clarity, complexity, practicality), (2) leadership strength (e.g., active principal support), (3) stages of concern and levels of use, (4) collegial interaction, and (5) barriers to change (e.g., lack of commitment, inadequate feedback, negative attitudes about change). Results from the survey were reported to decisionmakers responsible for designing the change program.

Social Reconnaissance. Developed by Saunders and elaborated by Nix, social reconnaissance has been adapted by the Henry J. Kaiser Family Foundation to assess health promotion needs and priorities in the southern United States (Williams 1990). This method involves identifying felt needs or problems of a community, prioritizing them, and then developing and implementing an action plan to address them. Assessment of readiness for change is part of this process. The foundation awarded planning grants to fund these assessments at the community level prior to awarding grants for projects that would address health promotion. This provided an opportunity for assessing readiness for change and addressing barriers that might prevent later success.

Social reconnaissance is based conceptually upon the PRECEDE/PROCEED model developed by Green and Kreuter (1991) for planning, implementing, and evaluating health education programs. The Planned Approach to Community Health (PATCH) is a similar model developed by the Centers for Disease Control and Prevention for community health programming (Green and Kreuter 1992). EMPOWER, a computer software system developed by Green (personal communication, May 4. 1993) under funding support from the National Cancer Institute, brings communities together to diagnose readiness for change and actual needs for change through computer interactions in six areas: situation analysis, social diagnosis, epidemiological diagnosis, behavioral diagnosis, educational diagnosis, and administrative diagnosis.

Mental Hospital Diagnostic Survey. Pond and colleagues (1984) developed a diagnostic survey of readiness for change for use with employees of a large mental hospital. Each item included four subparts concerning organizational climate, expectation of changeability, importance, and employee satisfaction with the aspect of climate measured. It was found that expectation of changeability, which is central to readiness for change, could be measured independently from the other three components in this study.

Public Health Service Diagnostic Survey. Fox and colleagues (1988) conducted a major OD intervention for the Department of Health and Human Services that focused on a research component of the Public Health Service. Prior to the intervention, a standardized human resource management index was administered to participants to obtain general information about management conditions, organizational climate, and other issues. The index included a specially developed five-item readiness for change scale. This scale measured the work group's willingness to make improvements in procedures and solve problems. Other organizational surveys might also use this readiness for change scale by appending it to other item content.

Social Marketing

Strategic planning for the assessment of change readiness may be facilitated by applying concepts of social marketing. Based on marketing concepts from the business sector (Kotler and Roberto 1989; Walsh et al. 1993), social marketing provides a management framework for systematic efforts to understand the characteristics of an audience being targeted for change (e.g., the group of people in an organization or

community being targeted to adopt an innovation) using standard marketing methods such as audience segmentation and audience analysis using focus groups.

For instance, Golden and Johnson (1991) describe an application of social marketing to creating a strategic plan for AIDS prevention education. Integrating important aspects of the Health Belief Model and using the national distribution of the Surgeon General's booklet on AIDS as a vehicle for testing some assumptions. this study presents a clear vision of how social marketing can provide a guiding framework for the development of a change effort, including its assessment component. Social marketing can perform the following.

- Identify types of information about people and institutions that need to be gathered through an assessment process;

- Provide assessment tools to assist with data gathering;

- Provide a framework for planning the campaign and understanding both how it will work and what results it may achieve;

- Offer specific marketing methods that may help to orchestrate the media approaches that are used; and

- Provide a framework for integrating related theoretical constructs, such as the Health Belief Model. and other input from related fields, such as health education.

Contextual Factors

Readiness for change is influenced by people's attitudes and beliefs about the larger context in which a new idea or technology is to be implemented. What other changes, or calls for change. are occurring within the organization or community at the same time? Are people feeling energized or overwhelmed by these other changes?

Armenakis and colleagues (1993) suggest that most organizations can sustain a maximum of three major types of change at any one time. Message clutter can lower readiness for change if people are being asked to change on too many fronts at once. For instance, technology transfer of an innovative drug abuse prevention program for public schools may face low readiness among teachers and administrators if they are also

wrestling with the changes required by major budget cutbacks or implementing educational reform. In addition, a refractory period of low readiness for change may immediately follow a major change, even if that change was successful.

Message Characteristics

In any technology transfer intervention, the message provided about an innovation and its potential for adoption contains two components.

- Discrepancy: the felt need for change (the difference between what is and some desired end-state) which often is experienced emotionally as discomfort or pain. Bandura (1982) refers to unfavorable personal consequences, which can be interpreted in the organizational context as the threat of organizational failure.

- Efficacy: the ability of the individual or organization to correct the discrepancy, or what Bandura calls self-efficacy. Bandura's work demonstrates that individuals will avoid activities they think exceed their capabilities.

Communication strategies may be useful in conveying the message that some new technology is needed and that the organization is capable of changing in ways that will allow technology transfer to be successful. In a comprehensive analysis of the literature on this subject, Backer and colleagues (1992) identified a number of factors characterizing successful communication strategies (e.g., use of multiple media rather than just one channel, combining media and interpersonal strategies). Backer and Rogers (1993) further identified interorganizational networking as a key component of major communication campaigns concerning such topics as drug abuse prevention. Such analyses may be helpful in designing communication approaches for conveying what has been learned about the need for change and the ability of the organization to undertake it, especially if a large organization or community is involved.

Novelty also can be an element for success. For instance, Green's EMPOWER computer software system has potential partly because its novel way of bringing communities together attracts attention, so that the messages gathered about readiness will have a greater chance of actually influencing productive change.

Change Agent Attributes

Most significant technology transfer efforts are initiated and coordinated by internal or external change agents. Internal change agents can include organizational leaders and staff persons selected by management to spearhead the implementation of a new program or technology. External change agents may be developers of the innovation to be transferred or consultants with process expertise in innovation and change. Change agents are often the individuals who make the initial communication about change and guide the process of assessing and enhancing readiness for change. Thus, their perceived credibility, trustworthiness, sincerity, and expertise (both content expertise about the innovation and process expertise about readiness enhancement and other stages in technology transfer) can have an important impact on readiness for change within the organizational setting (Turner 1982).

The organizational position of internal change agents can bear significantly on their influence upon increasing readiness for change. Top-down approaches to introducing change are often problematic, but so are bottom-up approaches (Armenakis et al. 1993). Change agents who are accepted opinion leaders within the organization. usually at the midrange of authority, often are the most successful in assessing and developing readiness (Backer 1991: Rogers 1983).

Interpersonal and Social Dynamics

Interventions to create readiness for change are attempts to mobilize collective support by building and shaping awareness among organizational members about the existence of, sources of, and solutions to the organization's problems. Thus, interpersonal and social dynamics of the organization or community play a key part in determining readiness. Armenakis and colleagues (1993) refer to three theoretical perspectives from the behavioral sciences that have important implications for designing readiness interventions:

- Individual differences. Responses of individuals to readiness interventions vary because of their own differing cognitive structures.

- Social differentiation. Responses vary according to people's cultural or subcultural membership (e.g., position in the organization, racial or ethnic group).

- Social relationships. Opinion leaders have a disproportionate influence upon affecting readiness for change through the social relationships they have with others in the system. Thus, beginning an intervention by enhancing readiness in opinion leaders can stimulate a snowball effect of increased readiness throughout the system.

Enhancement Interventions

At least three strategies can be used to increase change readiness for both individuals and groups:

- Persuasive communication. Both oral and written communications that persuasively address the issues of discrepancy and efficacy can begin the process of enhancing readiness for change. As with any organizational communication, issues of clarity, accessibility to the target population (e.g., literacy levels), and user-friendly, attractive formats all bear upon the effectiveness of these communications.

- Active participation. The literature on behavior change is replete with evidence that people trust what they learn through their own activities. Thus, getting people involved in early efforts to define what change is needed, and how technology transfer can help, can have an impact on readiness for change. Strategic interventions, such as appointing a natural opinion leader to a strategic planning committee, can have a mobilizing effect on all efforts to promote readiness for change.

- Management of external sources of information. People's readiness to consider change within their organization may be influenced by information that comes to them from outside the organization (e.g., a diagnostic report by a consulting firm, information presented in the public media). Organizations can manage such information flow (e.g., through press releases to the media).

Active interventions to promote readiness for change also can occur throughout the process of technology transfer. In fact, the potential impact of readiness for change does not end with the initial actions by users to adopt some new program or technology. Readiness for change actually includes both the initial readiness of innovation developers (e.g., researchers) to get involved in technology transfer activities and long-term efforts to promote durability of innovation once they have been transferred effectively into some new setting (Backer 1991).

Applications to Drug Abuse and Drug Abuse-Related HIV/AIDS

A number of approaches to assessing and enhancing readiness have been undertaken in the drug abuse and drug abuse-related HIV areas. For example, the Center for Substance Abuse Treatment (CSAT) has initiated statewide needs assessments that are used for strategic planning of service delivery, including those services funded by CSAT. Many elements of these needs assessments provide clear indicators of readiness for change that can be addressed through technical assistance. technology transfer, and other activities sponsored by CSAT (Backer and Goodstein 1993).

NIDA has developed a program to help communities identify readiness for change with regard to siting drug abuse treatment facilities in their areas. The Overcoming Barriers to Treatment Program incorporates many of the readiness concepts addressed here into a community action format (NIDA 1989).

UNRESOLVED ISSUES: READINESS AND DRUG ABUSE TECHNOLOGY TRANSFER

Several unresolved issues emerge from this discussion of assessing and enhancing readiness for change as part of the process of drug abuse technology transfer. These issues can be the focus of future efforts to adapt the larger behavioral science knowledge base to this particular arena.

1. Readiness assessment and enhancement must become a regular part of technology transfer interventions. Worthwhile innovations and promising methods for technology transfer (e.g., technical assistance consultation, the technology transfer packages NIDA is developing) may fail to yield the desired results if potential adopters are low in readiness for change--especially if no efforts are made to address limited readiness. If potential users are planning for change when they are not ready for the innovation, resistance and even sabotage can result. Preliminary interventions can help prevent these negative reactions. In addition, assessment and enhancement of readiness needs to be built into legislation and administrative policies that guide the replication or dissemination of new programs and technologies, just as change agents may work at the policy level to promote technology transfer (Hall and Hord 1984).

2. Assessing and enhancing readiness for change is especially critical for dealing with the public bureaucracies in which most drug abuse agencies operate. Such systems often do not readily reveal lack of readiness for change, and staff can engage in resistance to change in many ways that are protected by civil service rules and other features of Governmental organizations. Perhaps even more damaging, these human service environments may carry a tacit, yet inaccurate, assumption of readiness because of the service orientation of both the individuals and the agency. Yet dedication does not automatically lead to readiness for change.

3. Durability of innovations implemented through technology transfer interventions may be significantly affected by early inattention to readiness for change. In many cases, it may be possible to adopt an innovation (e.g., through legislative mandate or administrative order). However, if the adoption occurs prior to achieving a reasonable level of staff and community readiness, the new program or technology may have great difficulty surviving over time due to unenthusiastic implementation or sabotage.

4. A systems approach is needed to integrate readiness assessment and enhancement into the technology transfer process. Strategic planning is usually needed given the scope of change required for most significant technologies.

5. Management style in the organization has much to do with the impact of readiness for change and its assessment. For instance, Robertson and Briggs' (1993) case studies indicate that the implementation of school-based management enhances readiness for change by affecting school decisionmaking processes and culture. School-based management may provide a receptive environment for technology transfer because it works to enhance overall readiness for change. The current emphasis on reinventing government at Federal, State, and local levels also can have a significant impact-both positive and negative-on readiness.

6. Readiness for unexpected change raises special issues such as crisis management, as revealed in the work of management scientists such as Mitroff and the Crisis Management Institute at the University of Southern California.

7. When multiple adoption sites for technology transfer and different measured levels of readiness exist, significant strategy decisions must be made. Does the change agent responsible for making multiple interventions select those most ready for change, leaving those not ready without any help? Should resources be devoted to enhancing readiness among those less ready for change? If so, should the change agent select the cases requiring only minor movement or use significant resources to address the greater challenges?

8. Staging change to facilitate readiness necessitates strategy decisions. For instance. community organizers since the 1960s often have used a strategy to create readiness for major change by organizing people around a small issue that was likely to be successful. Once the community achieved success. they were much more likely to be ready for the major change. Practical approaches such as this need to be integrated into the behavioral science knowledge base on how to assess and enhance readiness for change in drug abuse treatment and prevention.

REFERENCES

Armenakis, A.A.; Harris, S.G.; and Mossholder, K.W. Creating readiness for organizational change. *Hum Relat* 46(6):681-703, 1993.

Backer, T.E. *Drug Abuse Technology Transfer.* Rockville, MD: National Institute on Drug Abuse, 1991.

Backer, T.E., and Goodstein, J. *Technology Transfer and Strategic Planning for the Center on Substance Abuse Treatment: Final Report.* Los Angeles: Human Interaction Research Institute, 1993.

Backer, T.E., and Rogers, E.M., eds. *Organizational Aspects of Health Communication Campaigns.* Newbury Park, CA: Sage, 1993.

Backer, T.E.; Rogers, E.M.; and Sopory, P. *Designing Health Communication Campaigns: What Works?* Newbury Park, CA: Sage, 1992.

Bandura, A. Self-efficacy mechanisms in human agency. *Am Psychol* 37:122-147, 1982.

Bandura, A.; Becker, M.H.; Fishbein, M.; Kanfer, F.H.; Triandis, H.C.; and Middlestadt, S.E. "Factors Influencing Behavior and Behavior Change." Final report prepared for the Theorist's Workshop, National Institute of Mental Health, 1991.

Barabba, V., and Zaltman, G. *Hearing the Voice of the Market.* Cambridge, MA: Harvard Business School Press, 1991.

Beer, M. *Organization Development and Change: A Systems View.* Santa Monica, CA: Goodyear, 1980.

Coch, L., and French, J. Overcoming resistance to change. *Hum Relat* 1(4):512-532, 1948.

D'Amico, J.J., and Corbett, H.D. *Developing Readiness for School Improvement:* Lessons of *Context.* Philadelphia: Research for Better Schools, 1988.

Davis, H.A. Management of innovation and change in mental health services. *Hosp Community Psychiatry* 29(10):649-658, 1978.

Fox, D.G.; Ellison. R.L.; and Keith, K.L. Human resource management: An index and its relationship to readiness for change. *Public Pers Manag* 17(3):297-302, 1988.

Fullan, M. *The Meaning of Educational Change.* New York: Teachers College Press, Columbia University, 1982.

Golden, L.L.. and Johnson, K. Information acquisition and behavioral change: A social marketing application. *Health Mark Q* 8(3-4):23-60, 1991.

Green, L.W., and Kreuter, M.W. *Health Promotion Planning: An Educational and Environmental Approach.* Mountain View, CA: Mayfield, 1991.

Green, L.W., and Kreuter, M.W. CDC's planned approach to community health as an application of PRECEED and an inspiration for PROCEED. *J Health Educ* 23:140-147, 1992.

Griffin, R. Toward an integrated theory of task design. In: Cummings, L.L., and Staw, B.. eds. *Research in Organizational Behavior.* Greenwich, CT: JAI, 1987.

Hall, G.M., and Hord, S.M. Analyzing what change facilitators do: The intervention taxonomy. *Knowl Creat Diffus Util* 5(3):275-307, 1984.

Hall, G.M., and Louks, S. Teacher concerns as a basis for facilitating and personalizing staff development. *Teach Coll Rec* 80(1):36-53, 1978.

Javorek, F.J.; Ciarlo, J.A.; and Brodie. S.F. *A Questionnaire to Assess Davis' A VICTORY Dimensions of Readiness to Address an Organizational Problem.* University of Denver: Mental Health Systems Evaluation Project, 1979.

Kanter, R.M. *The Change Musters.* New York: Simon and Schuster, 1983.

Kotler, P., and Roberto, E. *Social Marketing: Strategies for Changing Public Behavior.* New York: Free Press, 1989.

Kotter, J., and Schlesinger, L. Choosing strategies for change. *Harv, Bus Rev* 57(2):106-114, 1979.

Levinson, H. *Organizational Diagnosis.* Cambridge, MA: Harvard University Press, 1972.

Lewin, K. Frontiers in group dynamics. *Hum Relat* 1:5-41, 1947.
Lipton. D.S., and Appel, P. The state perspective. In: Tims, F.M., and Ludford, J., eds. *Research Analysis and Utilization System.* Rockville, MD: National Institute on Drug Abuse, 1984.
Nadler, D.A., and Tushman, M.L. Organizational frame bending: Principles for managing reorientation. *Acad Manag Exec* 3(3):194-204, 1989.
National Institute on Drug Abuse. *Overcoming Barriers to Drug Abuse Treatment in the Community.* Rockville, MD: National Institute on Drug Abuse, 1989.
Peterson, M.J. "When Is a School District Ready for Change? An Evaluation." Paper presented at the annual meeting of the American Evaluation Association, Seattle, 1992.
Pond, S.B.; Armenakis, A.A.; and Green, S.B. The importance of employee expectations in organizational diagnosis. *J Appl Behav Sci* 20:167-180, 1984.
Porras, J.I., and Silvers, R.C. Organization development and transformation. *Ann Rev Psychol* 42:51-78, 1991.
Roberts, J. "School Personnel and Improvement Projects: Indicators of Readiness." Paper presented at the annual meeting of the American Educational Research Association, Chicago, 1991.
Robertson, P.J., and Briggs, K.L. "Managing Change Through School-Based Management." Paper presented at the 15th Annual Research Conference of the Association for Public Policy Analysis and Management, Washington. DC, 1993.
Schein, E. Personal change through interpersonal relationships. In: Bennis, W., ed. *Essays in Interpersonal Dynamics.* Homewood, IL: Dorsey, 1979.
Strommen, M.A. A Howie dream that came alive. *Knowl Creat Diffus Util* 8(2):245-248, 1985.
Turner, A.N. Consulting is more than giving advice. *Harv Bus Rev* 60(5):120-129, 1982.
Walsh, D.C. Social marketing for public health. *Health Affairs* Summer: 105- 119, 1993.
Williams, R.M. Rx: Social reconnaissance. *Found News* 31(4):24-29, 1990.
Woodman, R.W., and Tolchinsky, P.D. Expectation effects: Implications for organization development interventions. In: Warrick, D.D., ed. *Contemporary Organization Development: Current Thinking and Applications.* Glenview, IL: Scott, Foresman. 1985.

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Collaboration and Diversity in Technology Transfer

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Understanding relationships between behavioral science knowledge and technology transfer in the area of drug abuse treatment calls for appraisal of the technology, how it is generated and applied, and how it fits with the needs of practice-level providers and consumers. Additionally, maximizing technology utilization necessitates critical scrutiny of the assumption that the technology and its transfer should be the locus of concern. In addition to scrutiny of relationships between drug abuse intervention and the major theories and practices used in that aspect of health care, one must ask whether the ethos of implementation rather than transfer of new knowledge most acutely needs attention.

This chapter addresses broad relationships between society and drug abuse intervention and explores the likelihood that the challenge of drug abuse prevention and treatment is perpetuated by neglect or disregard of already available knowledge and technology. The unavoidable conclusion is that new knowledge is less needed than are strategies that will assist in implementation of what is already known but is devalued because change requires confrontation of basic social processes intrinsic to traditional intervention situations. Increased efficacy in drug abuse intervention, in short, hinges on redefinition of the interactive circumstances of that intervention. Only then can other knowledge and strategies be fully accepted and utilized.

THEORY, CONTEXT, AND PRAXIS

The role of theory in practice always has been problematic. Health care's struggle with whether the theories used should come from practice-based or theory-testing scientific paradigms (Hoshmand and Polkinghome 1992; Staats 1993; Steenbarger 1993) is a consequence of the field's positivist legacy. The science-practice rift fuels continued controversy over the viability of unifying academic and applied perspectives and roles. Although the generators of scientific theory usually are interested in testing their hypotheses, typically they are not held accountable for designing and testing outcome-oriented interventions involving the

results of that theory testing. The direct relevance of theory to practice often remains, therefore, more presumption than fact.

It is increasingly argued that development of theories and methods useful in drug abuse treatment should not be constrained by assumptions that the processes of physical science are automatically appropriate to mental health intervention (Eliason 1993; Kim and Berry 1993). Most theories must be applied cautiously to health and illness-related behaviors to improve chances of development and operationalization of relevant and acceptable intervention approaches. To accomplish this improvement, in light of today's escalating population diversity as well as society's current preoccupation with political correctness, frameworks for understanding and knowing how to manage drug-related phenomena must be adequately broad and flexible to lend themselves to formation of contextualized intervention approaches.

Both theoretical and empirical knowledge, to be useful, must help to account for observations through the redefining of the unknown in terms of the known. Contemporary thinking along postmodem lines promotes examination of the value of practitioners' experiences over theory. However, this approach neither counteracts the lack of credibility attributed to experience in generating outcomes (Steenbarger 1993) nor explains how to fill the gaps left in prevention and health care delivery when clinicians do not have adequate theories to guide them (Facione 1993). While lack of substantive theoretical frameworks to support understanding and explanation risks distortion and misuse of intervention strategies, theoretical approaches without adequate flexibility inhibit implementation of potentially useful interventions. Drug use is spread through behaviors that are personally as well as socially and culturally meaningful. Past experiences, social interaction patterns, institutions, norms, and values shape both individual and collective responses to drug-related phenomena (Leap and O'Connor 1993; Nelkin et al. 1991). The everyday significance of multidimensional drug-related behaviors has the potential to facilitate effective prevention and intervention. However, attitudes and behaviors embedded in basic social processes involving the distribution of power and recognition of diversity impede development, communication, acceptance, and implementation of potentially useful knowledge and effective strategies. Based on critical examination of the current gap between research knowledge and its utilization in practice, this chapter asserts that the obstacles to technology transfer are more basic than the level at which they are generally examined. This chapter further asserts that collaboration in the form of empowerment and

management of diversity are essential constituents in drug abuse treatment that is acceptable at the practice level. Without these components. both the process of technology transfer and the implementation of transferred technology remain curtailed.

Whether originating in science or practice. only context-sensitive and population-specific approaches can bridge gaps formed by multiple conceptualizations and methods generated by the interface of myriad disciplinary, experiential, and ethnocultural perspectives (Andrews 1992; Facione 1993: Kavanagh and Kennedy 1992; Kenney 1992: Pedersen 1988). The contemporary sociolegal movement toward participatory health care and patient self-determination corroborates the relevance of contextualized collaborative. advocacy. and empowerment models of intervention. Such approaches encourage client empowerment through involvement in goal and strategy development, responsible decision-making, and the experience of the consequences of those decisions (Connelly et al. 1993: Kavanagh 1993: Moxley and Freddolino 1990).

The empowerment paradigm emphasizes interactive systems and those who learn and know, both individually and collectively, over knowledge. Health-related empowerment involves enabling persons to become well and whole, to develop potential. and to add quality to life (Jones and Meleis 1993). Interpreted for practice. this approach involves rights to resources, identification and maximization of strengths, transformation of negative attitudes and behaviors (Ponterotto and Pedersen 1993), personal and collective responsibilities, and the availability of options that address root causes. Whereas traditional intervention models often replicate the physical sciences and medicine's emphasis on pathology and alleviation of symptoms. many newer approaches address long-neglected needs for social action. Developing ways to employ knowledge realistically entails exposing contradictions and distorted understandings embedded in both traditional research and practice (Lather 1986).

Empowerment as a theoretical framework acknowledges knowing and praxis as socially constituted, historically contextualized, value based, and multidimensional (Lather 1986; Schoem et al. 1993). Achievement of goals is less important than the opportunity to experience, and the actual experience of, empowering processes that lead people to believe in their own efficacy (Connelly et al. 1993; Kavanagh 1993; Northrup 1993). This belief leads to increased energy, sense of well-being, and effectiveness in realizing health potential (Jones and Meleis 1993), all of which allow people and communities to gain mastery over their own lives

(Connelly et al. 1993; Rappaport 1984). However, whether couched as advocacy, collaboration, enablement, or empowerment, the bottom-up approach is challenging to implement due to its nonspecificity, flexibility, and requirement that access to power be redistributed. Given that society's history with addiction has always been marked by political conflict as well as confusion among moral, medical, and social understandings and labels (Conrad and Schneider 1992) it is not surprising that the United States today, already unsettled by the unknowns and uncertainties of health care reform, has only unevenly begun to accept this modification of the established model of treatment.

The contextualization and applicability that form the strength of collaborative empowerment often are disconcerting and threatening in traditional treatment settings. The nature of treatment has been reductionistic. Focused on specific behaviors and on control, traditional treatment approaches are oriented toward the expertise and competence of providers and the failure of consumers to meet socially acceptable standards of behavior. Collaborative empowerment requires rethinking, reorientation to a consumer-based context, and attention to the diversity found there.

Collaborative approaches and effective management of diversity at multiple levels of health care hierarchies are practical and flexible media for the transfer of technical knowledge from research to practice settings. However, they can be expected to facilitate that process only when the technical knowledge and strategies are recognizably appropriate and relevant to practice. The medium for both collaborative treatment and diversity management is mutual communication. Such communication has the dual goals of producing respectful, culturally acceptable, and effective clinical interventions and reducing the impediments that many current structures impose on intervention processes. Whether attempts to change norms and expectations come through top-down structural alterations or from bottom-up attitude changes, face-to-face situations serve as the critical intermediate links (Pettigrew 1993).

Providers and consumers meet at what is referred to in this chapter as the "front line." As the focus of intervention, the front line serves as the bottom line in technology transfer, for it is there that knowledge as technology is tested and either utilized or rejected. To be cost effective, the technology must fit the needs and world views of consumers and providers. Otherwise it will not be viewed as worth implementing. It is important to realize that the front line is not composed of providers alone.

Interaction between providers and consumers (both individual and collective) gives it purpose. In sum, given the interactive nature of drug use and drug abuse treatment, one must understand interrelationships among power. diversity, and the health care scene to appreciate the potential for and obstacles to transfer of research knowledge to practice.

COLLABORATION: POWER AND POWER DIFFERENTIALS

Obstacles to effective technology transfer are not limited to the content of available technology and its applicability. Despite increasing evidence of the importance of collaborative and participatory health strategies, barriers to empowerment are found at all levels of society, bureaucratic and professional organizations, and provider-consumer interactions (Connelly et al. 1993). Everyday discourse and social interactions reinforce the ideological and structural status quo (van Dijk 1993). That basic pattern, in a stratified society like the United States, includes group dominance based on perceived and/or constructed social and cultural differences. In a truly participatory democracy there would be no segregation at the front line. Collaboration and respectful communication would obviate distinctions between consumers and providers. But that is rarely the case in treatment settings.

Patients are typically the most easily definable and censurable members of health care systems (Kavanagh 1991). As long as the concept of interactive otherness (that is. an us-them dichotomy) drives behavioral assessment and intervention, the gap between knowledge and practice remains very close to that potentially powerful but vulnerable front line. Whether the line is drawn between consumer and front-line provider or between front-line provider and agency hierarchy, only participatory collaboration fully promotes the dialog essential to the transferability and actual transmittal of technical knowledge.

Treatment providers may not associate the failure of empowerment strategies with dissonance between themselves and the population being treated (Ratner 1993). Open discussion in health care settings emphasizes the need for effective intervention to be congruent with the perceptions and interpretations of those who are designated as consumers. People who experience any phenomenon (including addiction) understand problems related to that phenomenon with different (and often greater) sensitivity and knowledge than do even the most educated and perceptive outsiders.

Individuals respond to others with whom they share commonalities (Frankel 1993; Hadorn 1991; Jacobson 1987; Kavanagh and Kennedy 1992; Kurtz 1982; McDougall 1993: Tindall and Gray 1985; van Dijk 1993). Numerous grassroots advocacy and collaborative intervention projects have proven to be successful (e.g., Bullard and Wright 1990; Facione 1993; Kelly et al. 1993: McDougall 1993; Thomas 1991). Collaborative approaches applicable to practitioner-consumer interaction (e.g., Hahn 1991; Kavanagh et al. 1992; Quirk 1993; Reason 1994) have been found particularly effective with historically devalued and economically disadvantaged groups who are unwilling to accept unquestioned goals and methods designed for the dominant population. Peer counseling, self-help groups, development of base communities that form action units, and other formats for collaborative participation are practical mechanisms for client involvement in decisionmaking, organized support systems, mutual and collaborative treatment strategies, and civic action.

For all its simplicity, however, collaboration also is immensely complex. In drug abuse treatment, use of personal experiences of service providers has long been argued to contribute to risk-reducing behavioral changes and health behavior patterns (e.g., Weeks et al. 1993). The addictions field is somewhat unique in health care for its heavy dependence on practitioners who have endured problems and social realities similar to those of their clients. However, due to the hierarchical structure of most health organizations, these roles also can leave practitioners ill-prepared and unprotected as intermediaries whose potential to be advocates and agents of empowerment is inhibited or obviated.

A basic tenet of empowerment is the belief that both providers and consumers have the ability (that is, power and capacity) to meet their own needs, to solve their own problems, and to mobilize the resources necessary to feel in control of their own lives (Connelly et al. 1993; Gibson 1991). Even when credentialed on a par with their hierarchical superiors (which is often not the case), drug abuse treatment providers serve “shock absorber” roles in which they often function as both advocates and adversaries. They are generally realists whose jobs involve buffering the health care industry’s hierarchy from the more socially marginal of its consumers and protecting consumers from various aspects of the health care hierarchy. Front-liners habitually question the effectiveness of their work and of their treatment (Rhodes 1991), but they answer to others (often those labeled “experts”) who are less likely to be close to the front line. To strengthen predictability and control, the less

powerful attend to the more powerful (who control their outcomes) (Fiske 1993). Meanwhile, communication tends to flow downward from hierarchical superior to subordinate (Kavanagh 1988, 1991; Kavanagh and Kennedy 1992).

Organizations, as subcultures, reflect the values of the dominant culture (Ray 1989). Traditionally, the structure of health care delivery has helped maintain resistance to relinquishing power to providers or from providers to consumers. Movement toward flatter organizational systems has prompted somewhat greater scrutiny of social processes that play forceful roles in the transfer of research-based technology to actual practice settings. However, this scrutiny is not consistent across organizations and seldom crosses (or attempts to rescind) the line drawn between provider and consumer. Idealism aside, in most cases neither organizational nor academic models push very hard to get real decision-making responsibility and control to the front line. Reconceptualization of the goals of praxis as integration and action (Schoem et al. 1993; van Dijk 1993) seldom receives much more than lipservice. Even contemporary political correctness debates, like prevailing ideologies and educational practices that underscore elite discourse, provoke more passion than change (van Dijk 1993). Although corporations are awakening to the fact that collaborative strategies with a diverse workforce enhance productivity (Thomas 1991), in the health care arena researchers typically do not, and practitioners often cannot, display the same motivation to work collaboratively with front-line consumers. One must ask in whose interest the system is perpetuated as it is as well as what other possibilities exist.

Control in the health disciplines is an issue with more history than resolution. As medicine essentially replaced religion as society's most powerful extralegal institution of social control, the issue of addiction (along with numerous other categories of "deviance") was conceptually transformed from being a highly political sociolegal problem to being a medical one (Conrad and Schneider 1992). The traditional ethos of control in mental health settings involves tension between anxiety over loss of control of the intervention, interaction, or organization and fear of confusing therapeutic limit setting with callousness (Kavanagh 1991). As long as clients are viewed as lacking the knowledge and capacity to merit mutual and collaborative relationships with support providers or to achieve real empowerment, social labeling preserves front-line staff and client polarization, client dependency, and institutional apathy and mistrust. Facilities continue, for the most part, to compel compliance to

rules and ideologies that inhibit empowerment and maintain powerlessness and subordinate status (Skoll 1992).

In bureaucratic organizations, power flows from official authority vested in hierarchical roles to control the allocation and exchange of resources (Blau 1974; Ray 1989; Thomas 1991). The front line is confronted with the (often unspoken) reality that egalitarian ideals do not delete ethnocentrism and other status differentials from clinical settings. Hierarchical values (such as authority and organizational preservation) reinforce inflexibility, which limits organizational recognition and attention to diverse perspectives (Thomas 1991).

While society and organizational hierarchies tend to minimize the issue, neither side of the front line can avoid the contradictions inherent in the expectation of quickly treating people whose problems are symptoms of broader serious societal and health care systems' failure (McBride 1991). The dynamics of circular victimization (Scott 1993) are striking in drug abuse treatment contexts where hierarchical fear of manipulation strengthens tendencies toward control and imposition. Consequently, front-line providers often wearily view their roles as lacking authenticity in respectful, collaborative client advocacy and/or participation. In such circumstances, the arrival of research findings, particularly if based on theory rather than practice, may be viewed as an irrelevant or even impertinent intrusion.

Practitioners at the front line tend to hold unenviable positions. Drug abuse treatment programs depend heavily on those who have successfully managed their own addictions. Thus they may be haunted by a generalized societal mistrust of drug users in combination with beliefs in the fragility of associations between health-promoting knowledge and risk-reducing behaviors (e.g., Baldwin and Baldwin 1988; Flaskerud and Nyamathi 1989; Jemmott and Jemmott 1991; O'Connor et al. 1993). While potential for breach of treatment protocol is aggressively suspected of consumers of drug abuse treatment services and the more subtle mistrust of providers remains submerged, overt collaboration between front-line providers and consumers is sometimes viewed by the hierarchy as unprofessional.

While providers who were previously consumers retain an element of the negative stigma attached to the patient role, providers without personal drug histories may have less credibility with consumers. In either case, drug abuse treatment providers remain close to the bottom of the mental

health hierarchy and must fight for the power that is invested in more valued and trusted (and often more overtly technically skilled) personnel and that could result in significant enhancement of treatment outcomes. In sum, to whatever extent and in whatever ways (empathetically, dialogically, or experientially) they cross the metaphorical line between themselves and consumers, front-line providers must endure the stigma of working in socially devalued aspects of health care and with socially devalued clients. This stigma has long been known to have significant impact on communication and relationship patterns among health care providers (Britain and Cohen 1980).

Those with authority in drug abuse treatment settings are more likely than those at the front line to come from dominant cultures. Supervisors are less likely than hands-on providers to be members of gender, ethnic, or racial minority groups or to have experienced the subordinate statuses associated with the health-related situations that the front-line provider is there to manage and that the front-line consumer is there to receive help managing (Pedersen 1988). Hierarchical superiors, who often are attentionally overloaded and may have strong needs for dominance, also typically know significantly less about their subordinates than vice versa (Berreman 1962) and are, therefore, particularly vulnerable to stereotyping those groups (Fiske 1993). The interaction between power and stereotyping is mutually reinforcing (Fiske 1993). Stereotypes risk the mislabeling of problems and promote diagnoses that emphasize the provider being right and the client being wrong (Eliason 1993).

Front-line providers are aware of strong associations between interpersonal relationships and health-related consequences. They share the front-line consumers' frustration with the urgency of addiction and its steadfast fixations on survival and the present. They must deal with the desperation of dependency, poverty, social alienation, mistrust, and isolation as well as with the widespread dissatisfaction and unrealistic expectations that reverberate from continuous but vicarious access to the rarefied lifestyles promulgated by the media. Drug abuse treatment providers cannot ignore the subtle but nefarious impacts of race, gender, and class in social process or the imbalances in relationships at all levels that contribute to vulnerability and discourage assertiveness and self-efficacy. But awareness of these phenomena does not necessarily help management of their consequences.

Although indispensable, significant personal and group empowerment tends to remain elusive for those at the front line. Providers are forced to

focus on consumers' futile attempts to use drugs to protect or enhance self-esteem and to decrease powerlessness rather than on movement toward meaningful life goals. While only technical knowledge that convincingly addresses these realities is likely to be useful or used, such issues may or may not receive research attention, and, if explored, the results (if they seem irrelevant to hierarchical superiors) may or may not filter through the organization to the front line.

The knowledge and skills necessary for personal control over one's life do not develop through health care intervention if observations and experiences are limited to "power over" relationships and do not facilitate participatory, "power with" exchanges between individuals and within communities (Kreisberg 1992). Nonetheless, commitment to collaborative practice remains generally weak in the area of mental health and addictions, and "service" remains linked to compliance, terminal objectives, and intervention programs focused on doing things "to" consumers.

When service system goals are inadequately defined to state and promote significant and meaningful positive outcomes, or they do not fit the needs of those involved, responsibility continues to be confused and fragmented, and real social action is minimal (Paul 1993; Rose and Black 1985). For example, the first decade of discourse on acquired immunodeficiency syndrome (AIDS) and the "AIDS service industry" (both of which are intimately associated with drug use and users) has been in large part about power, homophobia, and discrimination (Patton 1990). Today more programs are associating successful prevention and intervention with emphasis on positive change in lieu of prevention of negative behavior (Kavanagh et al. 1992; Sobo 1993). If effective practice requires the transformation of consumers into producers, then direct service programs must take more seriously the challenge to maintain relationships with clients and former clients that will expand knowledge and strategies related to real collaboration, advocacy, and empowerment (Rose and Black 1985). Development of nonhierarchical, community-oriented, and population-specific sources of support implies transformation but not lessening of society's role in promoting and assuring care (Salsberry 1993).

DIVERSITY AND DIVERSITY MANAGEMENT

Diversity refers to variation found among people and occurs wherever there is not sameness. Time is running out on the need for transformation of health care from a structure that expects consumers to fit it to one that accommodates the needs of its clienteles (Brislin 1993; Kavanagh and Kennedy 1992; Lefley and Pedersen 1986; Pedersen 1988). In most cases, the literature couches the diversity aspect of this need in terms of cross- or transcultural sensitivity. However, to be truly effective, diversity should be conceptualized more broadly. Diversity extends beyond ethnicity and culture to differences in age, health status, race, experience, gender, sexual orientation, and other aspects of social and economic position (Kavanagh and Kennedy 1992). Each of these noninterchangeable concepts contributes to the complexity of prevention and intervention in an increasingly diverse population.

Diversity is a major dimension in relationships between research findings and their utilization in practice because, if not managed effectively, differences form barriers between those who do not view themselves as having commonalities. These barriers can be expected to occur with the same powerful intensity found when similarities serve to connect those who recognize them (Frankel 1993). Any study of treatment processes is incomplete without a clear understanding of variables responsible for diversity among, between, and within the social categories involved.

Diversity both characterizes society and dictates a need for flexibility in approaches to intervention. Lack of intercultural and diversity-sensitive preparation by health care providers wastes substantial proportions of resources that are already strained and limited (Andrews 1992; Pedersen 1988). With the 21st century promising increased confrontation with demands for attention to diverse populations (Bullard and Wright 1990; Locke 1992), drug abuse treatment that reflects respect for multiple perspectives is more than a humanistic fad based on “conspicuous compassion” (McManus 1993). However, although increasingly recognized at the level of practice, diversity is seldom addressed in terms of practitioners. In other words, there is generally greater cognizance of the implications of diversity in relationships between front-line consumers and providers (where diversity is likely to be used as an argument against collaboration) than of diversity in terms of relationships among providers at various organizational levels.

In addition to being challenged to manage widely varying consumer needs and expectations, front-line providers must face, but may not be prepared to manage, the diversity above as well as below them in the hierarchy. For instance, they may or may not know how and to whom they can voice the difficulties imposed when advocacy and intervention strategies are viewed as essentially acultural, while clienteles are decidedly cultural in orientation (Andrews 1992; Davidson and Ray 1991; Kavanagh 1993; Pedersen 1988; Ray 1989). The empowerment of practitioners hinges on their competence and confidence as managers of diversity.

Managing diversity is defined as helping each person reach his or her full potential (Thomas 1990, 1991). The process does not involve manipulation but focuses on helping others achieve the best situation possible given the circumstances. Diversity management does not imply a supplementary effort to give relief to a system of negative consequences but asserts a need to change the system and modify its core culture (Thomas 1991). All of this management requires not only training and knowledge but also self-awareness, permission, and encouragement (at individual and collective levels) to develop multiple perspectives. However, the requisite sensitivity, knowledge, and skills may not be among those things that agency hierarchies currently can provide effectively.

Culture, ethnicity, race, and other aspects of diversity are not restricted to people of color; they involve and affect everyone. Diversity competence requires knowledge about the processes that perpetuate social inequality, since those processes continue to strongly influence people's experiences. In a society that values predictability and practicality, and in which prejudice and discrimination have become increasingly subtle (Stanfield 1993), diversity has been viewed traditionally as a liability. Despite valuing personal freedom, American society tends to promote oversimplified and practical routines for interventions that treat everyone as if they were the same. Furthermore, biomedical ethics, which strongly influence drug abuse treatment, are based on a philosophy that all people have an essential core of humanity and deserve the same rights. This philosophy reinforces the belief that every patient should be treated equally (Eliason 1993). However, "equality" has traditionally been interpreted to mean similar treatment rather than treatment that meets client- or population-specific expectations to the same extent.

In a participatory democracy, all groups would have a voice and be able to pursue their own interests while respecting those of other groups. Positive change contributes to a pretense that everything is the same for everyone and that everyone should be treated in exactly the same way. In reality opportunities and experiences still vary widely: people are not all the same, they do not all want to be, and they should not all be treated as if they were the same. They have diverse needs that, to be managed appropriately, must be met in different ways. The United States is already the world's most diverse society. A half-century from now, the average person in this country will trace his or her ancestry to Africa, Asia, the Pacific Islands, or the Hispanic or Arab worlds-or to a combination of those-rather than to roots in Europe (Henry 1991). The implications of such change for the potential redistribution of status, power, and wealth are threatening to some and heralded by others. In any event, this "browning of America" symbolizes a need not only to orient health care toward a diverse population but also to acknowledge that, as the century closes, people from diverse backgrounds expect, demand, and are viewed as deserving opportunities to preserve their widely varied lifestyles, beliefs, and practices (Wali 1992).

Treatment and care should be based on individual needs. However, this widely held belief has been premised on the assumption that practitioners can recognize and address these needs (Eliason 1993). In reality, health care providers generally are prepared to identify solutions to problems based on their own identifications and assessments of the problem (Brislin 1993) rather than on those of consumers. Health care organizational hierarchies often do not reflect the ethnic and racial variation found among the agencies' clienteles. Providers often compromise their credibility when they do not or cannot place clients' problems into frameworks that are familiar or acceptable to them. Similar discrepancies are likely to exist among those who generate knowledge applicable to health care practice and those who directly provide or receive that information. Unless all involved are prepared to manage these differences effectively, diversity further confounds an already complex health care scenario.

There are two additional aspects of multiculturalism that refute the efficacy of approaches that leave the locus of assessment and decision on the provider's side of the front line. One is that diversity provides a rich source of creativity and ideas, a source that is lost when differences in perspectives are overlooked or ignored (Wali 1992). Reconceptualization of diversity as an asset and resource supports its effective management. The other argument for multiculturalism is that failure to recognize and

acknowledge differences that are real can be painful and dehumanizing-no matter on which side of the front line one is or where one is in the hierarchy.

At this point, both the Nation and its health care face some tough realities. Not only is the U.S. population incessantly changing, but individuals and groups also increasingly celebrate their differences and are increasingly more likely to reject treatment compromises that fail to recognize or acknowledge what makes them unique (Thomas 1991). Transformation toward a multicultural perspective will change thinking in many arenas (Craige 1994), only one of which is health care. More attention must be paid in research, treatment, and related educational settings to both the process and content of the transformation toward participatory and collaborative styles of care already underway.

Despite the obvious needs, there are strong social biases against effective diversity management. Race is one of the most powerful of those biases. On the basis of skin color, no one with a global perspective can tell where one "race" ends and the next begins. Yet after a century of knowing that race is biologically insignificant, society continues to use the concept in daily discourse as if race had biological as well as social meaning, although ethnicity, culture, and gender have all acquired new significance as well (Locke 1992).

In addition to attending to diversity in the areas addressed above, practitioners must learn (therefore must be taught) to work with both groups and individuals. Although many health care disciplines focus on providing care and treatment to individuals, this approach tends to obscure understandings of group patterns and larger societal processes. Whether formal or informal, groups help maintain identity and express shared interests. These interests may not be considered acceptable at the societal level (such as relationships based on illegal drug use), but group identities can be intensely meaningful to consumers. In health and illness one finds particular tenacity in retention of beliefs and practices that have security-maintaining functions (Lefley and Pedersen 1986; Pedersen 1988). Regardless of the structure and organization of formal health care, people continue to cope in traditional ways within their own social networks and institutions. Comprehensive, balanced views must be learned and must include both the strengths and the problems experienced by groups and individuals. Ideally, information about a group comes from that group, and information about individuals is tested against group patterns and expectations (Kim and Berry 1993).

Unfortunately this area of formal education is one to which many adults are not privy. Relatively few providers have been taught to learn, teach, and counsel cooperatively and collaboratively; to facilitate dialog that does not turn into power-differentiated debate: to confront conflict and controversy constructively; to link micro- and macroanalyses; to understand how political, social, and economic factors work together to influence health care; essential dimensions of group process involved in distribution of power at the community level: the potency of participatory and cooperative action; objective group and self-evaluation; how to create an atmosphere for open and informed discussion: and how to use dialog and feedback for open learning and as ways to break down barriers (Brislin and Yoshida 1994; Deutsch 1993; Pedersen 1988; Schoem et al. 1993).

Although diversity is not limited to culture, ethnicity often is used to exemplify human differences. There are currently in the United States more than 100 ethnic groups with thousands of interpretations of health- and illness-related phenomena among their members. Each group is based on cultural orientations composed of shared and learned, but highly variable, systems of meanings (Betancourt and Lopez 1993). Variations within groups may be as great or greater than those between them. Discrete traditional cultural orientations overlap as they are adapted to accommodate the diversity of society or specific life circumstances. Many Americans have blended identities involving more than one racial or ethnic group. All have identities composed of multiple statuses and roles. Stereotypic information about groups that number in the millions and vary widely within is futile. The Nation is neither a melting pot nor a collection of clearly distinct and separate subcultures (Galanti 1991). Categories are arbitrary at best, but their meaning and significance in life are real and powerful. Providers, meanwhile, often are prepared to address only individuals and do not recognize social action as an intervention role. Despite being integral to collaborative empowerment, relatively few providers know how to work on behalf of populations and to take into account the full impact of the social, political, and economic influences that shape the health of society (Butterfield 1990).

Practitioners should accept the fact that they cannot and should not try to know everything about every group. They must, on the other hand, understand and acknowledge aspects of diversity that socialization processes in this society tend to minimize. The essential consideration here is that different groups have different values and norms. Health care traditionally has represented the values and norms of the dominant

society-which is Western European in its value orientation and predominantly middle class, Christian, and male in its thinking and behavior.

Without specialized training to promote multiple perspectives, providers learn to protect themselves from the complexity of multiple perspectives by imposing variations of their own views on consumers. They also may experience cross-cultural fatigue, a state that reinforces acceptance of in-group values and standards as universal, loyalty among the in-group, derogatory stereotyping of out-group characteristics (e.g., deficit theories such as cultural deprivation or genetic inferiority [Nieto 1992]), and hostile relations between in-group and out-group members (Seelye 1993).

Whatever the extent to which such diversity is acknowledged and managed, understanding and caring for a diverse clientele require comprehension of various perspectives used to interpret events or behavior. These multiple perspectives do not come easily to already harried practitioners guided from above by specific disciplinary perspectives that are shaped (however unconsciously) by orientations associated with specific ethnic and class characteristics and hierarchical status expectations.

THE BOTTOM LINE

Sensitivity, knowledge, and skills are required for collaboration with diverse populations at the front line and throughout health care organizations. Effective drug abuse prevention and treatment require a climate of flexibility, openmindedness, trust, objectivity, and respect for diverse viewpoints; an approach to inquiry in which analytical thinking, curiosity, decisiveness, and intellectual honesty are norms; and a forum for participants to have a voice and to experience opportunities to build self-esteem and experience success (Ponterotto and Pedersen 1993).

Formal mental health (as well as other health) services in the United States have had a cultural bias favoring members of the dominant social categories (Pedersen 1988). Even the dichotomy between psychological and physical conditions and the identification of addiction within the domain of medicine and health reflect those biases (Conrad and Schneider 1992). Ethnic and minority communities have experienced more than their share of the adverse effects of science and technology (Frankel 1993). Recent evidence verifies that indigenous modes of

treatment often work better than strategies based on the dominant society and imposed on others (Kim and Berry 1993: Pedersen 1988), but drug abuse treatment providers are in large part unprepared to examine and tap into those resources.

Given this scenario, effective intervention requires a balance of sensitivity, knowledge, and skills (Brislin and Yoshida 1994; Kavanagh and Kennedy 1992). The conventional emphasis on awareness and sensitivity leaves providers powerless and frustrated because the knowledge or skills needed by effective advocates are not provided. Knowledge alone is similarly inhibiting, as simplistic stereotypes of cultural groups fail to recognize variations within groups. If applied insensitively or without appropriate skill, knowledge can be counterproductive.

Although stereotypic expectations of cultural behavior are counterproductive, knowledge of expectable patterns of behavior is essential when clientele are diverse or there are significant differences between providers and consumers. The difference is that knowledge of expectable patterns is used only as a starting place for comparison with actual observations. Unlike stereotypes, actual knowledge changes as new information is collected. Such information is empowering. It protects against stereotyping by couching actual data in terms of adaptable generalizations that change with additional evidence. Although knowing general group characteristics helps, flexibility and sensitivity are needed to understand when those expectable patterns fit and when they do not as well as how to intervene appropriately and effectively.

Collaborative, participatory health care is based on the premise that all individuals and groups deserve respect. One need never fully accept another view or replace one's own with that view. On the other hand, every view is worthy of respect as the reflection and result of specific perspectives, experiences, and understandings. Sensitivity is needed for awareness of these various perspectives, and knowledge empowers their understanding. However, sensitivity and knowledge must be combined with communication, assessment, and intervention skills for appropriate and effective intervention to occur.

Many practical skills useful in managing diversity involve communication related to intervention. There are times when affirming and managing diversity requires venturing into unknown and potentially uncomfortable interactive situations. An atmosphere of safety and

comfort is essential for both provider and client to facilitate free expression of attitudes and diversity of opinions (Schoem et al. 1993). Usually the cost of inattention to and avoidance of multiple perspectives is lack of effective communication and intervention. By avoiding topics and viewpoints that have meaning to people and that may have significant impact on their lives, opportunities are eliminated for understanding views and concerns. Conversely, lack of collaborative communication opens the door to coercion. imposition, and exacerbation of barriers traditionally associated with diversity.

Individuals and groups have relationships with their problems. Interventions, to work, must consider technical processes as well as the perspectives of users and providers. Practitioners are unlikely to be viewed as contributing to solutions if they do not understand and accept (which does not mean they must agree with) consumers' views of the problem or if they impose their own views as if the alternatives did not matter. In many organizations, the front-liners burdened with the task of correctly communicating clients' points of views to others have not been prepared or permitted to do so. Socialized to accept professional standards as ideal, they must choose between supporting those standards (therefore increasing the "otherness" of the consumers) or taking lonely stands as unsupported advocates.

CONCLUSION

Health care reflects the society in which it occurs. It would not be accepted and utilized if it did not reflect the cultural values and social norms that predominate. While the values and norms that shape health care and drug abuse treatment in the United States generally reflect those of the dominant or majority culture, many subgroups within the Nation have quite different (even conflicting) values and norms (DeVita and Armstrong 1993; Stewart and Bennett 1991). The right to have these differences acknowledged and considered in health care is increasingly demanded and recognized. Although health care disciplines tend to have the same values as middle-class Americans of European American background, practitioners must be taught, allowed, and prepared to be flexible enough to meet the needs expressed by a diverse society with widely varying expectations and needs. Organizations (whether oriented toward education, research, or practice) must allow for this flexibility. Closure of the gap between knowledge and practice is contingent upon reduction of both process and content barriers to the applicability and

acceptability of the technology generated. Effective intervention requires enough equal-status contact for collaboration and empowerment to occur. Issues and topics that have traditionally been avoided must be dealt with openly and respectfully. Only with a collaborative and participatory health agenda will barriers to effective technology transfer be dispelled. Researchers must attend to the front line and learn to collaborate with the diverse peoples found there if there is serious commitment to making technology transferrable.

REFERENCES

Andrews M.M. Cultural perspectives on nursing in the 21st century. *J Prof Nurs* 8(1):7-15, 1992.

Baldwin, J.D.. and Baldwin, J.I. Factors affecting AIDS related sexual risk taking behavior among college students. *J Sex Res* 25(2):181-196, 1988.

Berreman, G.D. *Behind Many Masks.* Society for Applied Anthropology Monograph No. 4. Indianapolis: Bobbs-Merrill, 1962.

Betancourt, H.. and López. S.R. The study of culture. ethnicity, and race in American psychology. *Am Psychol* 48(6):629-637, 1993.

Blau, P.M. *On the Nature of Organization.* New York: Wiley, 1974.

Brislin, R. *Understanding Culture's Influence on Behavior.* Fort Worth, TX: Harcourt Brace, 1993.

Brislin, R.W., and Yoshida, T. *Improving Intercultural Interactions: Modules for Cross-Cultural Training Programs.* Thousand Oaks, CA: Sage, 1994.

Britain. G.M., and Cohen, R., eds. *Hierarchy and Society: Anthropological Perspectives on Bureaucracy.* Philadelphia: Institute for the Study of Human Issues. 1980.

Bullard, R.D.. and Wright, B.H. The quest for environmental equality: Mobilizing the African American community for social change. *Soc Nat Resour* 3:301-311, 1990.

Butterfield. P.G. Thinking upstream: Nurturing a conceptual understanding of the societal context of health behavior. *ANS Adv Nurs Sci* 13:1-8, 1990.

Connelly, L.M.; Keele, B.S.; Kleinbeck, S.V.M.; Schneider, J.K.; and Cobb, A.K. A place to be yourself: Empowerment from the client's perspective. *Image* 25(4):297-303. 1993.

Conrad, P., and Schneider, J.W. Opiate addiction: The fall and rise of medical involvement. In: *Deviance and Medicalization: From* Raciness to *Sickness.* Philadelphia: Temple University Press, 1992. pp. 110-144.

Craige, B.J. Multiculturalism and the Vietnam syndrome. *Chron Higher Educ* 40(13 January):B3, 1994.

Davidson, A.W., and Ray, M.A. Studying the human-environment phenomenon using the science of complexity. *ANS Adv Nurs Sci* 14(2):73-87, 1991.

Deutsch, M. Educating for a peaceful world. *Am Psychol* 48(5):510-517, 1993.

DeVita, P.R., and Armstrong, J.D. *Distant Mirrors: America as a Foreign Culture.* Belmont, CA: Wadsworth, 1993.

Eliason, M.J. Ethics and transcultural nursing care. *Nurs Outlook* 41(5):225-228, 1993.

Facione, N.C. The Triandis model for the study of health and illness behavior: A social behavior theory with sensitivity to diversity. *ANS Adv Nurs Sci* 15(3):49-58, 1993.

Fiske, S.T. Controlling other people: The impact of power on stereotyping. *Am Psychol* 48(6):621-628. 1993.

Flaskerud, J.H., and Nyamathi, A.M. Black and Latina women's AIDS related knowledge, attitudes and practices. *Res Nurs Health* 12:339-346, 1989.

Frankel, M.S. Multicultural science: Minority scholars bring key perspectives to research and policy issues. *Chron* Higher *Educ* 40(10 November):B1-2, 1993.

Galanti, G.A. *Caring for Patients from Different Cultures.* Philadelphia: University of Pennsylvania Press, 1991.

Gibson, C.H. A concept analysis of empowerment. *J Adv Nurs* 16:354-361, 1991.

Hadorn, D.C. The role of public values in setting health care priorities. *Soc Sci Med* 32(7):773-781, 1991.

Hahn, R.A. What should behavioral scientists be doing about AIDS? *Soc Sci Med* 33(1):1-3, 1991.

Henry, W.A. Beyond the melting pot. *Time* April 9, 1991. pp. 28-31.

Hoshmand, L.T., and Polkinghome, D.E. Redefining the science-practice relationship and professional training. *Am Psychol* 47:55-56, 1992.

Jacobson, S.B. The 12-step program and group therapy for adult children of alcoholics. *J Psychoac Drugs* 19(3):253-255, 1987.

Jemmott, L.S., and Jemmott, J.B. Applying the theory of reasoned action to AIDS risk behavior: Condom use among black women. *Nurs Res* 40(4):228-234, 1991.

Jones. P.S., and Meleis, AI. Health is empowerment. *ANS Adv Nurs Sci* 15(3):1-14. 1993.

Kavanagh, K.H. The cost of caring. *Hum Organ* 47(3):242-251, 1988.

Kavanagh, K.H. Invisibility and selective avoidance: Gender and ethnicity in psychiatry and psychiatric nursing staff interaction. *Cult Med Psychiatry* 15:245-274. 1991.

Kavanagh, K.H. Transcultural nursing: Facing the challenges of advocacy and diversity/universality. *J Transcult Nurs* 5(1):4-13, 1993.

Kavanagh, K.H., and Kennedy, P.H. *Promoting Cultural Diversity: Strategies for Health Care Professionals.* Newbury Park, CA: Sage, 1992.

Kavanagh, K.H.; Harris, R.M.; Hetherington, S.E.; and Scott, D.E. Collaboration as a strategy for acquired immunodeficiency syndrome prevention. *Arch Psychiatr Nurs* 6(8):331-339, 1992.

Kelly, J.A.; Murphy, D.A.; Sikkema, K.J.; and Kalichman, S.C. Psychological interventions to prevent HIV infection are urgently needed: New priorities for behavioral research in the second decade of AIDS. *Am Psychol* 48(10):1023-1034, 1993.

Kenney, J.W. The consumer's views of health. *J Adv Nurs* 17:829-834, 1992.

Kim, U., and Berry, J.W. *Indigenous Psychologies: Research and Experience in Cultural Context.* Newbury Park, CA: Sage, 1993.

Kreisberg, *S. Transforming Power: Domination, Empowerment, and Education.* New York: State University of New York Press, 1992.

Kurtz, E. The way AA works: The intellectual significance of Alcoholics Anonymous. *J Stud Alcohol* 43(1): 1982.

Lather, P. Research as praxis. *Harv Educ Rev* 56(3):257-277, 1986.

Leap, W.L., and O'Connor, K.A. Introduction: Applying anthropology in HIV/AIDS research. *Pract Anthropol* 15(4):3-4, 1993.

Lefley, H.P., and Pedersen, P.B. *Cross-Cultural Trainingfor Mental Health Professionals.* Springfield. IL: Charles C. Thomas, 1986.

Locke, D.C. *Increasing Multicultural Understanding: A Comprehensive Model.* Newbury Park, CA: Sage. 1992.

McBride, D. *From TB to AIDS: Epidemics Among Urban Blacks Since 1900.* New York: State University of New York Press, 1991.

McDougall, H.A. *Black Baltimore: A New Theory of Community.* Philadelphia: Temple University Press, 1993.

McManus, F.E. Constructivists and creationists. *Am Psychol* 48(1):57-58, 1993.

Moxley, D.P., and Freddolino, P.P. A model of advocacy for promoting client self-determination in psychosocial rehabilitation. *Psychosoc Rehabil J* 14(2):69-82, 1990.

Nelkin, D.; Willis, D.P.; and Parris, S.V. *A Disease of Society: Cultural and Institutional Responses to AIDS.* New York: Cambridge University Press, 1991.

Nieto, S. *Affirming Diversity: The Sociopolitical Context of Multicultural Education.* New York: Longman, 1992.

Northrup, D.T. Self-care myth reconsidered. *ANS Adv Nurs Sci* 15(3):59-66. 1993.

O'Connor, K.A.; McKay, S., and Dollar, M. HIV/AIDS knowledge on a college campus. *Pract Anthropol* 15(4):37-40, 1993.

Patton, *C. Inventing AIDS.* New York: Routledge, 1990.

Paul, R. *Critical Thinking: How to Prepare Students for a Rapidly Changing World.* Rohnert Park, CA: Foundation for Critical Thinking, 1993.

Pedersen, P. *A Handbook for Developing Multicultural Awareness.* Alexandria, VA: American Association for Counseling and Development, 1988.

Pettigrew, T.F. How events shape theoretical frames: A personal statement. In: Stanfield, J.H., ed. *A History of Race Relations Research.* Newbury Park, CA: Sage, 1993. pp. 159-178.

Ponterotto, J.G., and Pedersen, P.B. *Preventing Prejudice: A Guide for Counselors and Educators.* Newbury Park, CA: Sage, 1993.

Quirk, K.M. Ethnography and outreach: The benefits of team work. Pract *Anthropol* 15(4):41-43, 1993.

Rappaport. J. Studies in empowerment: Introduction to the issue. *Prev Hum Serv* 3(2/3):1-7, 1984.

Ratner, M.S. *Crack Pipe as Pimp: An Ethnographic Investigation of Sex-For-Crack Exchanges.* New York: Lexington, 1993.

Ray, M.A. The theory of bureaucratic caring for nursing practice in the organizational culture. *Nurs Adm Q* 14(2):31-42, 1989.

Reason, P. Three approaches to participative inquiry. In: Denzin, N.K., and Lincoln, Y.S., eds. *Handbook of Qualitative Research.* Thousand Oaks, CA: Sage, 1994. pp. 324-339.

Rhodes, L.A. *Emptying Beds: The Work of an Emergency Psychiatric Unit.* Berkeley, CA: University of California Press, 1991.

Rose, S.M., and Black, B.L. *Advocacy and Empowerment: Mental Health Care in the Community.* Boston: Routledge and Kegan Paul, 1985.

Salsberry, P.J. Assuming responsibility for one's health: An analysis of a key assumption in Nursing's Agenda for Health Care Reform. *Nurs Outlook* 41:212-216, 1993.

Schoem, D.; Frankel, L.; Zúñiga, X.; and Lewis, E.A., eds. *Multicultural Teaching in the University.* Westport, CT: Praeger, 1993.

Scott, C.B. Circular victimization in the caregiving relationship. *West J Nurs Res* 15(2):230-245, 1993.
Seelye. H.N. *Teaching Culture: Strategies for Intercultural Communication.* Lincolnwood. IL: National Textbook Company, 1993.
Skoll. G.R. *Wulk the Walk and Talk the Talk: An Ethnography of a Drug Abuse Treatment Facility.* Philadelphia: Temple University Press. 1992.
Sobo, E.J. Meaning and its usefulness for inner-city HIV/AIDS interventions. *Pract Anthropol* 15(4):56-58, *1993.*
Staats, A.W. Redefinitions of the science-practice relationship without a framework for unity will fail. *Am Psychol* 48(1):58-59, 1993.
Stanfield, J.H., ed. *A History of Race Relations Research.* Newbury Park. CA: Sage, 1993.
Steenbarger, B.N. On the role of theory in the postmodem integration of science and practice. *Am Psychol* 48(1):56-57, 1993.
Stewart, E.C., and Bennett, M.J. *American Cultural Patterns: A Cross-Cultural Perspective.* Yarmouth, ME: Intercultural Press, 1991.
Thomas, R.R. From Affirmative Action to affirming diversity. *Harv Bus Rev* 68(2):107-117, 1990.
Thomas, R.R. *Beyond Race and Gender: Unleashing the Power of Your Total Work Force by Managing Diversity. New* York: American Management Association, 1991.
Tindall, J.A., and Gray, H.D. *Peer Counseling: An Indepth Look at Training Peer Helpers.* Muncie, IL: Accelerated Development, Inc., 1985.
Van Dijk, T.A. *Elite Discourse and Racism.* Newbury Park, CA: Sage. 1993.
Wali, A. Multiculturalism: An anthropological perspective. *Rep Inst Phil Public Policy* 12(1):6-8, 1992.
Weeks, M.R.; Singer, M.; and Schensul, J.J. Anthropology and culturally targeted AIDS prevention. *Pract Anthropol* 15(4):17-20, 1993.

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Risk Communication: A Tool for Behavior Change

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INTRODUCTION

The chain of events between providing information about risks and benefits and behavior change in response to that information is a complex and uncertain process. Commercial and social marketers have struggled to design messages that deliver ideas that bind to the right receptors in the decision process and produce predictable and reproducible behavioral outcomes. Reduction of risk to individuals and to the community has been the impetus for much of the social marketing effort. Terms such as "risk analysis," "risk management," and "risk communication" have joined terms like "cost-benefit analysis," "decision analysis," "technology assessment," and "technology transfer" to categorize the tools that are used in the effort to optimize society. In the end, the power to change behavior carries the immense ethical responsibility to use this power wisely.

Risk analysis has been applied most often to environmental problems. It grew out of the need for toxicologists, engineers, social scientists, and policymakers to come together to address complex community risks. More recently, it has been applied to other risks. In comparative risk projects, it has been used to compare risks from personal health threats, environmental threats, and other threats such as economic problems in an effort to guide individuals and communities. The risk analysis process has been divided arbitrarily into three components: risk assessment, risk management, and risk communication (National Research Council 1983). It is, however, useful to consider these three components as being interrelated, each with its own unique character but inseparable from the others.

Risk assessment provides an identification of the hazard (the type of effect [e.g., cancer, birth defect] and the intensity of the effect for a unit dose), an evaluation of the dose response and exposure (the amount that reaches the exposed person), and a characterization of risk that integrates the information about the previous parts of the process and translates the risk into terms relevant to the risk manager (National Research Council 1983). If the assessor is not cognizant of the risk management options

and the public's understanding or misperceptions of the problem, the risk assessment is less likely to provide all the necessary information.

The major risk management tools are education. economic and social incentives or disincentives, and regulatory and legal restrictions. Selecting from the various risk management options, from least coercive to most coercive, depends on the level of risk (risk assessment) and the political and public acceptability of the management options (risk communication).

Communication is pivotal in the process. Individuals cannot change without the knowledge of alternatives and consequences or without the motivation, skills, and support systems to do so. Even the most stringent laws and regulations cannot function without broad-based public support. The National Research Council (1989, p. 50) defined risk communication as.

> [A]n interactive process of exchange of information and opinions among individuals, groups, and institutions. It involves multiple messages about the nature of risk, and other messages not strictly about risk, that express concerns. opinions or reactions to risk messages or to legal and institutional arrangements for risk management.

A better operational definition emphasizes the two-way nature of this process: Nonexperts need access to information and need to gain knowledge, while technical experts and officials need to learn more about nonexperts' interests, values, and concerns.

These definitions emphasize the complex nature of communication. When programs to influence individual behavior are designed, communication research seldom is given sufficient attention, particularly when communication is not the primary component. In addition, the linkage between the communication component and other program activities is frequently handled ineffectively. contributing to program failure.

According to Rossi and Berk (1988), the three main reasons for program failure are:

- The program structure incorporates a misunderstanding of the problem,

- The program is improperly designed, or

- The program cannot be delivered by a U.S. Government agency with sufficient fidelity and at the proper dosage.

If the risk communication program designer misunderstands the problem, the approach is unlikely to be effective. This error usually results from lack of attention to the formative research necessary to understand the target audiences and the leverage points that will be effective with those audiences. For example, a poster campaign aimed at low-income women that tested very well with the target audience appeared to be failing. The posters were unusual in that they were fantasy oriented, and the program used information cards rather than brochures. An evaluation showed that doctors and nurses were uncomfortable with the material and needed to be convinced that it would be effective, as well as instructed in how to use the material. The gatekeepers, not the patients, were the problem (Arkin, personal communication, April 21, 1993).

Program design not only suffers from lack of formative research, but also from a tendency to use one particular approach (e.g., a public service advertising campaign) rather than a comprehensive communication strategy that employs all or many of the channels and sources available to achieve and maintain behavior change.

Finally, either insufficient financial resources or inadequate technical support can lead to the failure of local units to administer an effective dose to the target audience when innovative programs are implemented. Many times this occurs because the developers and early adopters of the program have either more skill or more enthusiasm than later adopters. Hence, the later adopters underestimate the resources required to produce an effect with a broader audience and may require more support to achieve the same results.

The evaluation literature is replete with examples of programs that make one or more of these mistakes. Yet they can be avoided easily if program managers follow an empirical approach to communication planning. Drawing on the work of a number of researchers, this chapter outlines a step-by-step approach to communication planning (see McNeil et al. 1989).

ESTABLISH CLEAR GOALS AND OBJECTIVES

Setting attainable goals based on a strong understanding of the particular need for a risk communication program is a preeminent concern in achieving behavior change. Setting objectives will help to identify gaps in the information about the problem being addressed. Without clear objectives, success cannot be measured. Furthermore, these objectives should be flexible so that they can be adjusted in response to new information gained from evaluation research during the planning and implementation process.

The goals and objectives should emphasize the comprehensive nature of most successful public health campaigns, which include the following elements (Flay and Burton 1988):

- An integrated series of communication activities,
- Multiple activities and channels,
- The targeting of specific audience segments,
- Long duration, and
- A clear purpose.

The steps to success are easy to enumerate but difficult to achieve:

- Understand the risk

- Understand audience segment characteristics, including:

  -Demographics
  -Psychographics
  -Information utilization characteristics
  -Perceptions of risks
  -Perceptions of information sources

- Develop and test messages

  -Motivate audiences to attend to the messages
  -Motivate audiences to want to change behavior
  -Transmit skills necessary to achieve behavior change

- Deliver messages effectively

  -Time messages appropriately
  -Select appropriate channels
  -Select appropriate spokespersons
  -Deliver proper dosage

- Reinforce messages and behaviors

  -Encourage interpersonal communication among target audience
  -Encourage broader social change to support individual behavior change

- Measure the effects of the campaign

To achieve success, communication program managers should implement these steps as part of a process that includes development, implementation, evaluation, and any necessary midcourse corrections of the program.

UNDERSTAND THE RISK

The receptivity of populations and individuals to behavior change is, in part, related to their perception of risk. Individuals and groups must feel at risk to commit to or demand change. Many years of research have produced a long list of characteristics that are associated with audiences' perception of risks (see figure 1). Some examples of these characteristics are (1) the level of internal control, (2) whether the risk differentially affects children, and (3) whether the risk is voluntary or imposed. Many of the characteristics relate to whether personal action or sacrifice is needed to reduce the risk.

The implications of this research for behavior change are complex due to the inability to determine whether the perception reflects a justification for not making personal changes to reduce risk or whether the failure to act reflects risk perception. Regardless of the causal relationship, understanding public perceptions of risk provides useful information that will help predict the barriers and opportunities for individual and societal change.

- *Catastrophic potential*—Fatalities and injuries that are grouped in time and space (e.g., airplane crashes) cause more concern than fatalities and injuries that are scattered or random in time and space (e.g., automobile accidents).

- *Familiarity*—People are more concerned about risks that arc unfamiliar (e.g.. ozone depletion due to emissions of fluorocarbons) than about risks that are familiar (e.g., household accidents).

- *Understanding*—Activities characterized by poorly understood exposure mechanisms or processes (e.g., exposure to radiation j cause more anxiety than those characterized by apparently well-understood exposure mechanisms or processes (e.g., pedestrian accidents or slipping on ice).

- *Uncertainty*—Individuals are more concerned about risks that are scientifically unknown or uncertain (e.g., recombinant DNA experimentation) than about risks that are relatively well-known to science (e.g., actuarially documented automobile accidents).

- *Controllability*—Risks that are perceived to be not under individuals' personal control (e.g.. traveling as a passenger in an airplane or automobile) engender more concern than risks that are perceived to be under their personal control (e.g., driving an automobile).

- *Voluntariness of exposure*—Peopie are more concerned about risks that they perceive to be involuntary (e.g., exposure to unlabeled food additives or to air or water pollution) than about risks that they perceive to be voluntary (e.g., smoking, sunbathing, or mountain climbing).

- *Impact on children*—Activities that are perceived as putting children specifically at risk (e.g., school bus accidents) cause more concern than activities not generally so perceived (e.g., adult smoking).

- *Effects on future generations*—People are more concerned about activities that pose risks to future generations (e.g., genetic effects due to exposure to radiation) than about risks that do not pose risks to future generations (e.g., skiing accidents).

- *Victim identify*—People are more concerned about risks to identifiable victims (e.g., a yachtsman lost at sea or a trapped coal miner) than about risks to statistical victims (e.g., statistical profiles of automobile accident victims).

- *Dread*—The public is more concerned about certain dreaded risks that evoke a response of fear, terror, or anxiety (e.g., exposure to potential carcinogens from toxic waste dumps or to nuclear radiation) than about risks that are not especially dreaded (e.g., common colds and household accidents).

FIGURE 1. *Factors affecting the public's evaluation of risks.*

- *Institutional trust*—Situations where the responsible risk management institution is perceived to lack trust and credibility (e.g., criticisms of the Nuclear Regulatory Commission for its perceived close ties to industry) cause more concern than those where the responsible risk management institution is perceived to be trustworthy and credible (e.g., trust in the management of recombinant DNA risks by universities and the National Institutes of Health).

- *Media attention*—People are more concerned about risks that receive much media attention (e.g., airline crashes) than about risks that receive little media attention (e.g., on-the-job accidents).

- *Accident history*—People are more concerned about activities that have a history of major and sometimes minor accidents (e.g., nuclear power plant accidents such as the accident at Three Mile Island) than about activities that have a history of no major or minor accidents (e.g., recombinant DNA experimentation).

- *Equity*—People are more concerned about activities that are characterized by a perceived inequitable distribution of risks and benefits (e.g., offshore oil exploration) than about those characterized by a perceived equitable distribution of risks and benefits (e.g., vaccination).

- *Clarity of benefits*—People are more concerned about hazardous activities that are perceived to have unclear benefits (e.g., nuclear power generation) than about hazardous activities that are perceived to have clear benefits (automobile driving).

- *Reversibility*—People are more concerned about activities characterized by potentially irreversible adverse effects (e.g., acid rain) than about those characterized by reversible adverse effects (e.g., injuries from sports or household accidents).

- *Personal stake*—People are more concerned about activities that they believe place them (or their families) personally and directly at risk (e.g., drinking water contamination due to local dumping of hazardous waste) than about activities that do not place them (or their families) personally and directly at risk (e.g., dumping of hazardous waste at sea or in other remote sites).

- *Attributability*—People are more concerned about risks that are perceived to be due to human actions (e.g., industry accidents) than about risks that are perceived to be natural in origin (e.g., acts of God).

FIGURE 1. *Factors affecting the public's evaluation of risks (continued).*

SOURCE: Adapted from Covello and Merkhofer 1992. Based on Litai et al. 1983; Renn 1981; Slovic et al. 1980: Vlek and Stallen 1981.

For example, cigarette smoking was changed from an issue of individual behavior change to a social problem by identifying environmental tobacco smoke as a risk to others. This provided antismoking advocates with a reason and a means to put in place strong deterrents such as no-smoking regulations. Social acceptance of interference with personal freedom is enhanced by identifying a present health risk to others as opposed to a simple nuisance or personal risk imposed voluntarily, even when that risky behavior has economic and social consequences for the community.

Another example is the risk of injury in automobile accidents. The feeling of personal control in drivers is enhanced by the perception that their driving skill is superior to that of others. Almost all individuals rate their driving skills as above average. In addition, most people attribute collisions to accident, implying loss of control and therefore less personal or equipment culpability. Laws and communication have successfully produced behavior change: most people now use seat belts and child restraints. Communication alone was less effective, but laws without effective communication about the benefits of the change would have resulted in less behavior change (Washington Post 1993).

In the environmental arena, problems that Americans believe they, as individuals, can help solve are seen as much less serious. For example, a survey found that litter and indoor air pollution ranked 16th and 17th in terms of environmental anxieties, with more than 7 out of 10 people saying that they can "do a lot" about these problems. Solid waste and auto exhaust, which are largely caused by consumer behavior, ranked 8th and 1 Oth, respectively; however, fewer than half the people felt they could "do a lot" about these problems (Roper Organization 1990). Another possible conclusion to draw from this survey is that people adjust their perception of risk and personal control to reflect their willingness to act.

UNDERSTAND TARGET AUDIENCES

Target audiences need to be characterized in terms of both the perception of risks and the specific leverage points that may be effective in motivating changes in attitudes or behavior. In addition, credible sources and effective channels need to be identified. Sources and channels may vary according to the type of message as well as the type of audience. Standard audience segmentation techniques, such as focus groups, central

intercept interviews, risk perception surveys, and psychometric studies can be used to investigate audience characteristics (McNeil et al. 1988). Empirical descriptive studies, both qualitative and quantitative, can guide strategy development in the way that epidemiology guides clinical research and practice. However, the effects of information on individuals and populations, like those of pharmaceuticals, need to be tested and monitored for effectiveness and side effects.

One technique that has been particularly effective in identifying the kind of information that will be most influential has been the use of indepth interviews to characterize how subjects make decisions (Edgar et al. 1992). By comparing the decision model of lay persons with the model used by experts on a particular subject for evaluating the same situation, the information that is not present in the lay model at the time of the decision can be identified. At least one study on radon exposure (Bastrom et al. 1992) suggests that communications interventions using this approach are more effective in influencing decisions. This approach has been dubbed "mental models" and assumes cognitive processing of the information.

Determining whether audiences are processing information cognitively or simply responding to external cues such as source credibility has a strong influence on the selection of the message approach. Whether an issue is personally relevant is a major determinant of whether an individual invests the time and energy to use central processing instead of peripheral processing (Hammond 1990).

The amount and kind of information in which a particular target audience is interested is an important variable. For example, the amount of information patients desire about prescription medications varies from basic instructions for use to a full discussion of various alternatives and effects (McCallum 1989a). Hence, characterizing audiences by their receptivity to information is important in planning communication strategies.

Finally, the interest some audience segments show is subject specific. For example, target audience response to messages about marijuana can be quite different from those about cocaine. Careful evaluation of the differences in a target audience's response by subject area for both messages and spokespersons is necessary. Knowing where to target generic messages about drug use, and where to target messages about specific substances, can influence a program's effectiveness.

DEVELOP EFFECTIVE, TESTED MESSAGES

Because of the two-way nature of risk communication, effective messages about risks must contain the information the audience wants included as well as the information the program designer wishes to convey. In addition, the message should clarify information that audiences might otherwise misunderstand and show sensitivity to the emotions, concerns, and values of the audiences. Also, messages must be tested to measure their likely effectiveness. Standard message-testing techniques include focus groups, reading level evaluation, central intercept interviews, and theater testing (McNeil et al. 1989). Choosing a testing method depends on the size of the investment in the communication effort and judgment about the consequences of delivering an ineffective message or the wrong message.

Language in the message has emotional and political impact as well as cognitive value. Words such as "dump" or "medicine" elicit responses very different from "landfill" or "drug." The relationship between the perception of illicit drugs versus ethical drugs is an interesting example. In calling for clarity in messages about psychoactive substances, some experts have suggested that there is a continuum of drugs that society uses, ranging from prescription drugs to over-the-counter drugs and legal and socially accepted drugs, such as alcohol, to illicit drugs, such as marijuana, cocaine, and illicit prescription drugs. While the linkage between licit and illicit drugs is controversial, it seems clear that language should be chosen to minimize confusion. What is the interaction between benefit messages about prescription and over-the-counter medicines (e.g., take a pill to stop the pain) and risk messages about illicit drugs (e.g., the public service announcement that states "this is your brain on drugs" while an egg fries in a skillet) (McCallum 1989)? While there is little evidence that the public is confused about these differences, and illicit and ethical drugs may not be perceived as a continuum, the selection of words does affect perceptions. In one focus-group study, risks were evaluated as greater when prescription products were referred to as "drugs" than when they were referred to as "medicine." When prescription products were referred to as "medicine," the benefits were rated as greater. Communicators can make their messages more effective by choosing their words carefully (McCallum 1989b).

Motivational appeals, both to gain attention and to change behavior, range from humor to fear to homophyly sources who are people everyone would like to be, usually in slice-of-life situations. Fear has been one of

the more controversial options. Is it possible to scare people into healthful behavior or into avoiding risks? Fear has a cognitive component and creates a state that can lead to behavior change. Whether the message is processed or denied, or whether the potential thrill of the activity is enhanced, depends on how it is incorporated.

In a national seminar, guidelines for the use of fear appeals were developed (National Heart, Lung, and Blood Institute 1987):

1. Realize that individuals may react differently-research among target audiences is essential.

2. Choose a credible spokesperson; audiences may discount messages from noncredible sources.

3. Make the message as personally relevant as possible: audiences must feel vulnerable.

4. Encourage a sense of personal empowerment; audiences must believe that they can protect themselves.

5. Aim for immediacy in the message; audiences respond more to immediate consequences.

6. Be aware of the overall effect of the message. Fear of the problem (e.g., acquired immunodeficiency syndrome [AIDS]) should not overpower the message about the solution (e.g., safe sex).

7. Use appropriate channels for fear messages. Interpersonal channels (e.g., the doctor-patient relationship) may be better than the media.

8. Consider the effect of fear appeals on other health influentials (health practitioners and policymakers); fear appeals may drive the policy process.

9. Realize that fear messages have a significant wear-out factor-too much repetition can cause the audience to become desensitized.

10. Fear may be more effective in motivating an individual to avoid risk; fear may not be the best way to reinforce positive behavior.

These guidelines illustrate the complexity and the number of issues that have to be considered when using all emotional appeals. Emotional appeals are risky; however, many messages require a creative, emotionally engaging approach to be effective.

In addition to the motivational component of the message, it is necessary to transfer the skills the audience needs to respond to the message. Depending on the particular situation, this may be simple information, such as where to seek services, or instruction in a complex set of behaviors for self-care.

Linking the motivation to an action in a timely manner is where programs can fail or succeed. In an asbestos notification campaign for shipyard workers, awareness of hazardous exposure was linked to the need to take a series of protective action steps (e.g., quit smoking) to reduce a synergistic risk (Freimuth and Van Nevel 1981). Linking these messages provided a risk reduction strategy for those whose anxiety level was raised by information that they had been exposed to a cancer-causing substance. In another case, the effectiveness of substance abuse communications programs was lessened because people could not access drug treatment services (White House 1989).

Timing and consumer convenience are critical issues as well. The desire to overcome addiction. or the fear of the risk of not overcoming it, is fleeting. Even relatively small barriers can counter the most effective message strategy. One hospital was able to eliminate emergency admissions due to improper insulin dosages by implementing a 24-hour hotline so that patients could get their questions answered when they needed the information.

EFFECTIVE MESSAGE DELIVERY

Spokespersons

Spokespersons influence audience attentiveness and their acceptance of any message. The ability of a spokesperson to positively influence an audience to accept a message is known as credibility. The use of celebrity spokespersons has been popular because program developers feel that they are credible. Using celebrity spokespersons requires linking their image, or some other characteristic, to the message to assure credibility on a particular subject.

Every spokesperson is judged on credibility. Perception of credibility has been linked to the audience's perception of a spokesperson's caring, competence, and dedication (Covello, personal communication, May 15, 1992), with caring ranking as the most important factor. In a tracking study of six communities across the United States, respondents were asked how much they used various sources of information, how knowledgeable these sources were, and how much they trusted the sources. The data (see table 1) show the independence of trust and perceived competence. Doctors were the most trusted and were considered somewhat knowledgeable, while industry officials were the least trusted but were considered the most knowledgeable (McCallum and Santos 1994). Between 1988 and 1992, there was a decrease in trust of authoritative sources overall, but their relative positions remained the same.

Health professionals are particularly trusted sources of information on health and environmental issues. This has been exploited in programs related to chronic diseases. However, physicians may miscommunicate and reinforce misconception if they and their patients are not clear how each is perceived. This can be a problem in lifestyle advice and other areas that are not clearly medical.

A possible effect of a discrepancy in perception of role can be seen in the following environmental example (McCallum 1992). In 1988 a survey of the public questioned respondents about five common health problems they might have experienced in the previous month: headaches; nausea; eye, nose, or throat irritation; shortness of breath; and skin rashes. They were then queried about whether they thought the symptoms were related to chemicals in the environment and whether they went to a doctor for treatment. After the respondents' symptoms were reviewed, a strong relationship was found between consulting a doctor and viewing the environment as the cause of the problem ($x^2 = 141$, $df = 1$, $p < 0.001$). Approximately 4 1 percent of respondents who consulted a doctor about symptoms saw the environment as the cause of the problem. On the other hand, only 19 percent of those who experienced symptoms but did not consult a doctor blamed the environment.

In 1989 a survey looked at the physician's view. Physicians were queried about patients seen in the previous week with headaches; nausea; skin rashes; eye, nose, or throat irritation: or shortness of breath and about the relationship of these symptoms to chemicals in the air, water, or soil. The

TABLE 1. *Perception of information sources.*

	Amount of Info. Received (Percent answering "A Lot")		Trust (Percent answering "A Lot")		Knowledgeable (Percent answering "Very")	
	1988	1992	1988	1992	1988	1992
News reporters	27	25	27	18*	17	12
Environmental groups	21	16	40	28*	53	44
Friend/relatives	7	9	34	32	9	11
Local emergency planning committee	6	6	28	18*	33	24
State government	6	6	12	8	29	32
Local government	5	5	11	5	22	12
Federal government	4	6	12	8	36	38
Chemical industry officials	3	4	8	6	58	62
Doctors	3	8	46	28*	27	23
EPA	NA	9	NA	22	NA	52

KEY: * = $p < 0.05$; NA = not available.

SOURCE: McCallum and Santos 1994.

physicians had seen 1,741 patients with skin rashes in the preceding week, an average of 3 patients per doctor. The physicians independently attributed 5 percent to chemical exposure and reported that an additional 11 percent of the patients had told them the symptoms were environmentally induced. The doctors reported concurring with the patients' attribution 80 percent of the time (McCallum 1992).

Each of the other symptoms produced about six patients per week. Shortness of breath and eye, nose, and throat irritation were attributed to the environment for about 14 percent of cases—10 percent by patients and about 4 percent independently by doctors" Again, the physicians concurred with the patients' attribution to chemicals in over 80 percent of cases. Nausea and headaches yielded lower chemical attribution rates by doctors and a lower concurrence rate of doctor with patient. The great disparity between the low rate of independent attribution of common health problems to environmental causes and the high rate of concurrence with the patient's attribution to the environment suggests that the latter is not based on a careful review of the exposure history, but is a casual response to the patient's concern.

Because doctors are viewed as the most credible authorities on health risks, including environmental risks, a physician's attribution of a symptom to the environment can have a great impact on the patient. The research suggests that many physicians do not understand the importance that the public gives to the physician's role in these matters. They seem to treat a patient's questions and comments about environmental health risks as general conversation and do not see their own comments as the authoritative medical statements the patient sees them to be. So, in many cases, physicians allow their patients to go on blaming the environment for symptoms that are probably linked to other causes. Lifestyle issues, such as drug or alcohol abuse, may not be brought up by the physician, even if he or she suspects a problem, because of their discomfort with or their lack of skills in addressing the situation. Credibility is the most important factor in audience response when the audience is not sufficiently engaged to cognitively process the message. Therefore, the message must be carefully crafted to avoid miscommunication.

Channels

The mass media is the primary channel through which health risk information gets to most members of the general public. The mass media transmits health information through news coverage and programs such as talk shows. Though the media and public health professionals share the same clients-the public-they have conflicting priorities (see figure 2).

For example, in order to educate, health education campaigns require repetition, which is the antithesis of news. A particular health issue can graduate from occasional to frequent coverage, in part because the public wants it, but it has to be packaged as news (see figure 3). In addition,

Presentations and discussions brought out some fundamental differences between mass media and public health objectives.

Mass media objectives	*Public health objectives*
To entertain or inform	To educate
To cover short-term events	To conduct long-term campaigns
To deliver salient pieces of information	To create understanding of complex information
To reflect society	To change society
To address personal concerns	To address societal concerns
To make a profit	To improve public health

FIGURE 2. *Conflicting priorities of the mass media and public health professionals.*

SOURCE: U.S. Public Health Service 1991.

through entertainment programs displaying stories involving health issues, and through the behavior of actors, television is this country's major storyteller and prime agent of socialization. Television images are sometimes positive, but more frequently they are negative (see figure 4).

Both commercial advertising and public service announcements influence attitudes about health and individual behavior. The placement of public service advertising has become more difficult, and commercial messages have increasing numbers of health claims, Two major problems are misleading claims and advertising to vulnerable populations. Claims more often than not are incomplete. Vulnerable populations such as teenagers may be greatly influenced by cigarette and beer advertising.

- Human interest: Rock Hudson's suffering from AIDS
- Different events that are related to some problem: Betty Ford's drug dependency, River Phoenix's death
- Patience to keep the media's attention
- Personal contacts with journalists can be important
- Local news has more time to fill

FIGURE 3. *How health becomes news.*

SOURCE: U.S. Public Health Service 1991.

• Physical illness is romanticized	• Violence is frequently without consequences
• Mental illness is villainized	• Snacking and drinking alcohol are responses to stress
• Physicians are powerful	• Overweight people are rare
• Most health professionals are absent	• Sex is adolescent and titillating; little is done to prevent pregnancy or sexually transmitted diseases

FIGURE 4. *Health images in entertainment programming.*

SOURCE: U.S. Public Health Service 1991.

The ways in which some popular media reinforce negative images or behaviors frequently lead advocates of social change to call for guidelines. Yet, the media in general mirror rather than influence society (Klaidman 1991). Thus, the process of encouraging positive behavior

must recognize the need to communicate directly to the target audience as well as through the media. Also, as the use of multimedia channels becomes more common, the definition of literature needs to be expanded to include audio and video as well as print media. Schools and families need to help future generations use these new forms of communication by teaching young people to understand the symbols and become active rather than passive users of these information sources.

REINFORCE MESSAGES AND BEHAVIORS

Behavior change is difficult. To be successful, a campaign must repeat the message over and over. Further, the person making the behavior change has to get personal satisfaction and receive positive feedback from society.

Using interpersonal channels in addition to the media usually is more effective than using either alone. As more and more people adopt the behavior, it becomes the normative behavior for that group. The change in attitude towards cigarette smoking took a long time-almost 30 years-but it happened. One major factor was the commitment to keeping the health implications of smoking in front of the public over the years; another was identifying smoking as a hazard to others. There are certainly many examples of negative peer pressure in the campaign against smoking. Portraying cigarettes as "uncool" has been one approach. More and better creative strategies are needed.

The need for sustained effort is further illustrated by the recent increase in drug use by high school seniors (Thomas 1994). The news report on a survey by the University of Michigan shows an increase in marijuana and tobacco and a decrease in alcohol use. This researcher suggests that each new generation must overcome its naivete about drug use. Also, recent campaigns against underage drinking may have resulted in some substitution of other drugs. Other campaigns that have faltered because of complacency about the gains being made include the fights against tuberculosis and cigarette smoking among women.

EVALUATION

Evaluation should be part of any communication effort; without it, there is no way to measure progress or to identify the need to make timely

changes. Evaluation can be an effective tool in making programs more efficient and effective.

Problems and difficulties arise in the evaluation of risk communication activities due to conflicts and misunderstandings over values, goals, resources, and usefulness. Because the process of evaluation is a value-laden endeavor, significant practical and policy implications are likely to occur (Fisher et al. 1991).

Goals and Values

A difficulty in evaluating risk communication programs is the challenge of identifying appropriate goals (e.g., to raise awareness of an issue, to bring about action, to increase participation). Only when program goals and expected effects are defined clearly can there be significant evaluation. For many programs, however, this level of specificity is difficult to achieve. In addition, evaluators and program implementors often disagree on the goals of the program as well as on which goals should be evaluated. Communication goals must be agreed upon and built into the risk communication program from the beginning.

Any risk communication program has many stakeholders-including Government agencies, public interest groups, industry groups, and individuals-who are interested in the conduct and effectiveness of the program. Evaluators often are asked to respond to the interests and needs of each group; however, an initial difficulty in any evaluation of risk communication activities is to determine the perspective from which the evaluation will be conducted. Upon completion of an evaluation, the evaluator has a responsibility to identify the chosen perspectives and to recognize the existence of other viewpoints. Different audiences have different perspectives and goals and need different types of information. In addition, different risk communication activities require different types of evaluation studies.

Conflicts over values have sparked debate in the public health and substance abuse treatment communities and among the public. The designated driver campaign has reduced alcohol-related accidents, but some feel that it implies acceptance of alcohol abuse or underage drinking. In the quest to stop the spread of AIDS, needle-exchange programs and sexually frank campaigns have sparked similar value-related controversy.

Evaluation information is seldom neutral. Differences in goals and values can create conflict between the evaluator and program implementors. If the evaluator is part of the implementing team, tension may be reduced but the evaluator's vision may be clouded by prior experience and his or her stake in the process. Therefore, when the results of the evaluation are used to inform future program plans and dissemination efforts, planners need to ask questions such as:

- What was the original goal of the project?
- Has a particular ideology shaped the project or the evaluation?
- What values framework will be used in the evaluation and interpretation of the results?
- Are there competing points of view that need to be considered?

Resources

Ongoing evaluation of a program is important. With early and continuing evaluation, implementors are able to receive feedback on the effectiveness of the program; if the activities are not working as intended, there is time to reevaluate the program and make corrections that, in the long run, may save time and money.

In spite of its benefits, ongoing evaluation of risk communication activities is often disregarded, especially if no evaluation has been planned or budgeted for in advance. Managers often are reluctant to evaluate programs. Many managers believe that it is an expensive process that calls for skills beyond those present in the organization. Some are unwilling to support research that might show that the program is not working as intended. In addition, program managers often allocate all the available resources to the risk communication activities without considering if the activities are accomplishing the desired purposes.

Some strategies to bring about increased attention to, and usage of, evaluation research in risk communication programs are:

- Integrate evaluation activities into the program from the beginning;

- Use quick, simple, and informal evaluation methods, when appropriate;
- Develop incentives for planners to fund evaluation activities;
- Encourage managers to develop clear evaluation plans; and
- Encourage implementors to record and share successes.

Usefulness

Evaluations often are criticized because the results are not used immediately. However, current evaluation results, if not used at once, may be used to indicate the direction in which future programs should go, or on which to base future activities.

SUMMARY

This chapter presents some of the theories and models underpinning effective communication practice. It also emphasizes the central role of communication in achieving effective program implementation. Whether the communication is aimed at changing the attitudes and behavior of professionals, various segments of the public, or other target audiences, the basic approach is the same. The following checklist provides a guide to program planners (Arkin 1991):

- Commit adequate time, effort, and resources to communication planning and pretesting.
- Begin by singling out specific issues and specific target audiences. Then design messages based on the target audiences' values, needs, and interests.
- Conduct (or review existing) market research on the target audience to understand what will motivate them.
- Pretest messages and materials with the target audience to assure understanding and relevance to their needs and interests.

- Make sure that messages and materials appear where the target audience will pay attention to them (for sensitive issues, community and interpersonal channels that allow interactive discussion are very important).

- Produce public service announcements that are of high quality, community specific, marketed to stations, and targeted to audiences likely to see them when public service air time is available (such as fringe viewing times).

- Combine public service announcements with news and other uses of the mass media (e.g., building on related news) to increase exposure to issues.

- Use a combination of the mass media and community channels that will reach the target audience.

- Work collaboratively with other organizations, including drug treatment facilities, law enforcement and social service agencies, and other community organizations that have complementary strengths. Begin to coordinate efforts as early as possible in program planning.

- Use a multipronged communication strategy to focus on what an individual should do, how the individual can start to change, and factors that help reinforce individual change, such as peer approval and community support.

- Track progress and identify when, and what kind of, changes are needed in communications.

- Combine communications with other strategies needed to support change (e.g., access to treatment or positive alternatives to drug use).

- Set reasonable, short-term communication objectives to reach the long-term goal. Then, commit to communications as one program component over the long term. It is important to remember that one-shot campaigns are unlikely to have a lasting effect and that progress is incremental.

REFERENCES

Arkin, E. Motivating the public: Application of lessons learned to increasing organ donation. In: U.S. Public Health Service. *The Surgeon General's Workshop on Increasing Organ Donation. Background Papers.* Washington, DC: Division of Transplantation, U.S. Public Health Service, 1991.

Bastrom, A.; Fischhoff, B.; and Morgan, M.G. Characterizing mental models of hazardous processes. *J Soc Issues* 48(4):85-100, 1992.

Covello, V.T., and Merkhofer, M.W. *Risk Assessment: Methods and Approaches for Quantifying Health and Environmental Risks. New* York: Plenum, 1992.

Edgar, T.; Freimuth, V.; Hammond, S.; and Fink, E. Strategic sexual communication: Condom use resistance and response. Health *Commun* 4:2, 1992.

Fisher, A.; Pavlova, M.; and Covello, V.; eds. *Evaluation and Effective Risk Communications: Workshop Proceedings.* Proceedings of the Interagency Task Force on Environmental Cancer and Heart and Lung Disease, U.S. Environmental Protection Agency. Washington, DC: U.S. Environmental Protection Agency, 1991.

Flay, B.R.. and Burton, D. "Effective Mass Communications for Public Health." Paper prepared for a National Cancer Institute conference entitled Mass Media and Health: Complexities and Conflicts. Rancho Mirage, CA, September 17-19, 1988.

Freimuth, V.S., and Van Nevel, J.P. Reaching the public: The asbestos awareness campaign. *J Commun* 31(2):155-167, 1981.

Hammond, S. "Issue Involvement and the Elaboration Likelihood Model: A Field Experiment Using Environmental Risk Messages." Ph.D. diss., University of Maryland, 1990.

Klaidman, *S. Health in the Headlines: The Stories Behind the Stories.* New York: Oxford University Press, 1991.

Litai, D.; Lanning, D.; and Rasmussen, N.C. The public perception of risk. In: Covello, V.T.: Flamm, W.; Rodricks, J.; and Tardiff, R., eds. *The Analysis of Actual Versus Perceived Risks.* New York: Plenum, 1983.

McCallum, D.B. (executive producer). *Semantics of Prescription Drugs.* Videotape prepared for the Program on Risk Communication. Washington, DC: Georgetown University, 1989a.

McCallum, D.B., and Yenney, S. *Communicating the Benefits and Risks of Prescription Drugs.* Washington, DC: Georgetown University Medical Center Institute for Health Policy Analysis, 19896.

McCallum, D.B. Physicians and environmental risk communication. *Health Environ Dig* 6(1):3, 1992.

McCallum, D.B., and Santos, S.L. *Public Knowledge and Perceptions of Chemical Risks in Six Communities: Follow-up Survey Results.* Washington, DC: U.S. Environmental Protection Agency, 1994.

McNeil, C.; Arkin. E.B.; and McCallum. D.B. *Toxic and Hazardous Substances, Title III and Communities: An Outreach Manual for Community Groups.* Washington, DC: U.S. Environmental Protection Agency, 1989.

National Heart, Lung, and Blood Institute. "Seminar Results: Fear as a Persuasion Technique." Unpublished proceedings from the Conference on Fear Communications. December 1987.

National Research Council. *Risk Assessment in the Federal Government: Managing the Process.* Committee on the Institutional Means for Assessment of Risks to Public Health, National Academy of Science and National Research Council. Washington. DC: National Academy Press, 1983.

National Research Council. *Zmproving Risk Communication.* National Research Council Committee on Risk Perception and Communication. Washington, DC: National Academy Press, 1989.

Renn, *0. Man, Technology, and Risk: A Study on Intuitive Risk Assessment and Attitudes Towards Nuclear Power.* Report Jul-Spez 115. Juelich, German Federal Republic: Nuclear Research Center, 1981.

Roper Organization. "The Environment: Public Attitudes and Individual Behaviors." Report commissioned by S.C. Johnson & Son, Inc., 1990.

Rossi, P.H., and Berk, R.A. "A Guide to Evaluation Research Theory and Practice." Paper prepared for the Workshop on Evaluation and Effective Risk Communication, Interagency Task Force on Environmental Cancer and Heart and Lung Disease, 1988.

Slovic. P.; Fischhoff, B.; and Lichtenstein, S. Facts and fears: Understanding perceived risk. In: Schwing. R., and Albers, W.A., Jr., eds. *Societal Risk Assessment: How Safe is Safe Enough? New* York: Plenum, 1980.

Thomas, P. Illicit drug use rises among U.S. teenagers. *Washington Post.* February 1, 1994.

U.S. Public Health Service. *Mass Media and Health: Opportunities for Improving the Nation's Health.* Washington. DC: U.S. Department of Health and Human Services, 1991.

Vlek, C.A.J., and Stallen, P.J. Judging risks and benefits in the small and in the large. *Organ Behav Hum Perf* 28:122-123, 1981.

Washington Post. Seatbelt use sets record. December 19, 1993.

White House. *National Drug Control Strategy*. Washington, DC: Supt. of Docs., U.S. Govt. Print. Off., 1989.

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Diffusion of Drug Abuse Prevention Programs: Spontaneous Diffusion, Agenda Setting, and Reinvention

Everett M. Rogers

INTRODUCTION

Drug abuse prevention programs cannot have an effect on individual behavior until such programs are adopted and implemented by communities, schools, workplaces, and other organizations. Unfortunately, in previous research little attention has been paid to this issue of diffusion of drug abuse prevention programs. The rate of such diffusion should be related directly to the relative effectiveness of such programs in decreasing drug abuse. A review of evaluations of drug abuse prevention programs (some of which are detailed later in this chapter) indicates that even when such programs are implemented carefully, the results represent only a modest impact on drug use behavior.

Given this somewhat limited effectiveness, why have drug abuse prevention programs diffused so widely? For example, it is almost impossible to encounter an elementary school or a middle school in America that has *not* adopted Drug Abuse Resistance Education (DARE). In a decade DARE spread from its beginnings as a pilot project in 30 Los Angeles schools until by 1994 some 25 million U.S. schoolchildren were being trained in DARE programs.

Many drug abuse prevention programs diffuse for reasons unrelated to their proven effectiveness, as measured in evaluation research studies. In fact, some programs diffuse even before their effectiveness in reducing drug use has been determined. Clearly other factors than program effectiveness must be involved in such diffusion. What are they? The analysis of the diffusion of DARE in the United States suggests some possible reasons.

TECHNOLOGY TRANSFER AND DRUG ABUSE PREVENTION

The mission statements of most U.S. private foundations state that one of their important purposes is to grant funds to proposers in order to bring about meaningful social change in society. Private foundations are uniquely flexible in identifying and analyzing social problems in America and in formulating solutions through the utilization of research-based knowledge. However, many U.S. foundations have given little attention to whether, and how, the projects they fund actually lead to meaningful social change in society, thus solving social problems. This concern with the eventual end results of foundation-funded research activities leads to greater interest today in strategies for the diffusion of innovations and their implementation. Several U.S. foundations today are beginning to give more attention to dissemination and implementation.

The Kauffman Foundation is one of the leaders in this important change in thinking. Its consultant has helped the foundation conceptualize its concern with translating the results of foundation-supported projects into action. Indeed, the Kauffman Foundation may become a leader among U.S. private foundations in focusing on the issue of the utilization of research to bring about social change. One of the Kauffman Foundation's main concerns is with the social problem of drug use in America.

The National Institute on Drug Abuse (NIDA) is a pioneering Federal agency in organizing effective technology transfer programs to disseminate research-based information about drug abuse prevention and treatment to individual practitioners and organizations. NIDA's purpose is to encourage the adoption and implementation of the findings from drug abuse-related behavioral research.

So here is a situation in which a private foundation with considerable experience in disseminating drug abuse prevention programs to schools and communities, especially in the Midwest, shares a concern with an important Federal agency that is centrally involved in research and action on drug abuse problems in America. This collaboration has a high likelihood of finding useful solutions to drug abuse problems.

The purpose of this chapter is to draw upon research that has been conducted on the diffusion of innovations in order to suggest strategies that might be used in transferring drug abuse prevention technologies into adoption and implementation. A sizable number of research studies has been conducted on the diffusion of innovations of all kinds (from hybrid

seed corn to contraceptives to consumer innovations to modem math in schools), represented in more than 3,810 publications about diffusion (Rogers 1995). However, only a handful of the many diffusion publications deal with the spread of drug abuse prevention programs from community to community, from school to school, and from organization to organization. No concerted attempt has been made yet to use the diffusion model to explain the spread of drug abuse prevention programs. While there are unique aspects of drug abuse prevention behavior that may affect the diffusion and adoption of innovations concerned with drug abuse prevention, the assumption here IS that the diffusion model can be applied usefully.

PROJECT SMART AND ITS MANY "CHILDREN"

During a decade of teaching at Stanford University (1975 to 1985) this author served as a principal coinvestigator for the Stanford Heart Disease Prevention Program (SHDPP), a well-known health communication campaign carried out in selected California communities. Through a field experimental design, the SHDPP was evaluated carefully in terms of its resulting effects on the risk of heart disease among the populations of several California communities.

The SHDPP served as a kind of father (or mother) for Project SMART (Self-Management and Resistance Training), a drug abuse prevention intervention carried out in selected Los Angeles schools by the Health Behavior Research Institute (HBRI) at the University of Southern California (USC). From 1985 to 1993, while teaching at the USC Annenberg School for Communication, this author was involved with the Kauffman Foundation's Project STAR (Students Taught Awareness and Resistance), an intellectual descendant of Project SMART (and, indirectly, of SHDPP). The USC research evaluating the impacts of Projects STAR and the companion project in Indianapolis (I-STAR) is supported by a grant from NIDA, with the drug prevention program funded by the Kauffman Foundation. Project STAR spread from Kansas City and Indianapolis to the school-based Corporation Against Drug Abuse program in Washington, DC, in 1989 and to Communities for a Drug-Free Colorado. Figure 1 shows this family tree of health promotion and drug abuse prevention projects or at least the first several generations of this ancestry.

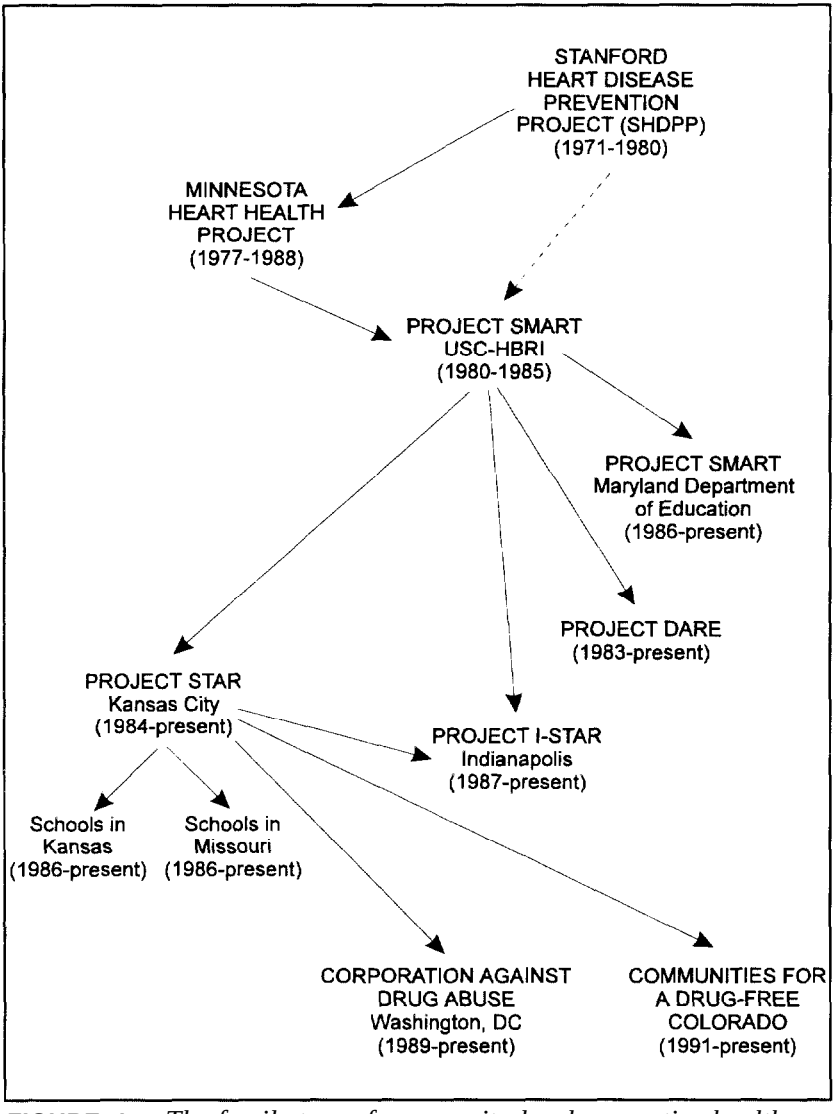

FIGURE 1. *The family tree of community-level preventive health and drug abuse prevention interventions.*

Project STAR spread to several of the control schools in Kansas City during the early years of the project (in the mid-1980s). Such spontaneous, unplanned dissemination obviously marred the research design for Project STAR, but it was a bonanza to Project STAR's dissemination and utilization. Such unplanned diffusion of an intervention program prior to completion of the intervention's evaluation is, of course, a cause for worry among evaluation researchers. For example, what if the evaluation shows that the treatment was ineffective after the treatment has diffused to other sites? Ideally an evaluation of a program ought to be completed *prior* to dissemination of the intervention program to other locations. Unfortunately, this time order is not always what occurs in real life. especially in the case of drug abuse prevention programs.

The USC director of evaluation for Project STAR was urged by this author to investigate the unplanned diffusion of the STAR program to the control schools in Kansas City and to other schools throughout Kansas and Missouri, which also occurred in the mid-1980s (and which was assisted by the Kauffman Foundation in response to a request from State officials in Kansas who were responsible for drug abuse prevention).' An account of the diffusion of Project STAR (Pentz and Valente 1993) was subsequently written.

That 1993 publication also contains a chapter on the amazingly rapid diffusion of Project DARE, another descendant of Project SMART, that has had a phenomenal spread throughout the United States and abroad (figure 2). DARE differs from Project SMART (and Project STAR) mainly in that uniformed police officers teach a 17-hour curriculum on drug abuse prevention to fifth and sixth grade students. DARE began in 1983 when Los Angeles Police Department (LAPD) Chief Daryl Gates, in collaboration with Los Angeles Unified School District health educators, created the first DARE program by training 30 police officers in the DARE curriculum. The program spread like wildfire. In less than 10 years, over 25 million schoolchildren were trained in the DARE program, and it continues to diffuse (see figure 2).

Thus one general model for preventive health behavior has diffused very widely and very rapidly through its reformation in a sequence of health prevention programs, each of which is a variation on a basic theme. For example, all of the drug abuse prevention programs deliver their educational intervention by means of training schoolchildren in their regular classroom. Exactly who provides this training differs,

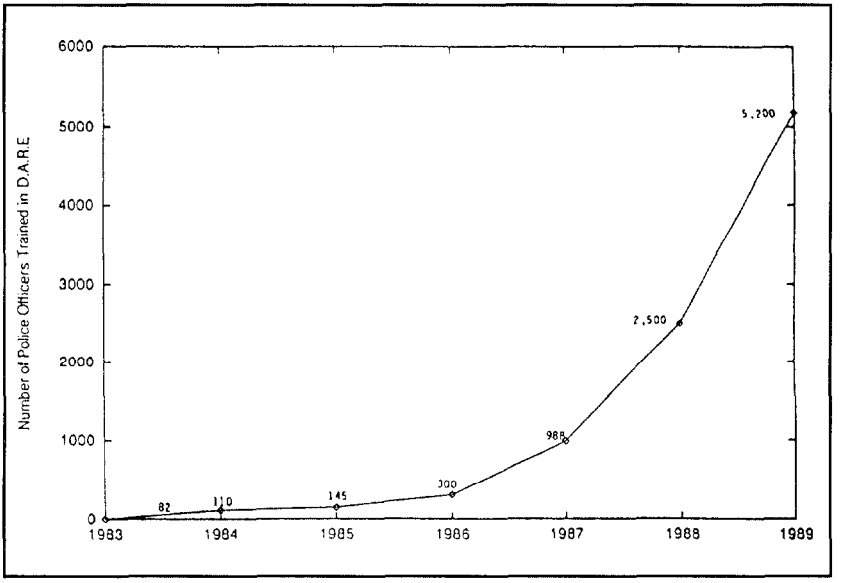

FIGURE 2. *Cumulative number of police officers trained in how to teach the DARE Program.*

SOURCE: Rogers 1993.

however: uniformed police officers in the case of DARE, and schoolteachers in the case of Project STAR and I-STAR.

The general experience of Project STAR in Kansas City leads one to wonder if field experiments go awry through spontaneous diffusion more often than one thinks. Sometimes the research results may be more valuable than if the field experiment had gone exactly as planned.

THE AGENDA-SETTING PROCESS FOR THE DRUG ISSUE

Why did the DARE program and Project STAR spread so rapidly? The drug problem ranked very high on the national agenda as a result of the extensive coverage of crack cocaine by "The New York Times" (due, in part, to a conversation between Rev. Jesse Jackson and the editor of "The Times" in 1985), the 1986 death of All-American basketball star Len Bias; First Lady Nancy Reagan's "Just Say No" campaign; and private and Federal funding for drug abuse prevention programs such as through the U.S. Department of Justice (to police departments for DARE training), the U.S. Department of Education, and other agencies like

NIDA and the Office of Substance Abuse Prevention (OSAP). Extensive media coverage of the crack attack (a drug of increasing use at that time in America) boosted the drug issue up the media agenda, led by actions of the White House and "The New York Times" (figure 3a). In mid-1989, 54 percent of the U.S. public indicated in a Gallup Poll that they regarded drugs as the most important problem facing America (figure 3b). Four years previously to 1989, this percentage was zero. By 1991, only 4 percent of the U.S. population thought that drugs were the most important problem facing America (Dearing and Rogers, in press). Drugs were pushed down the agenda by other issues, especially the Nation's economic difficulties at the end of the 1980s decade and by the 1991 Gulf War. Thus the public agenda for the drug issue rose and fell in just a few years.

In local communities, public concern about the drug problem meant that parents, teachers, and school administrators were very eager to adopt a drug abuse prevention program in their schools. Hence the widespread public interest in programs like Project STAR and DARE. And the timing of these drug abuse prevention programs was exquisite, coinciding with the dominant position of the drug issue on the public agenda.

What put an issue like the drug problem on the national agenda in the late 1980s? It was not a real-world indicator, an objective measure of the seriousness of this social problem. Since 1980 (and for several years previously), a long-term decline has been occurring in the annual number of deaths due to drugs in the United States. However, one cause of drug-related deaths, crack cocaine (a new form of drug abuse in the mid-1980s) increased sharply. The death of Len Bias due to a drug overdose was a tragic event that the mass media covered in great detail, helping the U.S. public generalize it into a high priority for the drug problem. Television documentaries like "Twenty-Four Hours on Crack Street" helped drive home the drug problem.'

In general, studies of the agenda-setting process for various issues (the War on Drugs. the environment, AIDS, the 1984 Ethiopian drought, etc.) suggest that "The New York Times" and the White House are the two most powerful forces in putting an issue on the national media agenda. This process often is triggered by a tragic personal event (for example, the death of Len Bias or Rock Hudson, Ryan White's exclusion from his school in Indiana, the Exxon Valdez oil spill, etc.). Real-world indicators for an issue make sense to the media and to the public when they are given meaning by personal tragedy. Thus the agenda-setting process in

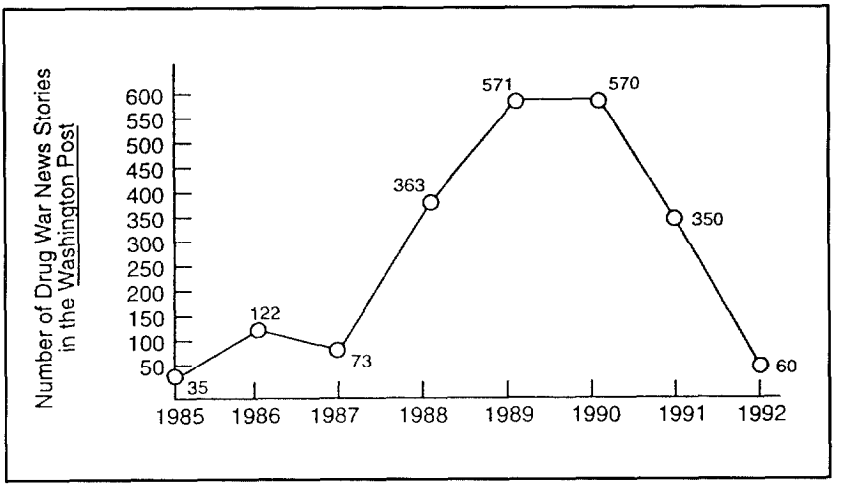

FIGURE 3a. *Number of drug war stories in the* "Washington Post" *by year: The media agenda.*

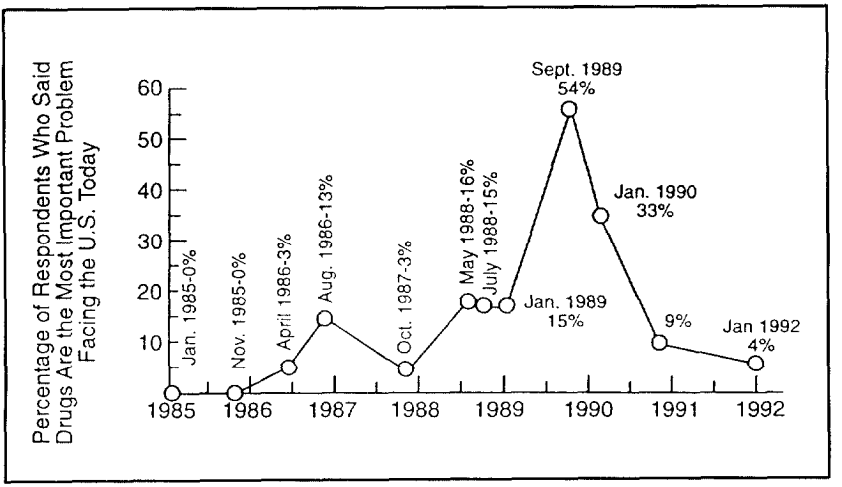

FIGURE 3b. *People who said that drugs are the main problem facing the U.S.: The public agenda.*

the United States is one of social construction through which people gradually give meaning to an issue (Dearing and Rogers, in press).

The *agenda-setting process* is the way in which an issue achieves a high priority on the media agenda (measured as the amount of media attention given to the issue), on the public agenda (measured as the relative number of people who say that the issue is the most important problem facing America), and on the policy agenda (measured as the passage of laws, the voting of appropriations, etc.). Usually the media agenda influences the public agenda, which in turn influences the policy agenda. What sets the media agenda? An objective, real-world indicator (like the number of deaths due to drug abuse) for the drug issue seldom has much direct influence on the media agenda. More important is a personal tragedy like the death of basketball star Len Bias. And, as stated previously, "The New York Times" and the White House have considerable influence in setting the media agenda for many issues. As Cohen (1963, p. 136) stated, "The press may not be successful much of the time in telling people what to think, but it is stunningly successful in telling its readers what to think about."

The position of an issue on the national agenda affects the rate of diffusion and adoption of an innovative program by local organizations and communities that promise to deal with the national issue. The high priority of the drug issue in the late 1980s boosted the spread of DARE and other drug abuse prevention programs in the United States. Has the disappearance of the drug issue from the national media agenda and the public agenda in the 1990s adversely affected the further diffusion of drug abuse prevention programs to schools, communities, and other units? Perhaps such drug abuse prevention programs are already so widespread (that is, a critical mass has been reached) that they continue to spread, even though the drug issue's salience on the national agenda has evaporated. Perhaps the agenda-setting process for the War on Drugs was mainly important in launching the diffusion process for drug abuse prevention programs, and now that a maintenance stage has been reached, the position of drugs on the national agenda has little impact on local decisions.

The Kauffman Foundation's Project STAR did not set the national agenda for the issue of drug abuse, although the Foundation's activities helped raise the drug problem on the local agenda in Kansas City. On certain occasions, a private foundation can identify a social problem and, by means of the attention that the foundation gives to the issue (either

locally or nationally) help boost that issue up the agenda. This role is a very powerful one indeed for private foundations and for the mass media.

American democracy might function more effectively if there were an early warning system for the detection of issues that will (or should) climb the national agenda. At present many issues get on the agenda by haphazard and accidental means. Many, many other issues that may deserve to get on the agenda do not. How could the agenda-setting process be rationalized so that deserving (on some objective basis) issues survive, while others do not? What role do private foundations presently play at the national and local community levels in the agenda-setting process? How could they play a more important role? These intriguing problems deserve further attention.

REINVENTION

The spontaneous diffusion of Project STAR in Kansas City is a case in which the drug abuse prevention program's diffusion outran its evaluation, as mentioned previously. The NIDA-supported USC evaluation of Project STAR indicated that the intervention had effects in delaying the onset of cigarette smoking, drug use, and alcohol drinking by the Kansas City students trained in Project STAR.

The evaluation of Project STAR in Kansas City showed that among the target audience of sixth and seventh graders, compared with the control schoolchildren, cigarette smoking was 25 percent less, alcohol drinking was 20 percent less, and marijuana use was 30 percent less. However, when the same substance abuse prevention model was implemented in Indianapolis as Project I-STAR, only a few percent less of the treatment schoolchildren used these substances than did the children in the control schools. Project STAR and Project I-STAR cost from $15 to $25 per student. Project I-STAR achieved the rather modest effects on prevention behavior typically found for most drug abuse prevention programs in schools.

The nontreatment schools in Kansas City that adopted Project STAR often modified, adapted, and reinvented the STAR approach, presumably to customize the model to their particular circumstances and available resources. In a parallel sense, considerable reinvention of Project STAR seems to have occurred as it spread to Indianapolis, Washington, DC, and Colorado, just as Project SMART was adapted earlier into Project STAR

and into the DARE program, which in turn was reinvented to a certain degree as it spread across America and beyond (see figure 1).

Reinvention is the degree to which an innovation is changed by adopters as it diffuses and is implemented. Why does reinvention happen? Does such reinvention lead to programs that are more effective, or less effective, in reaching program goals (that is, in the case of Project STAR, in decreasing drug abuse)? What elements of a program are reinvented, and which elements are transferred intact, in the typical process of the diffusion of an innovative drug abuse preventron program? For instance, the resistance-to-influence training component of Project SMART continued in Project STAR, the descendants of Project STAR, and in the various versions of DARE implemented in local communities. However, who does the in-class training (trainers were health educators from USC in Project SMART, uniformed police officers in Project DARE, and schoolteachers for Project STAR) differed from program to program. Is there a core or template of elements of an innovative drug abuse prevention program that is not reinvented as it diffuses, while only the bells and whistles change? Finding out would be useful.

The headquarters office of DARE America seeks actively to discourage the reinvention of this drug abuse prevention program. The original Los Angeles version of the DARE program is regarded officially as the correct template which should be followed exactly by other communities when they adopt the program.

Wulf (1987) of the University of Southern California found that 34 percent of a sample of 84 police departments carrying out DARE programs did not teach all 17 hour-long DARE lessons. For example, about one-fourth of all local DARE programs did not teach the lesson on resisting gang pressure (presumably those schools thought they did not have a gang problem). Reinvention aided the rapid diffusion of the DARE program among U.S. schools. Whether such reinvention adversely (or positively) affected the impacts of the DARE program on its participants is an important research question that should be investigated. One wonders how much reinvention of innovative drug abuse prevention programs occurs when they are implemented in schools and in communities.

PROGRAM EFFECTIVENESS AND THE RATE OF DIFFUSION

Previously mention was made of the worrisome possibility that a drug abuse prevention program might diffuse into widespread use, only for evaluation research to show later that the program was relatively ineffective. Generally, evaluations of the school-based drug abuse prevention programs find only a modest degree of program effectiveness. What role does program effectiveness play in the diffusion of drug abuse prevention programs?

One answer is available from an analysis of the diffusion of Project DARE in the United States (Rogers 1993). As shown previously (see figure 2), the rate of diffusion of Project DARE was very rapid. Was this speedy diffusion due to the proven effectiveness of DARE in combating drug abuse? Hardly. Evaluation studies (for example, Evaluation and Training Institute 1988; Nyre 1985) generally showed that students who were trained in the DARE program have a lower rate of cocaine use than non-DARE students. The rate of use of other drugs was also consistently lower for DARE-trained students. However, the differences between DARE and non-DARE students were rather small. DARE made a difference, but not a very big one, in prevention behavior. The research designs used to evaluate the effectiveness of DARE training have methodological problems, particularly a high dropout rate of DARE and non-DARE students in the year-to-year cohorts (Rogers 1993). Thus evaluating the long-term effects of DARE is methodologically difficult. Some evaluations of Project DARE show only very modest effects indeed (for example. Clayton et al. 1991). A meta-evaluation of the effectiveness of DARE, and of other drug abuse prevention programs, is needed.

The DARE experience suggests that the timing of an evaluation study may be almost as important as its findings. A particularly influential evaluation study was conducted by DeJong (1987), who gathered data from several hundred seventh graders in four Los Angeles middle schools who had received the 17-lesson DARE curriculum during their sixth grade. Compared with a non-DARE control group, the DARE seventh graders reported lower use of alcohol, cigarettes, and other drugs. This difference was especially marked for boys.

DeJong's DARE evaluation study was influential in convincing officials of the U.S. Department of Justice to fund DARE programs through police departments in local communities. The National Institute of Justice (NIJ) of the U.S. Department of Justice had funded DeJong's (1987) evaluation

study of DARE in Los Angeles. LAPD Chief Daryl Gates requested help from the director of NIJ for Federal assistance in promoting DARE. NIJ published DeJong's evaluation research findings in "NIJ Reports." which is distributed to every chief of police in the United States. The political climate for DARE's diffusion at that time was just right. The U.S. Department of Justice was receiving budget increases from the Reagan White House, while funding for other domestic programs in the United States was being cut. The War on Drugs was the number one priority on the national agenda in the late 1980s. The media were telling the U.S. public that the drug problem was serious, and the use of crack cocaine attracted massive news coverage. At this point a new drug abuse prevention program, DARE, that had been launched by a well-known police chief, Daryl Gates of the LAPD, was found to work by an academic scholar, DeJong, at a prestigious institution, the Harvard School of Public Health.

Small wonder then that Project DARE was widely and rapidly adopted by U.S. schools. They were being pressured by parents to do *something, anything* about the drug problem. DARE was not a budget cost to the local school, as U.S. Department of Justice funding for DARE was channeled through police departments. Whether DARE programs have modest versus major effects on drug abuse by students was not so important as whether DARE has any effects. The DeJong (1987) evaluation study showed that DARE has some beneficial effects on the prevention behavior of school children.

Here is evidence of the role of evaluation research on program effectiveness in influencing the rate of diffusion of a drug abuse prevention program. Had DeJong's (1987) evaluation shown that DARE had *no* effects, the U.S. Department of Justice might not have promoted the spread of DARE programs, and the rapid rate of diffusion in the late 1980s might not have occurred. Had the War on Drugs not been so high on the media agenda and the public agenda, DARE and other drug abuse prevention programs might not have been so high on the policy agenda. Even though the rate of drug-related deaths was not *increasing* (contrary to popular belief) during the 1980s. drug abuse was an important social problem in America (so the real-world Indicator was of at least some importance). Had this importance not been the case, the White House and "The New York Times" would hardly have championed the drug issue.

Program effectiveness, as determined by scholarly research, seems to be a minimum factor in a program's diffusion, along with such other minimum factors as a priority on the national agenda, evidence of the social problem's objective importance, and available funding from government or other sources. Each of these factors seems to be necessary, but not alone sufficient, for the diffusion and adoption of a drug abuse prevention program. Note also that these factors are socially constructed by a network of actors who give meaning to a new program like DARE and to a social problem like drug abuse in America. It is not the objective fact of a real-world indicator like drug-related deaths in the United States, or of the measured effectiveness of a program like DARE, that matters most in determining the rate of adoption. Instead, it is the subjective meaning of such social facts, worked out through a social process of interaction among key actors, that determines the rate of adoption of a new idea. Understanding how this microprocess of social interpretation is worked out at the local level and the adoption, reinvention, or rejection decision that results, is fundamental for coping with the drug problem facing American schools, communities, and work organizations today.

CONCLUSIONS

What conclusions can be drawn from the research evidence and program experiences about the diffusion and adoption of drug abuse prevention programs that have been related in this chapter?

1. Key factors in enhancing the dissemination of drug abuse prevention programs are that these programs provide perceived solutions to a social problem on the national, or the local, agenda. This matching of a program with a perceived social problem is a process of social construction.

2. Evaluation research to determine the effectiveness of drug abuse prevention programs ideally should be completed before dissemination begins (although this ideal time order does not always occur).

3. The spontaneous diffusion of a drug abuse prevention program before its evaluation is completed happens more frequently than one realizes. One needs to be more aware of its occurrence than in the past and be prepared to prevent it or to capitalize on it.

4. Evaluation research on the effectiveness of a drug abuse prevention program is only one factor, along with such other factors as the priority of drug abuse on the national agenda, in determining the rate of diffusion and adoption of such programs by communities, schools, and other organizations.

5. Boosting an issue (a social problem) on the national or local agenda is a very powerful force in encouraging the diffusion of programs that seek to cope with the social problem. Drug abuse prevention programs diffused very widely during the late 1980s when the War on Drugs was of highest priority on the national agenda.

6. A successful drug abuse prevention program often is reinvented during its diffusion, so that the second- and third-generation programs may be quite different from the original program that was evaluated and disseminated.

Finally, it is important to understand more fully how drug abuse prevention programs diffuse and are adopted and implemented by local communities, schools, work organizations, and other units. At this micro level of investigation, more should be learned about how an innovative drug abuse prevention program is put into use, leading to utilization of research-based knowledge in order to prevent drug abuse or to provide more effective treatment for drug-related problems.

NOTES

1. By 1993 Project STAR had spread to 80 percent of all school districts in Kansas and Missouri. And 100 percent of the middle schools in the Greater Kansas City Metropolitan Area had STAR teachers in then middle schools.

2. In a similar sense the Centers for Disease Control's monthly reports on the growing number of AIDS cases in the United States did not put the issue of AIDS on the media agenda from 1981 to 1985 until such human tragedies as those of Rock Hudson and Ryan White changed the meaning of AIDS for the media and for the public in early fall of 1985. Thereafter media coverage of the AIDS issue escalated, the issue of AIDS quickly climbed the public agenda, and increased government funding rapidly followed.

REFERENCES

Clayton, R.C.; Cattarello, A.: Day, L.E; and Walden, K.P. Persuasive communication and drug prevention: An evaluation of the DARE Program. In: Donahew, L.; Sypher, H.E.: and Bukoski, W.J., eds. *Persuasive Communication and Drug Abuse Prevention.* Hillsdale, NJ: Lawrence Erlbaum Associates, 1991.

Cohen, B.C. *The Press* and *Foreign Policy.* Princeton, NJ: Princeton University Press, 1963.

Dearing, J.W., and Rogers, E.M. *Agenda-Setting.* Newbury Park, CA: Sage, in press.

DeJong, W. A short term evaluation of Project DARE: Preliminary indications of effectiveness. *J Drug Educ* 17(4):279-294, 1987.

Evaluation and Training Institute. "DARE. Longitudinal Evaluation Annual Report, 1987-88." Report prepared for the Los Angeles Police Department Chief of Police, 1988.

Nyre, G.F. Drug Abuse Resistance Education (Project DARE) in elementary schools: Police as teachers. In: Berkevitz, I.H., and Selinger, J., eds. *Expanding Mental Health Interventions in Schools.* Los Angeles: Kendall/Hunt, 1985.

Pentz, M.A., and Valente, T. Project STAR: A substance abuse prevention campaign in Kansas City. In: Backer, T.E., and Rogers, E.M., eds. *Organizational Aspects of Health Communication Campaigns: What Works?* Newbury Park, CA: Sage, 1993. pp. 37-60.

Rogers, E.M. Diffusion and reinvention of Project DARE. In: Backer, T.E., and Rogers, E.M., eds. *Organizational Aspects of Health Communication Campaigns: What Works?* Newbury Park, CA: Sage, 1993. pp. 139-162.

Rogers, E.M. *Diffusion of Innovations.* 4th ed. New York: Free Press, 1995.

Wulf, K.M. "A Study of the Implementation of the DARE Program in Law Enforcement Agencies." Paper presented to the Crime Prevention Advisory Council, Los Angeles, School of Education, University of Southern California, May 17, 1987.

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Interorganizational Planning and Coordination as Technology Transfer: Lessons From a Case Study

Howell S. Baum

INTRODUCTION

In the human services, the technology is what a practitioner does. It is how a practitioner interacts with a client or a coworker. However, the term "technology" should not be misunderstood to connote routine or mechanical procedures. A practitioner's execution of a technology depends not only on the collaborative actions of the client or coworker, but also on the practitioner's skills and personality as well as the practitioner's organizational setting.

Technology transfer is an effort by one practitioner to change another's performance. Technology transfer is an interaction and is itself a technology. At its best, technology transfer is voluntary, not coercive, and the practitioner adopting a new technology may be said to learn it. But what is it that is learned? It may be a routine or way of organizing actions. It may be a skill or repertoire of skills. It also may be a new way of acting-more than a routine or skill, less than a personality transformation; a conceptualization of relations with a client, an approach to communicating with a client, or assumptions about the allocation of responsibility and authority vis-a-vis a client.

Successful technology transfer depends on the relationship between a practitioner who wants to change another's actions and the other. The former must provide meaningful instructions about how to act differently. Equally important, he or she must model rhe new actions-and in a way that seems attractive enough to imitate. Whether the latter adopts the proposed actions depends, first, on whether they are decipherable and compelling. Beyond that, the latter practitioner must have the abilities to enact them. Still further, the organizational or broader social setting must provide incentives to act differently. The proposed new technology will alter relations with clients. It will probably change relations with

coworkers, among others, and the practitioner must have the discretion to give up old relations and establish new ones.

This chapter describes an effort by a mayor's office to introduce a new technology into city agencies. The technology, interagency coordination and planning, was simultaneously a new way to think about and address urban problems and a new configuration of organizational relations. This example illustrates how all technological changes affect practitioner relationships. The case shows how any technology transfer must provide organizational supports for new individual practice.

HUMAN SERVICES COORDINATING COUNCILS

A mayor was concerned about growing problems of poverty and social disorganization among city residents. Anticipating no significant growth in the city budget, the mayor considered reorganizing the planning and delivery of services to focus limited fiscal and human resources on the neediest populations. The human resources director proposed human services coordinating councils. The city was divided into 33 neighborhoods, and councils were established to plan and implement service programs that would especially fit each neighborhood's needs. City human services agencies were directed to send representatives to each of the 33 councils.

Agencies involved included such conventional departments as social services, the public schools, health, juvenile services, planning, the police, housing and community development, manpower, and the library. In addition, individual councils included other public or voluntary service providers and neighborhood residents.

The councils represented two significant changes in human services planning and delivery. First, agencies would decentralize activities to focus on neighborhoods, with the expectation of providing different services to different populations. Second, agencies would coordinate actions with other agencies.

About 1 year after initiating this program, the human resources director called this author to consult. Several problems were reported. Fundamentally, the councils were not accomplishing much. Many met irregularly, many had considerable member turnover, and few people

seemed to take them very seriously. The director wanted to know what could be done to make the councils work.

The Organizational Setting for Innovation

The councils program can be seen as an effort at technology transfer, where the human resources director wanted service agency staff to think and act differently in planning and implementing programs. The director was asking what had gone wrong. This author interviewed council members and attended council meetings.

Some of the difficulties were straightforward and should not surprise anyone. One difficulty, quite simply, was that the human resources director had never developed or promulgated a clear idea of how the councils-the new technology-would work. Although the director had named 33 chairpersons and directed that agencies send representatives to act in decentralized and coordinated ways. many details had not been spelled out. The director did not delineate, for example, how programs emanating from the councils would relate to agencies' normal work.

Were the councils meant to be the lever for comprehensive reform of city agencies, or were they simply supposed to supplement the regular programs with a few targeted to neighborhoods? Were all councils expected to do the same things, or could they choose directions fitting their neighborhoods? Should the councils develop comprehensive neighborhood social pians, or should they concentrate on discrete projects? Should the councils devote their energies to long-term planning, or were they supposed to be a new channel for patronage from the mayor's office to neighborhoods? Simply, what success of the councils program would mean was not clear. Moreover, these questions led quickly to other discoveries: The program clearly was not working, and participants were trying to keep it from working.

Nearly every council member readily described the human resources director as autocratic. In this respect, the director was a perfect match for the mayor, and they had risen in city politics together. Both ordered people to do things and expected them to produce immediate, visible results. The director had issued an edict for councils and awaited the returns. At the least, vague directions were unlikely to guide basic innovation, but the director's use of authority had a negative effect as well.

Authority and Responsibility-Unequal and Ambiguous

The human resources director was an advisor to the mayor. The mayor had asked the director to coordinate human services activities in the city, but the director had no formal authority over any agency. Indeed, some city agency staffs were State employees, and many agencies received funds from the State or Federal governments. The director had no direct control over private, nonprofit agencies. Lacking organizational authority over agencies, the director tried to get collaboration by mixing appeals to service missions and the needs of city residents, judicious allocation of political rewards, and liberal use of intimidation. Thus authority with respect to agency directors was ambiguous, subject to ongoing negotiation.

The councils program was the incarnation of ambiguity about authority and responsibility. Although the human resources director asked agency heads to send representatives to councils, the councils were accountable to the director. Many agency directors saw the councils as either a drain on mandated or important activities or, more simply, a waste of time. As a result, they often sent low-level staff to serve on the councils. Sometimes the first person asked passed the assignment to someone still more subordinate. Because there were 33 councils, some people became members of as many as a half-dozen councils, most meeting biweekly.

Members of a typical council might include public agency staff of widely varying rank, representatives of voluntary agencies, and a few neighborhood residents. While some council members had considerable authority within their organizations, few came authorized to act on behalf of their agency within the council, and what authority members of a council collectively could exercise was unclear. If anything, they seemed to have little authority vis-a-vis either their home agencies or the mayor's office.

Council members' responsibilities also were ambiguous: What 'elaboration of the councils program' meant was not clear. How those responsibilities were related to primary work assignments was not clear either. For example, performance evaluations in home agencies included nothing related to the councils.

Finally, in this murky context, responsibility and authority seemed mismatched. For example, social services caseworkers or police community relations officers were asked to coordinate their home agency's actions

with other agencies in deciding which services should be delivered to a neighborhood.

Autonomous Authority

This situation might have been laughable, except that the human resources director kept issuing demands for results and threats about the consequences of failure. Few council members could describe the threats any more specifically than the demands for results, but the director seemed definitely dangerous. Implicitly, jobs could be on the line.

The vagueness of demands and threats in part reflected the reality that the director's goals were undefined and people could not be compelled to do very much. But the vagueness also reflected the distance between the director and the approximately 200 persons involved in the councils. The director was responsible for a number of human services projects, in addition to serving the mayor as a political lieutenant. The councils program was important, but so were other programs, especially those that were producing results.

Since the director did not have time to oversee the operations of the councils program, a program director and a coordinator were appointed to work with the councils from day to day. While these two represented the director with council members, they had uncertain authority (not to mention that both were borrowed for the mayor's office from the staffs and budgets of human services agencies). They ambiguously mixed evocations of the director's authority with acknowledgments they could not exercise much of his authority.

Thus, as far as council members could see, the human resources director remained their boss, but was rarely seen. If they had been so inclined, they would have had difficulty getting to talk with the director about expectations. Indeed, while ordering them about, the director did not seem to need them. Reasonably trying to ascertain how the director would judge them, they filled in a picture on the basis of inferences, guesses, and hunches. The clear image that most discovered was definitely threatening.

The Predicament

The councils program was a proposed technology transfer. If council members wanted to adopt the new technology-that is, if they wanted to

move toward collaborating with staff from other organizations to plan programs for neighborhoods-they needed clearer bounds for action. Thus they should try to clarify responsibility and authority and to match them with each other. Such a step would require them to talk and negotiate with one another, the human resources director, and agency directors.

They did not do so for several reasons. One reason simply was that few council members found the program rewarding. To the contrary, the work was invisible, taking time from what they wanted or were expected to do in their employing organizations. For this reason alone, many avoided council meetings or devoted time to forestalling decisions that would require them to give more time.

Beyond this reason, however, the relationship between the human resources director and council members seemed to make any movement toward implementing the program dangerous. On the one hand, responsibility and authority were ambiguous and unequal. However, the director seemed unchallengeably powerful and punitive. Hence council members' authority always looked likely to be less than their responsibility. If anything, authority seemed to grow ambiguously small at the same time that responsibility loomed ambiguously large. If the director were likely to punish for failure to meet responsibilities, any responsibility was dangerous. And yet council members lacked the authority to limit their responsibility. The alternative, many concluded, was to avoid as much responsibility as possible. When they could not do so directly, they tried instead to make their ambiguous responsibility yet more obscure. Two, they suggested, could play at this game (Baum 1991).

Sure enough, the result was that, as the director complained, the program did not work.

The Councils Program as Technology Transfer

The human resources director did not succeed in transferring a technology of interorganizational coordination and planning to human services agency staff. Many of the reasons are transparent in this example:

1. The director did not have a clear idea of the technology to transfer.

2. The director did not have a clear idea of to whom to transfer the technology.

3. The director did not provide organizational incentives to those asked to adopt (or invent) a new technology. For example, the director neglected to give them free time. link work on the new technology to organizational performance evaluations. and negotiate with department heads to change organizational structures and relations in ways consistent with implementing the new technology.

Yet ambiguities and inequalities of responsibility and authority—combined with the director's distant, autonomous authority—also created psychological disincentives for council members to proceed toward clarifying or improving the situation. Consideration of the influence of an organization's psychological structure on members' action is useful. The section below describes organizational psychological structure.

ORGANIZATIONAL PSYCHOLOGICAL STRUCTURE

Organizational psychological structure consists of patterns of typical emotional responses to the social structure of organizations (Baum 1987). Diamond (1993, p. 77) uses the term "organizational identity" to refer to manifestations of the psychological structure in "repetitive patterns of individual behavior and interpersonal relationships that, when taken together, comprise the unacknowledged meaning of organizational life."

Students of organizational behavior commonly refer to this phenomenon in terms of organizational culture (e.g., Deal and Kennedy 1982; Frost et al. 1985; Peters and Waterman 1982: Schein 1992; Smircich 1983). Studies of organizational culture argue for two important considerations. First, human beings act on the basis of the meanings they find in social phenomena. Second, through formal managerial communications, structural relationships, the evaluation of work, and the like, organizations convey meanings that influence how workers act.

With few exceptions, however, studies of organizational culture oversimplify the relations between organizational meanings and organizational members in three ways. (For exceptions, see Baum 1993; Diamond 1991; Hirschhom and Bamett 1993; Kunda 1992; Schneider and Dunbar 1992; Schwartz 1985). First, they assume organizations have single, coherent cultures. Second, they assume members passively

internalize and react to organizational cultures. Third and crucially, they assume all organizational meanings that matter to members concern more or less conscious and rational needs and are more or less consciously understood.

In contrast, a psychodynamic view of the meanings of organizational structures proceeds from different assumptions. (In addition to the exceptions noted above, see Baum 1987; Hirschhom 1988; Kets de Vries and Miller 1984; Levinson 1972; Schwartz 1990). First, organizational participants, as all human beings, experience unconscious as well as conscious aims and needs, think about these aims and needs both consciously and unconsciously, and act both consciously and unconsciously to achieve their aims and satisfy their needs. Second, persons in organizations attribute and contribute meanings to organizational experiences, although the salience of particular organizational features and similarities in personality characteristics can lead to finding widely shared meanings in aspects of organizations. Third, conflicting systems of social incentives in organizational arrangements as well as internal psychological conflicts in members can lead to the coexistence of conflicting schemes of organizational meanings or cultures.

In the psychodynamic view, transference is a principal means by which individuals endow organizations with meaning. Transference is an unconscious process of equating contemporaries with persons in one's past (Freud 1977 [originally published 1917]; Orr 1954; Racker 1968). In encountering others, people try to learn about them, to understand how they will act and react. Realistic inquiries may help, but they may not provide crucial information, and some people may lack the time or interest to do such research. They then may fill in missing details by analogy from past experiences. Sometimes these comparisons are realistic. At other times, particularly when someone seems important but unique, people unconsciously equate them with persons in their past who are only superficially similar. Strong emotional meanings of childhood relations with parents and siblings especially encourage adults to unconsciously act toward contemporary others as if they were these family members.

For example, workers may unconsciously associate a boss with an early authority figure in childhood, a parent, by thinking of the boss as the child may have thought of the parent: as omnipotent, omniscient, and omnicompetent. Similarly, they may equate coworkers with siblings (e.g., Baum 1987; Diamond 1993; Hodgson et al. 1965; Kets de Vries

and Miller 1984). While such analogizing may distort contemporary reality, people think this way because doing so offers benefits of apparently certain knowledge about someone who is important in everyday life, in addition to unconscious pleasure in being close to those from earlier in life with whom the contemporary is identified.

The Councils Program as a Case in Conflicting Structures and Meanings

The human resources director's failure to spell out what the councils program should do or look like crippled the program, as did failure to negotiate appropriate mixtures of authority and responsibility for council members. However, members did not try to work out the implementation of a program, the goals of which many endorsed. Instead, they fled from involvement, labored to forestall any action, or did their best to obscure their responsibilities, role, and existence.

These actions were conscious and unconscious reactions to the social structure of the program. Overtly the director ordered participants to implement a councils program. The formal structure of the program was ambiguous and did not provide the organizational resources needed to put the program in place. At the same time, the director's actions—imperious, menacing, and distant-seemed to arouse images and memories of childhood encounters with a seemingly omnipotent, punitive parent. Such unconscious associations affected council members' actions. Since the director demanded success, they assumed the director knew what success looked like. Their shortcomings, not the director's instructions or the program structure, confused them. Threatening unpredictably to punish them for failures only clipped their sense of competence further.

Strikingly, many council members described the director as a huge person despite relatively short stature. Over time, they spent increasing effort pondering the director's motives and less designing or implementing the program. Within a steeply hierarchical organizational setting, the director's actions encouraged council members to feel anxious about being shamed for failure and personal inadequacy (Baum 1987).

People's first experience of shame anxiety comes early in life when the child can do little and is dependent on the approval of apparently omnicompetent parents for a self-esteem that feels like the essence of life itself (Chasseguet-Smirgel 1985). To defend against shame anxiety, a

child may try to avoid being judged or even observed. When an adult experiences shame anxiety, he or she unconsciously feels drawn back into early childhood and may conclude that an adult contemporary, such as the director, is in fact treating him or her like a child. This insult, added to the anxiety of shame, contributes to rage about being so devalued (Kohut 1972). If, as in this case, adults feel acting angrily toward the one who humiliates them is dangerous, they will avoid relations if they can or may become depressed if they cannot. Neither reaction encourages program implementation or technology transfer.

Recommendations for Improving Implementation and Technology Transfer

As consultant, this author recommended actions both to rationalize authority and responsibility in relation to program aims and reduce unconscious dynamics that discouraged council members from acting. This author framed the approach as building council members' psychological ownership of the program. The following were the main objectives and recommendations:

1. Clarify the purposes and expectations of the councils, including consulting with councils about these matters and encouraging different councils to serve different purposes.

2. Give councils authority consistent with their responsibilities, including negotiating with agencies to delegate council representatives sufficient authority to accomplish council purposes and designating council chairpersons as an executive committee empowered to make policy for the program.

3. Offer training and organizational development assistance to councils, including developing a program guidebook, arranging ongoing consultation and periodic workshops, and training council chairpersons.

4. Establish incentives to encourage individual participation in councils, including providing public recognition and making council work part of regular performance evaluations.

These recommendations directly addressed the purposes and organizational structure of the program. Indirectly, they aimed to change the psychological structure to encourage the work that formal structural

changes could allow in three ways: by involving the director more closely in councils' work, by making the director more visible and accountable to them, and by letting council members see that the director needed them as much as they needed the director (see also Diamond 1993; Hirschhorn 1988; Kets de Vries and Miller 1984).

The fate of these recommendations told still more about the difficulty of change. During a discussion of the recommendations just after the director endorsed the concept of psychological ownership, an assistant interrupted and described problems with another program. The director immediately answered that the assistant should simply order people to work harder. By personality and role, the director seemed unlikely to change this approach to the councils. At any rate, 2 weeks later, the director resigned for a job in another city. Although this author and the director never discussed the reasons, the director seemed to feel stuck in an organizational situation where initiative was difficult. Regardless of inclinations, the director could not make the changes necessary for decentralized, coordinated planning.

CONCLUSIONS

This case shows that seeing technology transfer simply as knowledge utilization would be a mistake. Framing the process in that way puts the focus on abstract knowledge and devalues a professional's practice in a specific context. It implies a would-be change agent can know what targeted practitioners ought to do without consulting with them. Focusing on the latter's readiness for change suggests they could use the new knowledge if only they were sufficiently open minded, when reality is more complex. The case shows that the knowledge that affects a practitioner's decision to change is both conscious and unconscious, involves assumptions about the would-be change agent, and includes an assessment of organizational incentives for and against change.

A risk in thinking of technology transfer as simply knowledge utilization is that the would-be change agent comes to think of him- or herself as acting on, even against, those he or she means to change rather than collaborating with them-not just to understand how to utilize certain knowledge but to define the problem. if any, in the first place. That is, in fact, what occurred in this case. In other words, an intervenor must give as much attention to the transference process (pun intended) as to the technology if he or she wants to encourage practitioners to act differently.

This case describes a proposed technology transfer that failed. Some errors are so obvious that readers may be tempted to conclude they would never commit them. And yet these are normal ways innovations often are introduced into hierarchical settings. Few would dispute this process is typical bureaucracy. Moreover, the director's approach resembled common ways professionals and managers think about human relationships and problems. Practitioners often assume they must identify and solve problems unilaterally rather than admit uncertainty and join with others in learning and planning (Argyris 1982; Argyris and Schön 1974, 1978). This attitude, in turn, reflects a combination of common organizational norms, conventional professional socialization, and personality characteristics that lead to choosing and are reinforced by this socialization and these norms.

The case illustrates both consciously and unconsciously meaningful aspects of organizational structures that can support or inhibit technology transfer. The recommendations point to conditions necessary for successful transfer. At the same time, the outcome of the case encourages sophistication, humility, and a collaborative sense of experimentation in working with practitioners to enable them to act differently.

REFERENCES

Argyris, *C. Reasoning, Learning, and Action.* San Francisco: Jossey-Bass, 1982.

Argyris, C., and Schön, D.A. *Theory in Practice.* San Francisco: Jossey-Bass, 1974.

Argyris, C., and Schön, D.A. *Organizational Learning.* Reading, PA: Addison-Wesley, 1978.

Baum, H.S. *The Invisible Bureaucracy.* New York: Oxford, 1987.

Baum, H.S. How bureaucracy discourages responsibility. In: Kets de Vries, M.F.R., ed. *Organizations on the Couch.* San Francisco: Jossey-Bass, 1991.

Baum, H.S. Organizational politics against organizational culture. In: Hirschhom, L., and Bamett, *C.K.*, eds. *The Psychodynamics of Organizations.* Philadelphia: Temple, 1993.

Chasseguet-Smirgel, J. *The Ego Ideal.* Barrows, P., transl. New York: Norton, 1985.

Deal, T.E., and Kennedy, A.A. *Corporate Cultures.* Reading, PA: Addison-Wesley, 1982.

Diamond, M.A. Dimensions of organizational culture and beyond. *Political Psychol* 12(3):509-522, 1991.

Diamond, M.A. *The Unconscious Life of Organizations.* Westport, CT: Quorum, 1993.
Freud, *S. Introductory Lectures on Psychoanalysis.* Strachey, J.. transl. and ed. New York: Norton, 1977.
Frost, P.J.; Moore, L.F.; Louis, M.R.; Lundberg, C.C.; and Martin, J. *Organizational Culture.* Newbury Park, CA: Sage, 1985.
Hirschhom, L. *The Workplace Within.* Cambridge, MA: MIT, 1988.
Hirschhom, L., and Bamett, C.K., eds. *The Psychodynamics of Organizations.* Philadelphia: Temple, 1993.
Hodgson, R.C.; Levinson, D.J.; and Zaleznik, A. *The Executive Role Constellation.* Boston: Harvard University, The Graduate School of Business Administration, 1965.
Kets de Vries, M.F.R., and Miller, D. *The Neurotic Organization.* San Francisco: Jossey-Bass, 1984.
Kohut, H. Thoughts on narcissism and narcissistic rage. *Psychoanal Stud Child* 27(3):360-400, *1972.*
Kunda, *G. Engineering Culture.* Philadelphia: Temple, 1992.
Levinson, H. *Organizational Diagnosis.* Cambridge: Harvard, 1972.
Orr, D.W. Transference and countertransference: A historical survey. *J Am Psychoanal Assoc* 11(4):621-670, 1954.
Peters, T.J., and Waterman. R.H., Jr. *In Search of Excellence. New* York: Warner. 1982.
Racker, H. *Transference and Counter transference. New* York: International Universities Press, 1968.
Schein, E.H. *Organizational Culture and Leadership.* 2d ed. San Francisco: Jossey-Bass, 1992.
Schneider, S.C., and Dunbar, R.L.M. A psychoanalytic reading of hostile takeover events. *Acad Manag Rev* 17(3):537-567, 1992.
Schwartz, H.S. The usefulness of myth and the myth of usefulness. *J Manag* 11(1):31-42, 1985.
Schwartz, H.S. *Narcissistic Process and Corporate Decay. New* York: New York University, 1990.
Smircich, L. Concepts of culture and organizational analysis. *Admin Sci Q* 28(2):339-358, 1983.

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Organizational Change As Human Process, Not Technique

Michael A. Diamond

INTRODUCTION

Having practiced and written on organizational development and change for a number of years, this author has had many opportunities to observe technology transfer both in public and private organizations. The overarching problem is that efforts to introduce computer systems and advanced telecommunications often fail because technical experts and managers ignore the underlying psychological dynamics of organizational change and innovation (Baum 1987; Diamond 1993; Hirschhom 1988; Shapiro and Carr 1991).

Take this example: One State agency undergoing enormous expansion in public works projects looked to the State's data processing people to design a better computer system to assist project managers (PMs). The agency director and deputies met with the State's data processing people several times to convey their technological needs and requirements. The data processing agency for State government then went to work on developing a computerized project management program for the public works agency.

Here is what happened: The system was designed and installed 6 months later. After another 6 months, the PMs were not using the new system. In fact, the system was incomprehensible to them-only the data processing experts understood how to access it. Not only had little training of the PMs taken place, but the data processing experts never consulted the PMs on the actual design and implementation of the computer management system. Although trained to use the new system, the PMs found it to be cumbersome, excessively time consuming, and of little value to them. In fact, it seemed to have value only to the accounting office as a tool for budgetary review and evaluation on projects and as a tool for upper management in assessing progress on construction sites. The PMs had very little incentive or motivation to use the new system, because it did not help them manage projects. On the contrary, they viewed it as additional work because it required more time for them to update the computer on construction progress and budgetary

matters. Because they viewed it as an effort by upper management to establish greater controls over their work, the PMs came to view the technology with either disdain or cynicism that often took the form of humor. PMs were known to joke about the time they spent playing various computer games on their terminals.

What went wrong here? This case exemplifies a common problem in technology transfer: the denial of change and innovation as a human process and the consequential resistance to change and learning, which often is combined with workers' anger and resentment at the experts and the technical manner in which the innovation is introduced.

In what follows, four major points will be made. First, technology transfer often is based on the notion of technician as expert authority. The result is a control-oriented, information-dominated, top-down, hierarchic, and defensive approach to innovation, which limits learning and responsiveness to clients and customers (users) of technology. Second, technology transfer ignores the psychological fact of resistance to change based on a central and unavoidable human conflict between cognitive learning and emotional (interpersonal) security. Third, technology transfer similarly denies the organizational psychodynamics of change, which acknowledges that change at work implies emotional and cognitive loss among organizational participants. This experience of loss suggests that change efforts must include some process for workers to develop ownership and endorse the rationale behind the technology transfer and some opportunity to separate emotionally and cognitively from the old way in order to assume the new way of doing things. Fourth, technology transfer seems to ignore the degree to which the organization's culture is receptive or resistant to change-the need for a "transitional space" to facilitate the innovation. In other words, the degree to which the organization is defensive and bureaucratic rather than resilient and capable of systemic learning needs to be taken into consideration as a critical factor in measuring the potential for successful technology transfer. Finally, the transitional space (frequently called the holding environment) is the necessary psychological and organizational context for empathic acknowledgment of the human process of change.

THE PROBLEM OF EXPERT AUTHORITY IN TECHNOLOGY TRANSFER

In the case of the public works agency and State data processing described above-the experts were in data processing and the nonexperts were the PMs and their executive team-the work groups had polarized. The executives asked data processing for a more sophisticated tool for project management. Without consulting PMs, data processing acted as if they knew what that system and program would look like. Their design was simply the product of the executive request and their technical, rational notion of what the agency needed for more efficient and effective project management.

This process of introducing new technology into the workplace was not a collaborative, participative endeavor. Rather, it was a hierarchic, unilateral process in which information was shared but little communication occurred between the users of technology and the designers. Furthermore, little reflective and systemic thinking and innovation took place. The executives (customers) contracted the services of data processing, and data processing reinforced the image of expertise by developing a highly sophisticated computer system for project management that had questionable relevance for the PMs' actual work. In other words, the experts acted as *if* they knew what the PMs needed without talking directly to them, and, as experts, the data processing people were in charge. Authority and technical expertise are most often synonymous in instances of technology transfer. Thus, in this example, the task of developing technology for the public works agency was delegated to data processing, and they, in turn, told the PMs what information was needed to design the program.

Criticizing the limits of technical rationality, Schon (1983, p. 40) suggests the need to pay more attention to the human process of "problem setting" in addition to the technique of problemsolving. Schon writes:

> They [professionals] are coming to recognize that although problem setting is a necessary condition for technical problem solving, it is not itself a technical problem. When we set the problem, we select what we will treat as the "things" of the situation, we set the boundaries of our attention to it, and we impose upon it a coherence which allows us to

> say what is wrong and in what directions the situation needs to be changed. Problem setting is a process in which, interactively, we *name* the things to which we will attend and *frame* the context in which we will attend to them.

Technical problemsolving differs fundamentally from problem setting-the latter, as Schon (1983) suggests, is an interactive and reflective process that questions the status quo of governing norms and values that name and frame what one looks at. In the example cited above, the data processing group may have engaged in problemsolving but clearly not problem setting. Consequently. their nonparticipative, technical approach shut out the potential for learning about the uniqueness of the problem and thus limited their effectiveness.

Technical rationality comprises an ideology of expert-as-authority, and this belief system is governed by the scientific norms of positivism and empiricism. As a framework for rigorous research and problemsolving, it is nonreflective and nondialectic and ignores the psychological side of innovation and technology transfer. Thus, it does not acknowledge the possibility that technical processes for problem solving, which exclude participative feedback and reflective thinking, can themselves be defensive in nature-a social defense against the anxiety over loss of control and (the assumed position of) authority. (The notion of technology transfer as a social defense is discussed later in the chapter.)

This chapter now looks at the individual response to organizational change as it relates to technology transfer.

PSYCHOLOGICAL RESISTANCE TO ORGANIZATIONAL LEARNING AND CHANGE

Technology transfer, like many different kinds of organizational innovations, often runs into employee resistance. One reason many technology transfers are unsuccessful is that they tend to ignore the inevitability of psychological resistance to change in the status quo. Asking people to approach their work differently requires cognitive shifts in the naming and framing of problems (as noted in the previous section) and places emotional demands on their feelings of self-competence and self-confidence—their *self-esteem at work.*

As noted in the example above, the introduction of many new technologies into the workplace usually is handled by technicians or computer experts. Typically, these experts are not only insensitive to the human component of change but assume that rational people should comprehend readily the efficiencies and virtues of adopting the latest technology. This author's experience with large-scale technology transfers and organizational change efforts contradicts these assumptions, particularly at the emotional level of experience. Attempts to innovate and adopt new technology ought to combine the instruction of technical knowledge with the facilitation of organizational change as a fundamentally psychosocial process. This combined approach to technology transfer operates on the assumptions that the human personality is conflicted about learning and interpersonal security and that change works to stimulate the anxiety associated with the inherent conflict.

What is meant by this statement? The fact that individuals desire to learn and be competent on the one hand and wish to feel secure psychologically and anxiety-free on the other hand is a universal but often ignored human dilemma for workers. This predicament is triggered by the imposition of organizational change and workplace innovations. In other words, the dilemma is there all along in a latent form-it needs only the anxiety of uncertainty associated with change to activate it.

In 1986 this author stated:

> The problem of psychological resistance to change is well known to psychologists. Both the psychoanalytic psychologist's conception of unconscious defensive techniques as modes of adaptation and the cognitive psychologist's notion of limited learning and of contradictions in what people say and what they in fact do illustrate compulsive, repetitive, security-oriented, error-inducing, and self-sealing human behavior. These defensive and adaptive tendencies usually protect the status quo and, therefore, block learning (Diamond 1986, p. 543).

The successful adoption of innovations and technology transfer depends upon the individual's openness to learning and change, and that openness requires minimal defensiveness and adequate self-competence.

Stress is a factor here. If individuals experience the change as stressful due to uncertainty, lack of information, and insufficient participation, they will feel disrespected, angry, and resistant to learning. Moreover, the degree to which these stressful circumstances trigger neurotic anxiety will negatively affect their self-esteem at work.

Technology transfer and innovations often leave workers feeling powerless-more so than before the change—*specifical because* the technology transfer has been imposed on them. Frequently they are not involved in change efforts such as technology transfer that directly affect their jobs. Thus, one way to minimize the defensive reactions to technology transfer is to make certain that personnel participate in the designing (framing and naming) of the new systems. Workers must be part of the selection of new technologies and the reasoning behind their acquisition and implementation.

This chapter now focuses on the psychological fact that individuals experience change as loss. One may consider the value in designing a transitional space (or holding environment) at work in which organizational members can work through their feelings and thoughts about the change and assume responsibility for it.

CHANGE AS EMOTIONAL AND COGNITIVE LOSS

Technology transfer often represents a fundamental change at work and, thus, a transformation in the way people experience and interact with their tasks and the organization's mission. Successful adoption of technological innovations requires the internal commitment of workers, who need to endorse the rationale behind the innovation.

The human process for adoption of new technology ought to provide organizational members with an opportunity to examine where they are, where they have been, and where they are going-an emotional and cognitive map of the organization. This process of mapping requires facilitation of workers' thoughts and feelings about the change. An outside organizational consultant may be helpful in providing participants with a safe, nonpunitive environment-a transitional space-in which they can explore the implications of change.

At a deeper emotional level, workers will need to acknowledge what they are losing and, subsequently. what they will gain. This process often

involves some degree of grieving over the way things were, then letting go of the old way and trying on the new way of working on tasks. In addition, the opportunity to deal both emotionally and cognitively with this technological innovation often promotes reflective learning (problem setting and problemsolving) and internal commitment to the change. Workers are able to acknowledge the problems with the old system and consider the degree to which the transfer of technology will help to solve these often annoying problems. The extent to which organizational members engage in this sort of learning will positively influence their willingness to commit to the innovation and use of new technology. Moreover, the provision of a transitional space can offer workers an opportunity to confront their fears and anxieties related to organizational change. A psychodynamic approach to organizational change takes seriously the disruption of everyday work routines, rituals, processes, and procedures. People attach themselves emotionally to the predictability of organizational structures and procedures, and that attachment is severed with the introduction of change at work. This separation produces anxiety drawn from the stress of uncertainty and the phases of emotional loss.

Finally, and most critically, this author challenges the assumption that technological change is always an appropriate solution to organizational problems. More often the case, technological change is a defense against organizational problems. Indeed, the phases of grief and mourning can be viewed as a metaphor for organizational change.

Grief, according to the experts, comprises four phases:

1. Numbing-a sense of shock and outrage.

2. Yearning-a search for what is lost, anger and disbelief that it has occurred.

3. Disorganization and despair-a discarding of old patterns of thinking, feeling, and acting; a redefinition of oneself.

4. Reorganization-a reshaping of one’s internal world and a reframing of social reality (Bowlby 1982).

In organizations, the numbing phase may be a near paralysis of operations and a general state of confusion. The yearning phase follows in which members act as if the change has not occurred. Suppression and

denial are common defensive reactions, as is a nostalgic orientation to the past. These defenses conceal the underlying anger and outrage among workers.

Once participants are able to confront their anger and outrage over the loss of old routines and procedures, they experience the phase of disorganization and despair. Here they not only start letting go of old thinking, feeling, and acting in order to incorporate the new, but they also feel the despair of helplessness and lack of control. And, although their participation and collaboration in planning can aid the process, they must face the reality of a constantly changing environment over which they have little or no control. This knowledge is depressing and precedes reparation and organizational renewal.

During the reorganization phase, there is a willingness to experiment with new ideas and feelings-problemsolving, error detection, and correction now are possible. Organizational reality testing leads to an open system capable of what Argyris and Schon (1978) call single- and double-loop learning. That means organization members are capable of making changes, even when these include reexamining beliefs, norms, rules, and practicing values. They respond to shifts in their environment by reflecting on and making public their underlying operational assumptions and the associated behavioral consequences. Moreover, they can do so, in part, as an effect of acknowledging their psychological resistances to change and loss (Diamond 1992).

This chapter now looks at the role of organizational culture in technology transfer and innovation. When is it resistant to change, and when is it responsive to change?

ORGANIZATIONAL CULTURE: DEFENSIVE OR RESILIENT

Bureaucratic organizational cultures are unintentionally constructed on the model of psychological defenses-what might be called externalized ego defenses. These particular organizational cultures originate and then are perpetuated by ritualistic defenses that limit the processing of anxiety-producing information and thereby minimize the potential for learning and change. In these defensive organizations, information and feedback that oppose the status quo of norms, policies and procedures, or data that contradict planned schedules and routines, are typically censored. The organizational story of the public works agency and the State's data

processing division exemplifies the tangibility of externalized and ritualistic organizational defenses that not only obstruct technology transfer and innovation but also promote selective inattention to deeper structural and psychodynamic problems at work among organizational participants.

Ritualistic organizational defenses act as blinders to reality-defensive screens that conceal problems, deny conflicts, and resist change. Human energy (cognitions and emotions) that might otherwise be channeled into the correction of errors and actual problemsolving often is displaced by the influence of anxiety onto substitute objects, promoting the illusion of safety and security without substantive reflection and change. Under the stress of uncertainty and anxiety, form [procedures, regulations, impersonal rules, red tape, etc.) takes precedence over organizational mission and substantive output (problemsolving, provision of services, personal responsibility, and the quality of product). Managerial control and accountability take priority over organizational learning, collaboration, and problemsolving.

Technological transfer and workplace innovations produce excessive levels of worker stress. Thus, a process of intervention that assists participants in acknowledging and working through their social defenses is crucial because resistance to change is psychological at its roots. Technical approaches to innovation tend to ignore the psychological anchors of attachment to prevailing ways of working and to bureaucratic organizational cultures.

What then does one need to know about the relationship between the self and the organization to safeguard his- or herself against excessive reliance on the ritualistic defense? Organization theorists often depict organizational action as ritualistic. A psychodynamic perspective enables one to see the contradictory relationship between the individual and the organization. Bureaucratic organizations reinforce defensive human needs for psychological security and self-esteem. In bureaucracy, this desire is signified by ritualistic behavior intent on maintaining the status quo, avoiding anxiety-provoking conflict, and denying realities of shifting political pressures, technological innovations, and market demands. Exaggerated ego defenses and ritualistic actions perpetuate the organizational culture by encouraging resistance to insight and change.

This defensive organization censors anxiety-producing information antithetical to the status quo. Technology transfer represents a challenge

to organizational equilibrium. More important, however, is the fact that technology transfer often is itself a manifestation of these defenses and frequently is mistaken for a solution to cultural, systemic, and interpersonal problems at work. In these instances, technology transfer is a camouflage for more deeply rooted organizational pathologies.

Organizations are constructs of the mind; they acquire a reality of their own through the individual's reliance on their structures for protection and security against anxiety. In extreme situations, modem organizations consume individual initiative and will. As the above case example demonstrates, proponents of technology transfer will find it helpful to consider the subjective experiences and reflective knowledge (rooted in the actual practice) of organizational members prior to purchasing, designing, and installing the new technology.

This chapter now examines the concept of organizational resilience as a culture and leadership style more receptive to learning and change.

ORGANIZATIONAL RESILIENCE

Organizational resilience stands for a minimally defensive social system of collaboration and participation that is capable of responding to change. In fact, based on this author's observations as an organizational consultant to change, organizational resilience is the result of exploring resistances and grieving the loss caused by change. It is the result of what Klein calls reparation, a term stemming from Kleinian object relations theory, which emphasizes the human desire for connectedness and integration signified by the human effort to make whole that which is broken (Klein and Riviere 1964).

Organizational resilience is characterized by leader-follower relations that are minimally defensive and nonauthoritarian. In this sort of organizational culture, in contrast to the aforementioned case, leaders share information and decisionmaking with staff, and staff are in turn willing to give and receive critical feedback and take responsibility for their actions. Both supervisors and subordinates feel affiliated with the same system and are committed to a common mission. Many organizations lacking resilience are characterized by insecure and compulsive human relations in which individual members have only a partial comprehension of the total system and its public. Consequently. they are alienated and disconnected from the greater whole of the system, and their efforts are

viewed with little significance. In the case study, this set of assumptions operating in the defensive organizational culture discouraged upper management and data processing from consulting PMs in the design and implementation of a new computer system.

In practice, organizational resilience requires trust and mutual respect among organizational members, which stand or fall on their collective esteem. Organizationally resilient leaders and followers relate primarily on the basis of consciously shared meaning and purpose rather than on unconscious emotional needs. While they care about one another as fellow human beings, they are not driven to each other for psychologically compensatory and narcissistic motives. Despite being under the pressures of stress and the uncertainty of perpetual technological innovations, each leader's sense of self is integrated adequately and does not require constant aggrandizing from staff and the public. Organizationally resilient leaders do not attract subordinates who are driven primarily by emotional deficiencies-indeed, such leaders may promote greater self-worth among those with low self-esteem.

To promote organizational resilience, organizational leaders must be aware of self-and-other boundaries in their interpersonal relationships at work. They cannot have a pressing emotional need to displace bad feelings onto others, and they must be aware of the tendencies of others to do the same to them. Unconscious displacement and projection of bad feelings are more common under stressful conditions. Thus, organizational leaders able to manage interpersonal boundaries and minimize defensive tendencies will foster healthier and more productive interactions with and among their staff. They will tend to consult staff when necessary and delegate authority and responsibility appropriately. In addition, leaders of resilient organizations are aware of the unique character, talents, and skills of individual staff members. Hence, individuality and interdependence are values consciously stressed and intended to counteract the regressive pull of homogeneity and uniformity.

CONCLUSION: THE CASE OF THE DATA PROCESSING MANAGER GROUP

In conclusion, this author wishes to describe briefly an ongoing change effort. The case of the data processing managers group is mentioned here to reiterate this chapter's central thesis that technology transfer and innovation is a human process, not just a technical one.

Data processing managers representing more than one dozen departments and agencies are meeting for the first time in the State's history to integrate and design computer and telecommunications systems throughout State government. Struggling against their departmental tendencies to view themselves as separate entities with well-defended boundaries, these managers are attempting to find common ground. *Reparation is at work.*

Entertaining the idea of sharing resources and information across divisions and departments to enhance technological innovations for all of State government has forced managers to confront their anxieties over loss of control and over protection of their perceived organizational boundaries. As their consultant, this author is encouraging them to publicly express their reservations and anxieties about integrating systems and sharing resources. Monthly meetings have become the transitional space in which they experiment with new ideas, thoughts, and feelings related to a common mission to improve technological services for all of State government.

In short, this effort has challenged the status of data processing managers as expert authorities due to the requirement of participation and collaboration. It has confronted psychological resistance to organizational change by acknowledging the feelings of insecurity associated with reflective thinking and learning that challenge the status quo. It has meant a public acknowledgement and letting go of the old way of inefficient technology utilization so that the new way of technology sharing and participation can be incorporated. Finally, it has meant challenging directly the defensive culture of bureaucracy. Departments can no longer view themselves as relatively independent from other departments and agencies within State government. Technology and data processing experts must learn about their counterpart agencies and the technological needs of those agencies. Thus, they must come to accept more complex roles as well as more integrative operations. Interagency boundaries are being transcended and are becoming more flexible, less forbidding. Collaboration based on mutual respect and a shared mission eventually will facilitate a more resilient organizational culture. This organizational culture is, then, better able to respond to change by engaging shared resources and expertise to advance the appropriate and effective use of technologies.

REFERENCES

Argyris, C., and Schon, D. *Organizational Learning.* Lexington, MA: Addison-Wesley, 1978.

Baum. H.S. *The Invisible Bureaucracy.* New York: Oxford University Press, 1987.

Bowlby, J. *Loss.* Vol. 3. New York: Basic Books, 1982.

Diamond, M.A. *The Unconscious Life of Organizations: Interpreting Organizational Identity.* Westport CT: Quorum Books, Greenwood Publishing Group, 1993.

Diamond, M.A. Hobbesian and Rousseauian identities: The psychodynamics of organizational leadership and change. *Admin Soc* 24(3):267-289, 1992.

Diamond, M.A. Resistance to change: A psychoanalytic critique of Argyris and Schon's contributions to organizational theory and intervention. *J Manag Stud* 23(5):543-562, 1986.

Hirschhom, L. *The Workplace Within.* Cambridge, MA: MIT Press, 1988.

Klein, M., and Riviere, J. *Love, Hate and Reparation. New* York: W.W. Norton & Co., 1964.

Schon, D. *The Reflective Practitioner.* New York: Basic Books, 1983.

Shapiro, E., and Cart-, A.W. *Lost in Familiar Places.* New Haven, CT: Yale University Press, 1991.

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Rethinking Organization Stability as a Determinant for Innovation Adoption and Diffusion

Alan M. Glassman

> Everything has changed but our ways of thinking, and if these do not change we drift toward unparalleled catastrophe.
>
> *Albert Einstein*

> People prefer the certainty of misery to the misery of uncertainty.
>
> *Anonymous*

INTRODUCTION

In "Preparing for the 2 1 st Century," Kennedy (1993) asserts that the world has entered an era of unprecedented turmoil, reflecting the entwined forces of shifting demographics; rapidly occurring technological, biotechnological, and communication advances; and increasing global competition. Based on these forces, Kennedy speculates on the winners and losers in an emergent two- or three-tier world order, forcefully arguing that a key determinant will reside in systems of learning:

> If my analysis is correct, the forces of change facing the world could be so far reaching, complex, and interactive that they call for nothing less than the reeducation of humankind (Kennedy 1993, p. 339).

Similarly, at the organization level, a remarkable transition in America is transforming private, not-for-profit, and public organizations. Harris (1985) estimates, for instance, that usable knowledge doubles every 5 to 7 years, while the media chronicles the latest advances in electronics,

microprocessors, and lasers, promising a multidimensional information highway. Commenting on the need for organizations to change, Bennis (1988) asserts:

> Most organizations reflect the uneasiness of transition for they were built upon certain assumptions about man and his environment. The environment was thought to be placid, predictable, and uncomplicated. Man was thought to be placid, predictable, and uncomplicated, Organizations based on these assumptions will fail, if not today, then tomorrow. They will fail for the very same reasons that dinosaurs failed. The environment changed suddenly at the peak of their success.

The breadth and difficulty of this change can be seen in the ongoing disorder in such diverse fields as finance, transportation, high- and low-technology manufacturing, retailing, media, aerospace and defense, health care, social services, education, and even Government itself. It also can be seen in the usage of new language (i.e., shorthand) to describe emergent organizational designs and practices-network or cluster organizations, posthierarchial or flattened structures, transformational leadership, and reinvented Government. It is an era of permanent white water (Vaill 1989).

LEARNING ORGANIZATIONS

In such an environment, organizations can no longer focus resources and managerial action on seeking stability or seeking better means of control; rather, organizations must learn to plan under discontinuous conditions and to develop leaders and managers who accept as a substantive part of their role the management of conflict and ambiguity. As summarized by Stacy (1992, p. 19), "The real challenge, therefore, is to develop a more appropriate frame of reference through which to understand the unstable dynamics . . . and design creative actions." This is the antithesis of the classical bureaucratic model that functions best in a predictable and ordered environment. Many observers assert that this is nearly impossible for public agencies (Shrivastava 1983).

The concept of learning organizations refers to "organizations that continually expand their ability to shape their future" (Senge 1992a, p. 3 1). Characteristics often associated with such organizations include

(1) employment of systems thinking that moves beyond simple situational adaptation to examine complex, intraorganizational relationships; these organizations seek to understand how their responses to change and the resultant outcomes are influenced by the existing structure and culture (Senge 1992a; Ventriss and Luke 1988); (2) advocating learning as a shared responsibility of all organizational members (not just key members of the hierarchy) and constructing processes that encourage dialog, empowerment, and risk taking (Kiechel 1990; McGill et. al. 1992); and (3) developing new mental models to prepare for the future and eschewing established frameworks for comparison (Senge 1992b). Throughout, rather than concentrating on discrete events, the commitment is to understanding the relationship between incidents and incorporating new knowledge (Bennis and Nanus 1985; Garvin 1993; McGill et al. 1992). Thus, the focus is on the whole, not on unit or individual achievement.

This chapter stems from the premise that the United States has entered a new era of organizational revitalization and that old models of organization need drastic change. It is contended that the fundamental character and structure of most organizations are more appropriate to the previous decades than to the demands of the forthcoming millennium and that organizational learning and therefore innovation adoption are inhibited by these structures. First, the chapter briefly reviews the characteristics of the classical bureaucracy and the impact of bureaucracy on innovation. This section also explores the emergent awareness of the external environment as a critical determinant of organization design and the implications for innovation adoption and diffusion. Second, the chapter reviews recent findings on innovation and introduces the notion of bounded instability in organization design. Third, the chapter describes the characteristics of the new organization designs that seem more favorable to innovation adoption and diffusion and challenges political leaders to redefine themselves as change agents.

BUREAUCRATIC STABILITY AND INNOVATION ADOPTION AND DIFFUSION

The dominant organizational mindset in the United States is the bureaucratic paradigm that emerged in the early 1900s as a means of bringing order to the expansion of industry and Government. In its most developed form, a bureaucratic structure exhibits six defining characteristics: (1) high functional differentiation: (2) rigid hierarchical

relationships; (3) bounded, specialized role responsibilities; (4) formal interactive rules and regulations; (5) predominantly downward communication; and (6) centralized authority and decisionmaking. As initially described, this form of organization leads to incomparable efficiency and increased production (Urwick 1944; Weber 1947). The machine metaphor became commonplace for the ideal bureaucratic organization.

This paradigm-with tight controls, specialized jobs, and clearly defined interactions-was ideally suited to the early, simple factories of the Industrial Revolution that had relatively stable operating environments and uncomplicated information-processing needs. In Government, bureaucratic structures were adopted to separate politics from the administrative functions. This generated a complex set of rules and regulations to ensure a machine-like sameness to all similar concerns -efficient, predictable, and stable.

As argued by Taylor and Van Every (1993, p. xv), "Once established, the bureaucratic form of administration was practically invulnerable to assault from outside or inside. In its own way, it was a fortress, protecting the agencies of power from the vicissitudes of their environment." Indeed, throughout the first half of this century, as social scientists and practitioners extended the understanding of organizations through scientific management, administrative theory, social man and human relations theory, systems theory, and situational management, the bureaucratic paradigm adjusted to reflect these new leamings. That is, individual discretion was limited, and uniformity and predictability were ensured through the clearly defined systems governing work relationships and actions.

Bureaucracy and Innovation

Bureaucracy is aimed at accomplishing similar tasks as efficiently as possible on a recurring basis. Its success is dependent on strict adherence to policies and rules, tight financial controls, and vigilant supervision. It is structurally designed to emphasize narrow subtasks and functional divisions, to be impersonal, and to centralize authority, information gathering, and decisionmaking. Consequently, organizational units are buffeted from each other and from external environmental impingements. Under these conditions, the units will strongly defend the status quo (often unconsciously). If one unit introduces a change, other units of the organization will want to reject it-a change would disrupt the highly efficient existing patterns. Diffusion becomes nearly impossible, since

the barriers are already institutionalized in the machine philosophy of doing, not thinking.

When bureaucratic organizations do adopt innovations. they frequently force the change into the existing structure, requiring compliance with established regulations and relationships. Over time, the changes become absorbed and, as often stated by employees, nothing really changes.

Bureaucracy and the Environment

For purposes of this chapter, an organization's environment represents anything outside the organization that may affect its operations or performance outcomes. A review of some of the major research studies of the past 30 years helps explain the critical role of the environment and the structural responses and variations (from the machine-like bureaucracy) now observable in many organizations.

Bums and Stalker (196 1) studied 20 manufacturing firms in Scotland and England. Through indepth interviews with managerial personnel and observation, they identified two distinctive structure types: mechanistic and organic. The mechanistic organization was highly structured, exhibiting precise definition of tasks, reliance on the formal chain of command, and strict adherence to formal rules and regulations. Because of these qualities, it was judged to be better suited to a stable environment. The organic structure was characterized by reliance on individual knowledge and was found to function better in an increasingly unstable environment. The researchers concluded by emphasizing the situationality of structures:

> We have endeavored to stress the appropriateness of each system to its own unique set of conditions. Equally, we desire to avoid the suggestion that either system is superior under all circumstances to the other. In particular, nothing in our experience justifies the assumption that mechanistic systems should be superseded by organic in conditions of stability (Bums and Stalker 1961, p. 125).

Lawrence and Lorsch (1967) studied 10 organizations in 3 different industries (plastics, consumer foods, and standardized containers) to determine their needs for differentiation and integration. Differentiation was defined as "the differences in cognitive and emotional orientations

among managers in different functional departments, and the differences in formal structure among the departments" (Lawrence and Lorsch 1967, p. 11). Integration was defined as "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the environment" (Ibid.).

Based on data from questionnaires and interviews with managerial personnel, the researchers drew two major conclusions. First, the more complex and uncertain the industry's environment, the greater the degree of differentiation. Thus, organizations in the plastics industry, which had a rapidly changing technology and shifting markets, had greater departmental differentiation than those in the moderately stable foods industry; the latter had greater differentiation than organizations in the very stable container industry. Second, regardless of industry, the more successful the organization, the higher the degree of integration.

Woodward (1965) conducted a lo-year study of 100 organizations to determine what characteristics were associated with economic success. The organizations were characterized according to the type of technology employed: unit, mass, or process. Woodward then determined that the organizations in each of the three categories had different mean values for such factors as number of management levels, span of control, number of specialists, and degree of formality and delegation. Of major significance was the finding that the successful organizations within each category were those that were closest to their own group mean.

Using these studies as a foundation for questioning the suitability of bureaucratic structure in environments where change is increasing at an increasing rate, recent research has focused on the ability of organizations to process external information. Galbraith (1977) argues that uncertainty is the dominant variable as organizations seek to develop the fit between the information-processing requirements of the organizational tasks and the information-processing capacity of the structure. Research indicates that in ill-defined situations, managers must be able to debate their views and reach a common understanding of the needed requirements before they engage in decisionmaking (Daft and Lengel 1986; Hambrick 1987).

In summary, it is commonly accepted that to determine the optimal organizational structure, it is first necessary to understand the specific environment of an organization. Moreover, as organizational environments become increasingly complex, there is a need to move from the machine-like classical bureaucratic structure to alternative structures

that allow interunit debate and integration, more integration across boundaries, and greater interaction with the external environment. Given the knowledge explosion, it follows that bureaucratic structures would be inhospitable to innovation development. adoption, and diffusion. Commenting specifically on the continual dominance of bureaucracy in today's world, Mills (1993, p. 13) states, "The traditional hierarchical structure of our companies is more than just a system that has outlived its usefulness-it is a clear and present danger."

INNOVATION AND BOUNDED INSTABILITY

A special category of learning for organizations is deftness at perceiving and evaluating potential innovations in the external environment and, when appropriate, assimilating these innovations within the organization.' Surprisingly, there is minimal research focused on innovation in either the private or public sectors. but where data do exist, neither sector displays greater adoption and diffusion rates than the other sector (Roessner 1983; Taylor and Van Every 1993).

As described by Van de Ven (1993) and Van de Ven and Poole (1990), the Minnesota Innovation Research Program (MIRP) was the most important research study in the effort to develop a grounded theory of the process of innovation development.' The program, conducted from 1983 to 1992, involved 30 researchers organized in 14 interdisciplinary teams utilizing a common methodology to compare results. Van de Ven (1993, pp. 273-283) summarized the research findings:

1. The innovation process consists of numerous events performed by many different people over an extended period of time...[T]he innovation process began with an extended gestation period that lasted several years.

2. Concentrated actions to allocate resources and initiate innovation development are triggered by "shocks" (not mere persuasion) produced by direct personal confrontation with needs or problems. These shocks are sufficiently large to trigger the attention and action of Organizational participants.

3. Once innovation development work begins, the process does not unfold in a simple linear sequence... [T]he process diverges into multiple, parallel, and interdependent paths of activities.

4. Setbacks are frequently encountered during the innovation process These setbacks either signal rejection of the innovation or opportunities for learning through reinvention.

5. Innovation receptiveness, learning, and adoption speed are facilitated when the innovation is initially developed within the user organization, and they are inhibited when end users are provided no opportunity to reinvent (or modify) innovations developed elsewhere. Organization members not involved in the development or reinvention of an innovation tend to view it as an external mandate...[T]he adoption process is facilitated by modifying the innovations to fit the local situations, extensive top management involvement and commitment to the innovation, and the use of various techniques to maintain task completion and momentum.

6. Management cannot ensure innovation success, but can influence its odds. The odds of success increase with experience and learning from past trials at innovation and decrease with the novelty, size, and temporal duration of the innovation venture.

The conclusions of the MIRP researchers clearly establish that innovation development, adoption, and diffusion is a messy process. Focusing specifically on the adoption of innovations, individual studies within the MIRP offer the following helpful suggestions (Van de Ven 1993, pp. 283-287):

1. Modify the innovation to fit the peculiarities of the local setting.

2. Insure active involvement by top management.

3. Develop internal processes to facilitate coordination among disparate groups needing to cooperate.

Van de Ven notes that other MIRP researchers suggest that a breadth strategy is more effective than a depth strategy and that flexibility in applying evaluation criteria is more appropriate than lockstep measures. Summarizing, Van de Ven (1993, p. 285) asserts:

> Be forewarned of the possible consequences of passive acceptance of external dictates by those who strictly follow the letter of the law; they may do so in "bad faith" that may not achieve the results intended... Mere compliance is insufficient...The "not mvented here" syndrome is well known...Adopting agencies or organizations that have not developed any sense of commitment to those innovations may well behave bureaupathically and simply do what the letter of the law requires.

In contrast with the qualitative aspects of the MIRP study, Damanpour (1991) conducted a meta-analysis of the relationship between structure and innovation and reached some of the same conclusions. The results indicated that: (1) organic structures promote innovation by decreasing formalization and centralization, which encourages cross-fertilization, adaptation to changing circumstances, and personal flexibility; (2) long-term managerial tenure offers the necessary leadership confidence to attempt innovation; (3) slack resources provide a cost cushion that allows for experimentation and even failure; and (4) use of task groups and committees facilitates involvement, adoption and diffusion, and long-term commitment. Other studies have highlighted the importance of entrepreneurial behavior within the organization, employee autonomy, and individual champions and sponsors (Howell and Higgms 1990; Kanter 1983). As stated by Peters and Austin (1985, p. 114) "The real world of innovating is serendipitous and passions-filled." Innovation adoption and diffusion requires acute awareness to surroundings, in contrast with the specialized bureaucratic (mechanistic) structures designed for another era.

Bounded Instability

A common theme runs through all the writing on innovation adoption and diffusion-conventional management wisdom that prescribes

stability (as defined by the traditional bureaucracy) as a touchstone for success is not appropriate for today's rapidly changing organizational environment. Rather, there is a need to design organizational structures that encourage ambiguity and stimulate individual actions and organizational learning. Stacy (1992) states that organizations must embrace instability and benefit from its inherent tension and conflict. Stacy refers to this phenomenon as "bounded instability" and contends that successful organizations use bounded instability to provoke innovation. Similarly, Kanter and colleagues (1992, p. 53) state:

> Successful companies...are always a little off balance. Leaders deliberately provoke disequilibrium to challenge people to argue for new ideas and new possibilities. Resources are not permanently assigned to one group or another; each must bargain for them in the marketplace of ideas...Organizations with high rates of innovation make it easier for people to challenge the established allocation of resources and divert them or attract them to their causes.

In summary, organizations must accept disorderly processes and lack of outcome certainty if they wish to design structures that are receptive to innovation adoption and diffusion. They must adopt a new frame for "the correct" organizational structure. That is, if they want to foster innovation, they must adopt the counterconventional notion that bounded instability equals success and stability means failure. In this model, everyone is a learner.

THE NEW ORGANIZATION

In an environment of increasing and unrelenting change, where organizations must continually learn and innovate, "The traditional organizational map describes a world that no longer exists" (Hirschhorn and Gilmore 1992, p. 105). Consequently, researchers are beginning to explore designs that will condone bounded instability and thus change people's mental models of organizations in profound ways. As stated by Mills (1993, p. 69), "Adapting to the modem world means that the now dominant hierarchy will assume a residual role, confined primarily to the top-most reaches of the organization."

These new organizations, still emerging, are referred to as networks, clusters, enterprise groups, or autonomous units. Hierarchy is eschewed as employees work together in new, semipermanent, overlapping arrangements that seek to maximize flexibility and innovations (Charan 1991; Hirschhorn and Gilmore 1992; Limerick and Cunnington 1993; Mills 1993). From a study of 10 companies, Charan (1991, p. 106) reports:

> Unlike most teams and task forces, networks do not merely solve problems that have been defined for them. Networks are dynamic: they take initiative. They become the vehicle to redirect the flows of information and decisions, the uses of power, and the sources of feedback within the hierarchy. They become a new way of doing business and a new operating mechanism for individual managers to make their presence felt.

It is important to emphasize that these new designs are not temporary. They are not simply a quick-response effort to an immediate need (within the conventional bureaucratic and hierarchical structure) that vanishes after completing the assignment. These organizations represent the emergence of a new paradigm.

Three characteristics seem to dominate these new, more flexible, and innovative organizations. First, the workforce is *truly* empowered. Inherent in the empowerment concept is that given the opportunity, employees will initiate entrepreneurial behavior and take personal responsibility for pursuing appropriate directions. This includes negotiating agreements across traditional boundaries and initiating and working in multiple collaborative arrangements at all levels of the organization (Block 1987; Limerick and Cunnington 1993). Second, to strengthen individual initiative, the information technology needed for decisionmaking is available throughout the organization. By creating a new computerization and telecommunication environment, these organizations have forever altered the need for information to be centralized for distribution; individuals can receive unfiltered information. The sharing, however, must exceed the typical definition of data:

> The network must also share openly and simultaneously each member's experiences, successes, and problems, soft information that can't be captured in databases and

> spreadsheets...This is the kind of sharing that builds trust, empathy, and secure relationships. It also broadens the participants (Charan 1991, p. 112).

Third, the focus within the organization is on the improvement of processes that cut across boundaries, not on functions and tasks. This is the essence of the total quality management movement. Over time, this process orientation creates a new social architecture or set of relationships among employees in different areas that is vital to innovation adoption (Hirschhorn and Gilmore 1992; Howard 1992).

Within these new organizations, the role of the manager also changes. Rather than concentrating on control systems, so common in hierarchical structures, managers adopt such unusual workplace roles as facilitator, consultant, and resource integrator or coordinator. While these managers maintain leadership in managing overall direction, they see their primary job as supporting those doing the work; they accept that project authority shifts based on needed expertise. Thus, at times, a manager may serve on a team lead by a subordinate (Hirschhorn and Gilmore 1992).

LEAVING THE PAST

This chapter has briefly explored four interrelated streams of academic exploration: (1) the increasing rate of change and turbulence in organizational environments and the concomitant need for organizational learning; (2) the relationship between organizational environment and organization design; (3) the determinants of innovation development, adoption, and diffusion; and (4) the characteristics of the new organizations. It is contended that if organizations are going to survive and prosper, a new paradigm is needed-one that embraces the notion of bounded instability.

In discussing the new organizations, Mills (1993) notes that the greatest resistance to change comes from managers who fear loss of control. Yet, the problem may go even deeper. A high percentage of senior-level managers in organizations only know the rules of the bureaucratic and hierarchical structure and are most comfortable operating within its parameters, regardless of the mounting evidence on the need to change; it is the model in which they have been successful. Thus, the tendency is to try to fix the model rather than change it.

Moreover, even when the need to change is apparent, in unconscious ways these managers return to the same familiar models. As summarized by Argyris (1985. p. x):

> Key individuals are able to define the characteristics of a rigid organization. They agree they must create a new organization relatively free from those characteristics. They are given the resources to do it, and they succeed in creating what they condemn.

Therefore, the challenge to leaders is to explore existing paradigms regularly and to recognize that potentially better ideas emerge outside current paradigms. As questioning becomes an acceptable norm, newer models will receive a fairer hearing.

NOTES

1. The most often cited model for understanding innovation is the three-step (i.e., idea invention, development, adoption and diffusion) sequential process put forth by Rogers (1962, 1983) and Rogers and Shoemaker (197 1) based on the extensive examination of research studies. While this model IS the bedrock of most continuing studies, its focus is on the individual, not on the organization.

2 . The 14 interdisciplinary teams included hearing health, therapeutic apheresis, naval system development contracts, school site-based management, computer company startups, commercialization of space, nuclear safety standards, Government strategic planning, advanced integrated circuits, hybrid wheat development, corporate mergers and acquisitions, State education reform, multihospital systems, and human resources management.

REFERENCES

Argyris, *C. Strategy, Change and Defensive Routines.* Boston: Pitman Publishing, 1985.

Bennis, W. Unpublished presentation. Western Academy of Management, San Francisco, March 1988.

Bennis, W., and Nanus, B. *Leaders.* New York: Harper and Row, 1985.

Block, P. *The Empowered Manager.* San Francisco: Jossey-Bass, 1987.

Burns, T., and Stalker, G.M. *The Management of Innovation.* London: Tavistock Publications, 196 1.
Charan, R. How networks reshape organizations-for results. *Harv Bus Rev* 69(5):104-116, 1991.
Daft, R.L., and Lengel, R.H. Organization information requirements, media richness, and structural design. *Manag Sci* 32:554-571, 1986.
Damanpour, F. Organizational innovation: A meta-analysis of effects of determinants and moderators. *Acad Manag J* 34:555-590, 1991.
Galbraith, J. *Organization Design.* Reading, MA: Addison-Wesley, 1977.
Garvin, D.A. Building a learning organization. *Harv Bus Rev* 71(4):78-91, 1993.
Hambrick, D.C. The top management team: Key to strategic success. *Calif Manag Rev* 30:1-20, 1987.
Harris, P.R. *Management in Transition.* San Francisco: Jossey-Bass, 1985.
Hirschhorn, L., and Gilmore, T. The new boundaries of the boundaryless company. Han, Bus *Rev* 70(3):104-115, 1992.
Howard, R. The CEO as organizational architect: An interview with Xerox's Paul Allaire. *Harv Bus Rev* 70(5):107-119, 1992.
Howell, J.M., and Higgins, C.A. Champions of change. *Bus Q* 54(4):31-36, 1990.
Kanter, R.M. *The Change Masters. New* York: Simon and Schuster, 1983.
Kanter, R.M.; Stein, B.A.; and Jick, T.D. *The Challenge of Organizational Change. New* York: Free Press, 1992.
Kennedy, P. *Preparing for the 21st Century.* New York: Random House, 1993.
Kiechel, W., III. The organization that learns. *Fortune* March 12, 1990, pp. 133-135.
Lawrence, P.R., and Lorsch, J.W. *Organization and Environment: Managing Differentiation and Integration.* Boston: Harvard Graduate School, 1967.
Limerick, D.C., and Cunnington, B. *Managing the New Organization.* Chatsworth, Australia: Business and Professional Publishing, 1993.
McGill, M.E.; Slocum, J.W., Jr.; and Lei, D. Management practices in learning organizations. *Organ Dyn* 21(2):5-16, 1992.
Mills, D.Q. *Rebirth of the Corporation. New* York: John Wiley and Sons, 1993.
Peters, T., and Austin, N. *A Passion for Excellence. New* York: Random House, 1985.
Roessner, J.D. Incentives to innovate in public and private organizations. In: Perry, J.L., and Kraemer, K.L., eds. *Public Management.* Mountain View, CA: Mayfield Press, 1983.
Rogers, E. *Diffusion and Innovation.* 1st ed. New York: Free Press, 1962.

Rogers, E. *Diffusion and Innovation.* 3d ed. New York: Free Press, 1983.
Rogers, E., and Shoemaker, F. *Communication of Innovation: A Cross-Cultural Perspective. New* York: Free Press, 1971.
Senge, P. Building learning organizations. *J Qual Particip* March:30-38, 1992a.
Senge, P. Mental models. *Planning Review* 20(2):4-10, 44, 1992b.
Shrivastava, P. A typology of organizational learning systems. *J Manag Stud* 20:8-28, 1983
Stacy, R.D. *Managing the Unknowable: Strategic Boundaries Between Order and Chaos in Organizations.* San Francisco: Jossey-Bass, 1992.
Taylor, J.R., and Van Every, E.J. *The Vulnerable Fortress: Bureaucratic Organization and Management in the Information Age.* Toronto, Canada: University of Toronto Press, 1993.
Urwick, L. *The Elements of Administration.* New York: Harper and Row, 1944.
Vaill, P. *Managing As a Performing Art.* San Francisco: Jossey-Bass, 1989.
Van de Ven, A.H. Managing the process of organizational innovation. In: Huber, G.P., and Glick, W.H., eds. *Organizational Change and Redesign.* New York: Oxford University Press, 1993. pp. 269-294.
Van de Ven, A.H., and Poole, M.S. Methods for studying innovation development in the Minnesota innovation research program. *Organ sci* 1(3):3 13-335, 1990.
Ventriss, C., and Luke, J. Organizational learning and public policy: Towards a substantive perspective. *Am Rev Public Admin* 18(4):337-356, 1988.
Weber, M. *The Theory of Social and Economic Organizations.* Edited by T. Parsons. Translated by T.M. Henderson and T. Parsons. New York: Free Press, 1947.
Woodward, J. *Industrial Organizution: Theory and Practice.* Oxford, England: Oxford University Press, 1965.

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Technology Transfer as Collaborative Learning

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INTRODUCTION

The field of technology transfer studies has been traced back to the European beginnings of social science (Rogers 1983). In the United States, a wave of interest and activity began in the 1920s and continued until the 1980s (Backer 1991). After a brief lull, the field has seen a resurgence in the late 1980s and the 1990s (Backer 1991). From the domains of business, government, and academia come uniform calls to develop more creative approaches to the problem of technology transfer (Breuder 1988; Reich 1989).

Although application of the term carries unique interpretations in different domains such as government, business, economic development, and health care, the common definition of technology transfer reflects the transmission of ideas, knowledge, information, and equipment from the developer (often a research laboratory) to the user (marketplace). The implicit model of the process is a source-destination paradigm (Williams and Gibson 1990) or a conduit model of communication with the sender(s) transmitting information from one end and the receiver(s) faithfully receiving it at another (Doheny-Farina 1992; Reddy 1979).

This chapter argues that this information transmission model is inadequate to represent the realities and complexities involved in effective technology transfer, irrespective of the domain of application, and that a fundamental reframing of the understanding of the process needs to occur for technologies to be adopted successfully. This is particularly true of soft (Backer 1991), disembodied (Feeny 1985), or dynamic (Greer 1988) technologies that are prevalent in the arena of drug abuse-technologies that are not equipment based but rather involve techniques, approaches, and methods, or what is commonly referred to as procedural knowledge (Singley and Anderson 1989). A shift in frame needs to take place from the view of technology diffusion as a problem of knowledge and information transmission, or even knowledge utilization, to one of contextual-collaborative knowledge creation through mutual learning.

The rest of the chapter briefly reviews the traditional transmission models of technology transfer, points out the limiting operative assumptions of this predominant information transmission paradigm, proposes a different set of assumptions about the nature of knowledge that provide the rationale for contextual collaborative knowledge creation through mutual learning processes as an alternate model of technology transfer, examines potential barriers to such mutual learning, and concludes by discussing ways of facilitating contextual-collaborative knowledge creation for technology transfer.

TRADITIONAL MODELS OF TECHNOLOGY TRANSFER

While technology transfer is an umbrella term that covers an entire range of activities around development of technologies and their applications to the marketplace, attempts to model the process can be classified into three major approaches: the appropriability model, the dissemination model, and the currently popular knowledge utilization model (Williams and Gibson 1990). A fourth and emergent stream called the communication model (Doheny-Farina 1992; Gibson et al. 1990; Williams and Gibson 1990) is closer to the notion of technology transfer presented in this chapter. However, the image of communication, though definitely a step above the information transmission approaches in capturing the dynamics of transfer, still does not do justice to the complexities of the diffusion process.

The appropriability model follows the logic that good technologies sell themselves. It is really the quality of research and competitive market pressures that promote the use of research findings (Devine et al. 1987). Therefore, purposive transfer mechanisms are unnecessary. Once the researcher develops the right idea and makes the results available through various forms of mediated communication, such as technical reports and professional journals, the customer will automatically show up at the inventor's door. Kozmetsky (1990, p. 23) summarizes the dominant presumption of this approach as viewing technology transfer as "the result of an automatic process that began with scientific research and then moved to development, financing, manufacturing, and marketing. [One] did not necessarily need to be concerned with linkages in the technology commercialization process."

The technology dissemination approach popularized by Rogers (Rogers 1983; Rogers and Kincaid 1981) takes the view that diffusion of

innovations is best facilitated when experts inform potential users of the technology (Williams and Gibson 1990). The situation is one in which an expert transfers specialized knowledge to the user, who is normally a willing receptor. The guiding assumption is that "once the linkages are established, the new technology will flow from the expert to the nonexpert much like water through a pipe once the channel is opened" (Williams and Gibson 1990, p. 15).

The knowledge utilization model is an increasingly popular view of technology transfer reflected in much of the current literature (Szakonyi 1990; Zacchea 1992). The knowledge utilization paradigm represents an evolutionary step that focuses on strategies to put knowledge to effective use in the recipient settings (Backer 1991). According to this model, interpersonal communication between technology researchers and clients plays an important role. Further, it also attempts to identify the organizational barriers or facilitators of technology transfer.

While this model shows an appreciation of the complexities of transfer, it has been argued (Dimancescu and Botkin 1986) that the knowledge utilization model suffers from a linear bias:

> The stated or implicit notion is that basic research moves from researcher to client, in one direction, to become a developed idea and eventually a product. This model reduces the transfer process to chronologically ordered one-way stages, whereas practice shows the process to be interactive and complex (Williams and Gibson 1990, p. 5).

UNPACKING THE OPERATIVE ASSUMPTIONS OF THE TRADITIONAL MODELS

The major argument against the predominant transfer approaches is that they entail a one-way transmission of information, from source to destination or from originator to receiver. Although this is a valid criticism, this chapter posits further that the one-way transmission of information is essentially a manifestation of three interrelated theses about the nature of transferred knowledge that serve as operative assumptions for the technology transfer field. The real challenge iies in reframing these operative assumptions, particularly in relation to soft or disembodied technologies. The authors believe such a cognitive turn is

essential to engage the realities and complexities of the transfer process and adopt a perspective of contextual-collaborative knowledge creation as the heart of effective technology transfer.

The three conjoint operative assumptions about the nature of transferred knowledge are that knowledge is objective. knowledge is universally applicable, and knowledge is complete.

1. Knowledge can be objectively determined and will be objectively consumed: The assumption behind this thesis is that truthfulness of knowledge can be empirically determined. Thus, knowledge that has been empirically determined is objective, has validity, and will be seen as so by others. An example would be when a research finding that high performers are driven by the need to achieve is taken as truth and used to guide action.

2. Knowledge is applicable across contexts: An interrelated postulate is that knowledge that has been objectively determined will apply uniformly across contexts and time. An example would be the belief, based on the aforementioned research, that all people trained in achievement motivation will perform better.

3. Knowledge is complete: The assumption here is that knowledge can be created in its complete form by people who have the expertise. A single individual or group can hold all the requisite knowledge necessary for productive action, and the issue is one of transmission of this knowledge so that nonexperts (users) can put it to productive use. This assumption would be embodied in approaches to the diffusion of technology that involve packaging or instrumenting the technology. Following the above example, this assumption might lead the generators of the knowledge that high performers are driven by the need to achieve to base selection tests, training, and counseling interventions on this "truth." The diffusion of quality circles in the 1980s as a methodology for involving people in making process improvements in organizations is another example. Technology developers packaged steps, structures, training, and role descriptions in products they sold to the users.

The above operating assumptions about the nature of knowledge are well reflected in the appropriability and the diffusion models of transfer. In the first model, the users simply absorb the knowledge or technology, and in the second instance, the absorption of knowledge is facilitated through

instructions by an expert. One can infer that these one-way transmissions of knowledge are guided by the implicit frames of objectivity, universal applicability, and completeness of knowledge.

The knowledge utilization model does contain an element of two-way communication. However, as Doheny-Farina (1992) and Dobrin (1989) argue, the two-way communication is primarily oriented towards maneuvering around the communication barriers between the originator group and the user group. The assumption still is that there is "a body of information, of objective facts, just lying there waiting to be communicated" (Dobrin 1989, p. 60). The underlying tenet is that knowledge is an object that exists independently, is valid, is complete, and has universal applicability. It is the job of the implementers to transfer the knowledge correctly through the appropriate channels. If there are problems with the user group adopting this knowledge, it is because they do not understand. The solution would entail finding better ways of managing those channels to achieve better dissemination or diffusion of knowledge.

If the foregoing assumptions about knowledge (objectivity, universal applicability, and completeness) were true, then the information transmission model would be the most appropriate. Then technology transfer would be a simple process of moving innovations from the source to the receivers. However, this chapter argues that a different set of theses about the nature of knowledge are better able to capture and manage the complexities of technology adoption. This alternate set of assumptions presents a rationale to understand technology transfer as a process of contextual knowledge creation through collaborative learning. The next section will examine this alternate set of assumptions and provide case examples to illustrate how they more accurately address the complexities of the technology transfer process.

AN ALTERNATE SET OF ASSUMPTIONS ABOUT THE NATURE OF KNOWLEDGE

In contrast to the generally accepted views of knowledge, the authors posit that three different assumptions can provide a more relevant set of operating assumptions to comprehend the technology transfer process: knowledge is subjectively constructed, knowledge requires contextual adaptation, and knowledge is incomplete. These are described below.

Knowledge Is Subjectively Constructed and May Be Subjectively Consumed

Knowledge is a belief or set of beliefs about a segment of reality that is socially constructed by a community of knowing (Denzin 1989). It is based on a set of assumptions about the nature of such a segment of reality. Any information or knowledge, irrespective of how well it is empirically determined by an outside authority, may still be subjectively consumed. Each community of knowing (e.g., the development community versus the marketing community) has its distinct interpretive conventions, whether they be a "community of nuclear physicists. cabinet makers, high school classmates, [or a] street comer society" (Brown and Duguid 1991, p. 48). Kuhn (1970) calls this the incommensurability of meaning systems among different communities of knowing.

Fleck's (1979) concept of thought worlds is similar to Kuhn's notion. Thought worlds emphasize the unique interpretive repertoires of different communities of knowing. The interpretive repertoire of each community of knowing is characterized by two distinctive aspects: their fund of knowledge, or what they know; and their systems of meaning, or how they know. What is already known influences the method and content of cognition. A thought world evolves in a community of knowing as an internally shared system of meaning that provides a readiness for directed perception. For example, a fund of knowledge can be primarily conceptual (such as research and development) and acquired through education, training, and laboratory experimentation, or practice based (such as marketing) and acquired through direct interaction with customers.

Ideas cannot be easily shared across thought worlds with different funds of knowledge and systems of meaning. People in different thought worlds will attempt to interpret each other's ideas based on their unique thought worlds. If such interpretation fails, then they may view the other's central issues as esoteric, if not meaningless.

A good illustration of this subjective construction and consumption of knowledge in technology transfer is provided by Dougherty (1992). In a study of transfer processes in 18 new product efforts, Dougherty found that key players from development, manufacturing, and marketing interpreted and understood issues around technology-market linking in qualitatively different ways from one another. The technical (research) group's focus was on establishing the product's performance

specifications. They defined the market in terms of what the product could do, stressing product features. However, when research transferred their technology to marketing, the marketing group looked for what the user wanted to do with the product, and the user needs were unique or constantly changing. Manufacturing people's concern was with reliability, quality, and manufacturability, and they evaluated and defined the product and the market in those terms. They believed that a higher number of product features made it more difficult to establish reliability and quality. When transferred products were very antithetical to what the manufacturing or marketing groups defined as product requirements, the process of transferring and adopting the technology became extremely difficult.

Knowledge May Require Contextual Reconfiguration To Be Adopted in the New Context, Otherwise It Could Be Rejected Outright

For a community of knowing to adopt an idea, information, or knowledge from a different community of knowing, the information or knowledge may have to be reconfigured or adapted to fit in with the recipient community's meaning system. External ideas that may not fit in with one's system of meaning may be rejected outright (Fleck 1979).

Drawing on Giddens' (1979) theory of structuration, Orlikowski and Robey (1991) and Poole and DeSanctis (1992) call this reconfiguration process the phenomenon of appropriation. The theory of structuration essentially argues that human understanding and behavior are contextual. Knowledge, cognition, and behavior in any social system are guided and constrained by the contextual rules and resources resident in the social structures. Actors use these rules to make sense of their own acts and those of other people. The structurational conventions that condition human understanding, behavior, and practices are constituted by three interdependent structures, what Giddens (1979) terms the "modalities of structuration." These interdependent structures are interpretive schemes, norms, and power relationships.

Interpretive schemes are standardized, shared stocks of knowledge and beliefs that actors in a setting draw upon to interpret behavior and events. Norms are the rules governing sanctioned or appropriate conduct. Power enters into human interaction by providing humans the capabilities to accomplish outcomes, and most social systems are marked by an

asymmetry of power distribution. Frequently there is a defined pattern of power relationships within a social system.

Technology, or any external knowledge or information, may be appropriated by a social system within the context of its structurational conventions. The structurational conventions can mediate the appropriation process. If an idea is too antithetical to a system's structurational conventions, then the system could reject it. So the task becomes one of reconfiguring the technology to fit the situational contextual requirements or changing the structurational conventions of the recipient group.

Kelly and colleagues (1993) illustrate how social norms of certain communities stifle the adoption of technologies intended to combat human immunodeficiency virus (HIV) infection. They argue that social and peer norms that favor risk-taking behaviors have come in the way of accepting safe sex practices and technologies. The drive now is to try to create new norms of social responsibility to foster openness to safe sex practices.

A good example of contextual adaptation of received knowledge is illustrated in the global campaign to eradicate smallpox (Joseph et al. 1994), a dreadful disease known to mankind since the 12th century BC. As the result of a 1 O-year effort spearheaded by the smallpox eradication unit instituted by the World Health Organization. the last case of smallpox was detected in Somalia in 1977. However, the technology (in the form of a vaccine) to eradicate smallpox had been in existence for over 177 years. In fact, several earlier attempts to combat the disease failed; "a century and a half of vaccination attempts yielded only modest results" (Fenner et al. 1988, p. 1346). One of the major barriers to the earlier campaigns was that in many countries the indigenous system of medicine held beliefs and advocated practices that interfered with the concept of vaccination.

The earlier programs tried to force the vaccination technology without understanding or acknowledging these local belief systems. However, in the case of the successful campaign, some of the local leaders recognized this problem and made an attempt to present the vaccination technology as complementing the local knowledge and belief systems. For example, in India the folk goddess of smallpox was a deity named Shitala Mata. She was represented as riding on a donkey with a basketful of grain on her head. In one hand she had a pitcher of water and in the other a

broom. The belief was that when she shook her head, the grains that spilled turned into smallpox pustules. The victim survived if she cleaned the spilt grain with water, but did not if she only used the dry broom. To incorporate the vaccination technology within this local meaning system, hundreds of large posters were created where the water in the goddess's hand was replaced by a large syringe containing the vaccine.

In a similar vein, Brown and Duguid (1991) present interesting examples of how repair service technicians effectively appropriated and modified the prescribed and directive repair procedures and knowledge of the company to develop local and often more effective techniques and methods to fix malfunctions. This modified knowledge became part of their community of interpretation.

Bruce and Peyton (1990) argue that such reconfiguration of received knowledge is essential for successful innovation adoption. They posit that the so-called distortion of innovations is in reality adaptation of innovations to suit the local context. These perceived distortions are an integral part of appropriating the technology or fitting it to the situational context of the transfer domain. This might well be a prerequisite for successful adoption of an innovation.

> The prevalence of distortions of innovations is a clue that the conventional model of implementation is inadequate. The "distortions" arise because the innovation is not the only active element. . . . In reality, the innovation is but one small addition to a complex social system. Instead of seeing it as the primary instrument of change, it is better to see it as a bit of raw material that may stimulate the creation of something new (Bruce and Peyton 1990, pp. 172-173).

This leads to a different model for implementation of innovations. In this model, the active agents are not innovations, but the participants in the setting in which the innovation is placed. These participants develop a perception of what the innovation is and then re-create it as they adapt to fit with institutional and physical constraints and with their own goals and practices. What they produce are different realizations of the original innovation (Bruce and Peyton 1990).

Knowledge Is Incomplete (Both Received and Contextual), and Effective Contextual Adaptation May Require a Creative Synthesis of Different Thought Worlds To Produce New Knowledge

Hayek (1945), a Nobel laureate in economics, has argued that the knowledge necessary for productive action rarely resides in any one place, person, or group, but is divided throughout society. The knowledge challenge society faces is how best to tap into and communicate the additional knowledge required for effective action.

This premise implies that effective contextual reconfiguration of knowledge cannot be purely based on the receiver's thought world, since it is as incomplete as the originator's thought world. Knowledge for effective action requires a fusion of distinct knowledge domains. As Dougherty (1992) found, thought worlds can selectively filter information and insights. Because of different funds of knowledge, a certain thought world is likely to best understand certain issues but ignore information that is equally essential to the total task. Relying on such partial knowledge may result in ineffectual contextual adaptation.

One kind of ineffectual contextual adaptation is described by Poole and DeSanctis (1992) in their notion of ironic appropriation. In their study of adoption of computer technology by users, they found two types of appropriation patterns. Faithful appropriation occurred when the technology was adapted to the local requirements and was still consistent with the spirit of the technology, defined as the designer's intention behind the technology. An ironic appropriation involved use of a technology that was inconsistent with or violated the spirit of the technology. They clarify the faithful-ironic distinction: "Ironic use of a GDSS [Group Decision Support System] does not include using it in creative ways different from those envisioned by the developer. It means using the system in a way that violates or negates its spirit" (Poole and DeSanctis 1992, p. 10).

Orlikowski (1991) provides a good illustration of such ironic appropriation. This example describes a company that had implemented new information technology aids designed by the developers with the intention of enhancing productivity, delegating and enriching work at lower levels of the organization by providing users with the requisite knowledge to carry out more complex work, and facilitating better communication among levels of the organization. However, in actuality

the information system was used for electronic surveillance and constant monitoring of employees by the managers. This ironic appropriation resulted in producing the opposite effects of what was intended with the introduction of the technology: lower productivity, less communication, lower morale, and tighter controls. The managers were left wondering what went wrong and blamed the systems development department for giving them a technology that did not work.

Dougherty (1992) attests to the fact that effective contextual adaptation was best achieved when there was a creative synthesis of distinct knowledge domains. Successful product transfers involved a fusion of the conceptual knowledge of the development group and the practice-based knowledge of the marketing group. The various actors established collaborative mechanisms that took into account their unique interpretive dynamics-their distinct thought worlds-and interactions at this core level of understanding made possible joining of their knowledge domains to produce new insights and new facts. Successful technology transfer required the creation of new knowledge through collaboration and mutual learning.

THE PROBLEM WITH SOFT TECHNOLOGIES

The subjectivity of knowledge, the need for contextual adaptation, and dialoging at the level of values, assumptions, and beliefs takes on more acute proportions with soft or disembodied technologies. Soft technologies such as procedures or systems can be conceived of as social practices that may reflect a specific system's structurational conventions about how to organize, work, or manage people. They are more abstract than hard technologies, and the developer's contextual assumptions behind the nature of the technology have to be explicated and their relevance examined in light of the contextual background of the recipient. This combined approach may result in creative approaches to contextualize the technology productively.

Hofstede (1980) extends an interesting example of how attempts to transfer management by objectives (MBO) to some other countries failed miserably. Hofstede argues that MBO presupposes that subordinates are sufficiently independent to negotiate meaningfully with their boss and that performance is seen as important by both.

When MBO was first introduced in France in the 1960s, people expected that this new technique would result in the long overdue improvements in productivity. However, by 1970 MBO was severely discredited in France The reason. argues Hofstede, is that the French culture encourages dependency relationships among superiors and subordinates. The traditional hierarchical structure protects against anxiety, while MBO generates anxiety.

As Hofstede (1980, p. 55) elucidates:

> The reason for the anxiety in the French cultural context is that MBO presupposes a depersonalized authority in the form of internalized objectives; but French people, from their early childhood onward, are accustomed to large power distances, to an authority that is highly personalized. And in spite of all attempts to introduce Anglo-Saxon management methods. French superiors do not easily decentralize and do not stop short-circuiting intermediate hierarchical levels. nor do French subordinates expect them to.

TECHNOLOGY TRANSFER AS CONTEXTUAL-COLLABORATIVE KNOWLEDGE CREATION

These alternate sets of assumptions about the nature of knowledge provide a different view of technology transfer-that it entails the creation of new knowledge. If innovations have to be adopted successfully, then knowledge has to be contextually adapted: "Technology transfer demands the shaping of the technology to fit the detail of the different system which comprises the new context... contextual mapping to use the jargon of morphological analysts" (Bradbury 1978, p. 112). Effective contextual shaping is best achieved by a fusion of thought worlds that makes possible new knowledge, new insights, and new facts through creative joint learning.

Viewed from this angle, technology transfer involves more than information transmission or knowledge utilization. An evolutionary move beyond the emergent communication images of technology transfer to a learning notion is implied, since successful transfer and adoption requires the creation of new knowledge. Webster's "Seventh New Collegiate Dictionary" defines the verb communicate as "to impart; to air;

to make known," while the verb to learn is "to understand, to discern, to acquire knowledge or skill." While communication is an essential aspect of learning, it cannot replace learning. Learning is more than a message exchange process; it is the act of dialoging at the level of interpretive dynamics, the task of opening up one's preconceptions, assumptions, and meaning systems to oneself and to others (Habermas 1981).

In sum, collaborative learning requires a process of mutual "perspective taking" in which distinctive individual knowledge, meanings, assumptions, and beliefs are exchanged, evaluated, and integrated with those of others (Duncan and Weiss 1979; Shrivastava 1983). Much of social behavior is predicated upon the assumptions an actor makes about the knowledge. beliefs, and motives of others. The knowing of what others know is a necessary component for coordinated action to take place. As Brown (1981) observes, understanding another requires that the point of view of the other be realistically imagined. The fundamental importance of taking the other's point of view into account is seen in Mead (1934), who referred to it as taking the attitude of the other and equated one's ability to be fully human with the ability to maintain an inner conversation with a generalized other. This is the essence of the process of perspective taking (Bakthin 1981; Clark 1985; Krauss and Fussell 1991).

Barriers to Perspective Taking

Mutual perspective taking of each other's knowledge and background is fundamental for collaborative learning. However, it is a complex process and can frequently break down. There are two principal and interrelated barriers to mutual perspective taking. First, knowledge and meaning systems of a community of knowing are often tacit and taken for granted. Second, because such knowledge and meaning systems are tacit, and one's interpretative procedures are so automatic, most people assume that the rest of the world's perspectives are more similar to one's own than they actually are.

Know/edge as Tacit and Taken for Granted. At least part of the knowledge, beliefs, meaning systems, and norms that form the structurational or interpretive conventions of any group or community of knowing are tacit in nature. In other words, understanding and interpretation of events in any group or community involve a great deal of knowledge that is not explicit and cannot be stated explicitly. Such knowledge is framed

and embedded in communal conventions and practices that actors invoke automatically in their conduct of daily life (Brown and Duguid 1991).

As Giddens (1979) elaborates, there are at least two levels of consciousness in any social system: discursive consciousness that involves knowledge that actors are able to express at the level of discourse, and practical consciousness that involves tacit stocks of knowledge that actors are normally not able to formulate discursively, but draw upon in the constitution of social conduct

Collins (1983) also notes the hidden nature of such processes, and argues that many times it is only when the rules go wrong that a community of knowing examines the nature of their interpretation. "Otherwise, our giving of meaning to objects-out interpretative practices are [sic] so automatic that we do not notice that any interpretation is involved" (Collins 1983, p. 90).

False Assumption That Others' Knowledge and Meaning Systems Are More Similar to One's Own than They Actually Are. Since a group's knowledge and meaning systems can operate outside the bounds of day-to-day consciousness, there is a tendency to automatically assume that others' world views are more similar to one's own than they actually are. Fleck (1979) calls this the inherent tenacity of thought worlds to focus on their own perspectives.

The false-consensus effect, in which subjects assume that others are more similar to themselves than is actually the case (Ross et al. 1974), is a form of bias particularly relevant to the perspective-taking process. Steedman and Johnson-Laird (1980, p. 129 *j* propose that "the speaker assumes the hearer knows everything that the speaker knows about the world and about the conversation. unless there is some evidence to the contrary." This assumption should lead to overestimates of the extent to which a speaker's knowledge is shared by others.

Denzin (1989, p. 11) elucidates how this false-consensus effect can come in the way of designing effective social programs:

> In social life there is only interpretation. That is everyday life revolves around persons interpreting and making judgments about their own and others' behavior and experiences. Many times these interpretations and judgments are based on faulty, or incorrect understandings.

> Persons for instance mistake their own experiences for the experience of others. These interpretations are then formulated into social programs that are intended to alter and shape the lives of troubled people. But often the understandings that these programs are based on bear little relationship to the meanings, interpretation, and experiences of the persons they are intended to serve. As a consequence there is a gap or failure in understanding. The programs don't work because they are based on a failure to take the perspective and attitude of the person served.

Facilitating the Perspective-Taking Process as Mutual Learning

Perspective taking cannot be fully facilitated by normal structures of integration. As Dougherty (1992) experienced, the traditional integrative mechanisms such as project teams and matrices- structures that are often recommended for innovation and technology transfer (Tushman and Nadler 1986)—did not achieve the mutual exchange of perspectives. Rational tools and processes, the infusion of market research information, and the redesign of organizational reporting structures, while important, were not enough to manage the transfer process.

These traditional measures were not sufficient because they did not deal with issues of interpretation; they did not provide for the opening of one's preconceptions, assumptions, and meaning systems to oneself and to others (Habermas 1981). Becoming aware of tacit consciousness requires self-reflexivity on the part of the actors. In Schutz's (1964) terms, reflexivity is the ability to suspend natural attitude periodically. Interpretations normally given in a matter-of-course, natural way should be suspended so that one will be able to notice the assumptions, beliefs, and meanings that are the basis of one's knowledge. Perspective taking best happens when individuals interact with each other at the level of interpretive dynamics.

Facilitating perspective taking requires interpretive spaces for mutual learning and joint meaning making. According to Denzin (1989), the act of interpreting creates the conditions for understanding. Thus, interpretive spaces are interactional mechanisms that create the conditions for understanding by intervening at the level of knowledge structures,

interpretive schemes, or thought worlds; bringing them to conscious awareness; and facilitating their exchange in a process of mutual dialog.

Surfacing interpretive schemes enables the explication of hitherto tacit knowledge (Polanyi 1967) and extends a space for deeper self-reflection of one's interpretations. The process can be evocative, since it can reveal an individual's cause-and-effect logic. This in turn forces the individual to confront the reasonableness and validity of tacit cause-and-effect understandings. Comprehensive understandings of a situation can be best developed by makmg it possible for indrviduals to portray their original understandings of a situation, self-reflect. reexamine these displays in the process of exchange with others, and come away from these reexaminations with different interpretations and perspectives of what they might mean (Weick 1990).

This need can be abstractly described, but the issue of practice is to concretize it and make it actionable. The technologies for perspective taking are just beginning to evolve. Three such approaches, discussed below, support interpretive processes and collaborative learning. The different approaches, though rooted in different disciplines (information and decision sciences, organizational development, and sociology), are in their own right interpretive spaces and mechanisms aimed at creating conditions for understanding through mutual perspective taking between disparate thought worlds.

Spider. Spider is a computer-aided interpretive environment for people to portray in a structured way their interpretations and causal understandings of a situation, reflect on these interpretations, and share their interpretations with others in dialog (Boland et al. 1994; Tenkasi et al. 1993).

Cognitive maps are one of the central elements in Spider that enable the surfacing of tacit assumptions and knowledge. Also called cause maps, belief nets, and influence diagrams, cognitive maps reveal the causal logic behind a person's view of a situation. The effectiveness of the cognitive mapping model to elicit tacit knowledge has been well documented. According to Weick and Bougon (1986), a cognitive map provides an occasion to think carefully, deeply, and deliberately about a situation, and the knowledge in such a cause map gives knowledge about an organization.

Spider enables each actor to build a cognitive map of the factors that influence his or her sphere of concern, and each factor in the map in turn is linked to other maps, spreadsheets, descriptive notes, or graphs for revealing underlying assumptions. The multiple forms of representing one's understanding enable an actor to build a multilayered and rich depiction of a complex understanding. Individuals can mail their understandings to other actors who are system users, who in turn can contribute their own understandings in a mutually interactive learning process.

Early experiments with Spider with a group of product planners have shown that this computerized interpretive medium has been a source of new understanding for the managers involved. The intellectual effort and careful self-examination required to interactively construct a cognitive map, and the process of exchanging understandings and comparing their own assumptions, beliefs, and causal logics behind a situation vis-a-vis others, have led to significant new leamings and collaborative approaches (Boland et al. 1994).

Search Conferencing. An organization development approach popularized by Weisbord (1987, p. 285), search conferencing is a powerful method to "excite, engage, produce new insights, and build a sense of common values and purpose." It is an exercise in learning, awareness, understanding, and mutual support.

Frequently in a search conference, all parties who are stakeholders to a decision are brought together. Next the group conducts a series of activities to examine their past and present, with a specific emphasis on laying bare their understandings, assumptions, beliefs, and meanings to themselves and one another. Participants use different devices, such as stories, pictures, and skits, to help them explicate their tacit understanding to oneself and to others. The group looks at this information, interprets what it finds, and draws conclusions for action for the future. Successful search conferences always uncover shared values, new possibilities, and congruent action plans for the future.

Interpretive Interactionism. Grounded in sociological theory, interpretive interactionism (Denzin 1989) is an approach to social research that strives to clarify meanings. By producing meaningful descriptions and interpretations of social processes from the subjective point of view of different actors, interpretive interactionism attempts to create conditions of understanding and "translate what is said in one

language into the meanings and codes of another language" (Denzin 1989, p. 32). It is a mode of research that can expose and reveal the assumptions that support competing definitions of a problem.

The interpretive researcher uses naturalistic inquiry methods, such as case studies and biographical approaches, to identify different definitions of a problem and competing models of truth that may operate in an interactional setting. Armed with this rich data, the researcher then facilitates the process of mutual perspective taking and collaborative learning among the different parties.

CONCLUSION

This chapter argues for a fundamental reorientation of the current understanding of technology transfer. This shift is based on a different set of assumptions about the nature of knowledge: (1) knowledge is subjectively constructed and consumed. (2) knowledge may require contextual modification to be adopted in the new context, and (3) effective contextual adaptation may warrant a creative synthesis of different thought worlds to produce new knowledge. This shift implies a move away from the traditional information transmission approaches to understanding technology transfer as one of collaborative learning through a process of perspective taking

REFERENCES

Backer, T.E. *Drug Abuse Technology Transfer.* Rockville, MD: National Institute on Drug Abuse, 1991.

Bakthin, M.M. Discourse in the novel. In: Holquis, M., ed. *The Dialogic Imagination.* Austin, TX: University of Texas Press, 1981.

Boland, R.J.; Tenkasi, R.V.: and Te'eni, D. Designing information technology to support distributed cognition. *Organ Sci* 5(3):456-475, 1994"

Bradbury. F. Technology transfer. In: Bradbury, F.; Jervis, P.; Johnston, R.: and Pearson, A., eds. *Transfer Processes in Technical Change.* Netherlands: Sijthoff and Noordhoff, 1978.

Breuder, R.L. Technology transfer and training. *AACJC J* October-November:30-33, 1988.

Brown, R. Social *Psychology. New* York: Free Press, 1981.

Brown, J.S., and Duguid, P. Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation. *Organ Sci* 2(1):40-57, 1991.

Bruce, B., and Peyton, K.J. A new writing environment and an old culture: A situated evaluation of computer networking to teach writing. *Interact Learn Environ J* 1(3):171-191, 1990.

Clark, H. Language use and language users. In: Lindzey, G., and Aronson. E., eds. *Handbook of Social Psychology. New* York: Random House, 1985.

Collins, H.M. An empirical relativist programme in the sociology of scientific knowledge. In: Knorr-Cetina, K.D., and Mulkay, M., eds. *Science Observed.* London: Sage Publications, 1983.

Denzin, N.K. *Interpretive Interactionism.* Newbury Park, CA: Sage Publications, 1989.

Devine, M.D.; James, T.E.; and Adams, I.T. Government supported industry-research centers: Issues for successful technology transfer. *J Technol Transf* 12(1):27-28, 1987.

Dimancescu, D., and Botkin, J. *The New Alliance: America's R&D Consortia.* Cambridge, MA: Ballinger Publishing, 1986.

Dobrin, D. *Writing and Technique.* Urbana, IL: National Council of Teachers of English, 1989.

Doheny-Farina, *S. Rhetoric, Innovation, Technology.* Cambridge, MA: MIT Press, 1992.

Dougherty, D. Interpretive barriers to successful product innovation in large firms. *Organ Sci* 3:179-202, 1992.

Duncan, R., and Weiss, A. Organizational learning: Implications for organization design. In: Cummings, L.L., and Staw, B.M., eds. *Research in Organizational Behavior.* Vol. 1. Greenwich, CT: JAI Press, 1979.

Feeny, D. Neglected issues in the diffusion of health care technologies. *Int J Technol Assess Health Care* 1:681-692, 1985.

Fenner, F.; Henderson, D.A.; Arita, I.; Jezek, J.; and Ladnyi, I.D. *Smallpox and Its Eradication.* Geneva: World Health Organization, 1988.

Fleck, L. *Genesis and Development of a Scientific Fact.* Translated by F. Bradley and T. Trenn and edited by T. Trenn and R.K. Merton. Chicago: University of Chicago Press, 1979.

Gibson, D.V.; Rogers, E.; and Wohlert, K. "A Communication-Based Model of Technology Transfer." Paper presented at the International Communication Association Meeting, Dublin, Ireland, June 1990.

Giddens, A. *Central Problems in Social Theory.* London: MacMillan, 1979.

Greer. A.L. The state of the art versus the state of the science: The diffusion of new medical technologies into practice. *Int J Technol Assess Health Care* 4:5-26, *1988.*

Habermas, J. *The Theory of Communicative Action.* Boston: Beacon Press, 1981.

Hayek, F.A. Use of knowledge in society. *Am Econ Rev* September, 1945.

Hofstede, G. Motivation, leadership and organization: Do American theories apply abroad? Organ Dyn 9(1):42-63, 1980.

Joseph. T.; Tenkasi, R.V.: and Cooperrider. D.L. Local-universal knowledge nexus in global organizing: An example from the eradication of smallpox. In: Alkhafaji. A.. ed. *Business Research Year Book: Global Business Perspectives.* Vol. 1. Lanham, MD: University of America Press, 1994.

Kelly, J.A.; Murphy, D.; Sikkema, K.J.: and Kalichman, S.C. Psychological interventions to prevent HIV infections are urgently needed. *Am Psychol* 48(10):1023-1034, 1993.

Kozmetsky, G. The coming economy. In: Williams, F., and Gibson, D.V., eds. *Technology Transfer: A Communication Perspective.* Newbury Park, CA: Sage Publications, 1990.

Krauss, R.M., and Fussell, S.R. Perspective-taking in communication representation of others' knowledge in reference. *Soc Cogn* 9(1):2-24, 1991.

Kuhn, T.S. *The Structure of Scientific Revolutions.* 2d ed. Chicago: University of Chicago Press, 1970.

Mead, G.H. *Mind, Self and Society.* Chicago: University of Chicago Press, 1934.

Orlikowski, W.J. Integrated information environment or matrix of control? The contradictory implications of information technology. *Account Manag Inf Technol* 1:9-42, 1991.

Orlikowski, W.J., and Robey, D. Information technology as the structuring of organizations. *Inf Syst Res* 2:134-169, 1991.

Polanyi, M. *The Tacit Dimension.* Garden City, NJ: Doubleday, 1967.

Poole, M.S., and DeSanctis, G. Microlevel structuration in computer-supported group decision making. *J Hum Commun Res* 91(1):5-49, 1992.

Reddy, M.J. The conduit metaphor. In: Ortony, A., ed. *Metaphor and Thought.* Cambridge: Cambridge University Press, 1979.

Reich, R.B. The quiet path to technological preeminence. *Sci Am* 261(4):41-47, 1989.

Rogers, E.M. *Diffusion of Innovations. New* York: Free Press, 1983.

Rogers, E.M.. and Kincaid, D.L. *Communication Networks: A New Paradigm for Research. New* York: Free Press, 1981.

Ross, L.; Green, D.; and House, P. The false consensus phenomenon: An attributional bias in self-perception and social perception processes. *J Exp Soc Psychol* 13:279-301, 1974.

Schutz, A. *Studies in Social Theory.* The Hague, Netherlands: Martinus Nijhoff, 1964.

Shrivastava, P. A typology of organizational learning systems. *J Manag Stud* 20(1):9-25, 1983.

Singley, M.K., and Anderson, J.R. *The Transfer of Cognitive Skill.* Cambridge. MA: Harvard University Press, 1989.

Steedman. M.J., and Johnson-Laird, P.N. The productions of sentences, utterances and speech acts: Have computers anything to say? In: Butterworth, B., ed. *Language Productions: Speech and Talk.* London: Academic Press, 1980.

Szakonyi, R. 101 tips for managing R&D more effectively. *Res Technol Manag* 33(4):31-36, 1990.

Tenkasi, R.V.; Boland, R.J.; and Purser, R. Raising awareness of interpretive processes in knowledge work: Spider, a computer based hyper-environment for "thinking about thinking." In: Sumanth, D.J.; Edosomwan, J.A.; Sink, D.S.; and Poupart, R., eds. *Productivity and* Quality *Management Frontiers- IV.* Norcross, GA: Industrial Engineering and Management Press, Institute of Industrial Engineers, 1993. pp. 53-63.

Tushman, M.L., and Nadler, D.A. Organizing for innovation. *Calif Manag Rev* 38:74-92, 1986.

Weick, K.E. Cognitive processes in organizations. In: Cummings, L.L., and Staw, B.M., eds. *Information and Cognition in Organizations.* Greenwich, CT: JAI Press, 1990. pp. 287-320.

Weick, K.E., and Bougon, M.K. Organizations as cognitive maps: Charting ways to success and failure. In: Sims, H., and Goia, D., eds. *The Thinking Organization.* San Francisco: Jossey-Bass, 1986.

Weisbord, M. *Productive Workplaces.* San Francisco: Jossey-Bass, 1987.

Williams, F., and Gibson, D.V. *Technology Transfer: A Communication Perspective.* Newbury Park, CA: Sage Publications, 1990.

Zacchea, N. Technology transfer: From financial to performance auditing. *Manag Audit J* 7(1):17-23, 1992.

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Reducing Impediments to Technology Transfer in Drug Abuse Programming

Barry S. Brown

INTRODUCTION

Few activities in the drug abuse field excite as much concern and are as little undertaken as the transfer of research findings into clinical practice. It is a concern that information regarding the refinement of treatment and prevention strategies, obtained after years of costly study, is not finding its way to those responsible for developing and administering drug abuse treatment and prevention programs or, worse yet, that new models of service delivery have been created, tested, and found efficacious only to be interred on the shelves of academia or in the files of remote Federal agencies.

Such concerns likely exaggerate that which research has to offer the service delivery community and minimize the extent to which agencies with inadequate budgets are, in fact, invested in technology transfer efforts. Nonetheless, those concerns speak to the gulf seen as existing between service providers and members of the research community-a gulf dramatically widened by congressional action effecting a bureaucratic divorce between agencies responsible for substance abuse research and agencies responsible for providing support and technical assistance to staffs engaged in substance abuse treatment and prevention. Congress' dissolution of the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) has removed technical assistance from a base in research and removed research from a base in service provider issues. Fortunately, drug abuse agencies have taken some steps to repair the damage brought by that legislation. The newly created Substance Abuse and Mental Health Services Administration (SAMHSA) has made frequent use of research consultants to clarify findings on different aspects of service delivery, and the National Institute on Drug Abuse (NIDA) has called upon service providers to contribute their thinking to aspects of the NIDA research agenda. Nonetheless, the congressional action to sever research from services, without requiring any

collaboration, amplifies the dilemma confronting advocates of research utilization in the drug abuse field.

This chapter will address the issues for research utilization that have been described in the literature and speak to their application to the field of drug abuse service delivery. In addition, it will explore issues not addressed in the literature that are peculiar to the drug abuse field. The chapter also will describe an effective research utihzation model recently and successfully implemented by NIDA and will suggest strategies for the support of technology transfer efforts that would entail modest changes in NIDA's current functionmg.

ISSUES IN RESEARCH UTILIZATION

A number of factors have been cited for their influence on research utilization. Focus will be placed on the six factors that seem to emerge most frequently in journal discussions of technology transfer. Each of these will be addressed for its significance to research utilization by the service delivery community.

Relevance

The acceptance of a novel intervention by a treatment or prevention program depends largely on the extent to which that intervention is viewed as appropriate to the mission and perceived needs of the program (Averch 1975; Banta and Bauman 1976; Cox 1977; DiMaggio and Useem 1979; Glaser et al. 1983; Leviton and Hughes 1981; Nielsen 1975; Williams and Wysong 1975). A program that views relapse as inevitable may see its mission as making reentry into treatment a viable alternative to reinvestment in addict behaviors and thereby have little interest in a new aftercare model. By the same token, a program concerned about its high dropout rate may have great interest in an early retention initiative.

A number of authors (Backer 1991; Boyer and Langbein 1991; Carter 1971; Dawson and D' Amico 1985; Glaser and Taylor 1973; Lobosco and Newman 1992) have emphasized the utility of involving research consumers, or stakeholders, in planning and conducting studies. They argue that consumers achieve a level of ownership of the research findings likely to be reflected in a greater interest in transferring research findings to service initiatives. Leitko and Peterson (1982) also point out

that staff involvement may either increase a study's validity by increasing respondents' willingness to provide accurate information or reduce validity by reducing objectivity of respondents or by making use of inappropriately trained data collection staff.

Others (Brown 1987; Patton et al. 1977) have suggested developing a process to transmit clinical concerns and issues to program research staff or staff of Federal agencies responsible for setting and funding the research agenda. Indeed, NIDA has solicited input from representatives of the service delivery community in developing its strategic research plans in clinical areas. The need for routine assessment of field concerns, and feedback on the ways in which those concerns are incorporated in program or agency planning, is essential on two counts. First, assessment and followthrough on ideas from the field can lead to greater utilization of research findings in accord with the joint ownership of both problem and resolution that action implies. Second, such a process guarantees that the research conducted is responsive to the concerns of the treatment and prevention communities rather than to the interests of those more remote from the field.

Any such effort to assess the research needs of the treatment community must make use of a representative sample of treatment programs. All too often reliance is placed on the opinions and suggestions of a core of prestigious or politically prominent program or organization officials whose thinking, while important, may or may not represent the thinking of the larger service delivery community. Often, for example, those influential programs are university affiliated and supported through grant funding. They are thereby rich in terms of dollars and personnel relative to the broad array of service delivery programs. Their research concerns likely will reflect their advantaged status and may involve, for example, an understanding of the efficacy of interventions to be provided through staffing patterns available only to a few programs. While those research issues should be heard and considered, other programs whose research concerns may involve strategies for recruiting, training, and retaining effective paraprofessional staff, also should be heard and addressed.

Timeliness

To exert maximum influence, research findings need to be received in time to impact the planning or decisionmaking process (Banta ana Bauman 1976; Boyer and Langbein 1991; Falcone and Jaeger 1976; Florio et al. 1979; Guba 1975; Leviton and Hughes 1981; Siegel and

Tuckel 1985; Weiss 1973). In the drug abuse field, timeliness is a particularly significant and sometimes thorny issue. Currently, most public funds to support treatment and research activities are processed through the State (e.g., Federal block grant dollars) or come from the State's own tax revenues. In either event, it is the State that makes funds available to support new initiatives. More particularly. the drug authority in each State typically has responsibility for constructing State budgets and plans regarding drug abuse and for dispensing and overseeing all funds available to the State for drug abuse services. [In some instances, that responsibility is passed on to local administrators.) Consequently, to impact funding decisions, new initiatives are best proposed coincident with the State budget preparation cycle, typically a year or more before expected implementation. To make matters still more difficult, the States operate on different funding and budget preparation cycles. These cycles must be considered in planning a research utilization strategy.

Perhaps a larger issue with regard to timeliness is the time that elapses between the identification of a problem and the development and testing of an effective response to that problem. Research is necessarily reactive. It is a response to an identified problem. Consequently, it always runs late. Moreover, research is a deliberative process from the point of approval of a study for funding, if public dollars are sought, to the time of journal publication, if that stamp of acceptability is sought. Under the best of circumstances, an identified problem will have run a significant part of its course before research findings can clarify an effective response. To respond to this situation, at least in some part, NIDA has organized both a research newsletter-"NIDA Notes"-and technology transfer conferences. Both initiatives disseminate research findings that may be awaiting publication. Findings are couched in a language and format intended to make them accessible to a service delivery audience.

Clarity

Using a language and format that make findings accessible is significant in any field in which technology transfer is sought (Argarwala-Rogers 1977; Boyer and Langbein 1991: Glaser and Taylor 1973; Leviton and Hughes 1981: Siegel and Tuckel 1985: Smith 1988; Windle and Bates 1974), but it may be particularly significant to the field of drug abuse (Brown 1987). The common channel for sharing research findings is the research literature, that is, scientific journals. However, in fields such as mental health, journals are infrequently read by professionals (Sorensen and Guydish 1991). Journals probably are read even less frequently by

staff of drug abuse programs. In one study of technology transfer initiatives targeted to drug abuse treatment programs, no programs adopted an intervention available only in the research literature (Hall et al. 1988; Sorensen et al. 1988).

Two characteristics of drug abuse programming are worth noting here. First, drug abuse programming-particularly drug abuse treatment programming-has a long history of reliance on paraprofessional treatment staff. It is likely that the field of drug abuse employs more graduates of its own programs than any human service program other than education. In a few instances, those graduates have risen to become program directors. More commonly, they are key program staff in the delivery of treatment services. Their pathway to employment and to promotion typically has been through experience. They are unlikely to make significant use of the professional literature.

Second, reliance on paraprofessionals mirrors the reliance placed on experience in the drug abuse field generally. When the drug abuse treatment field came into being a little more than 20 years ago, there was little in the way of a collected body of wisdom. The first methadone maintenance program was less than 10 years old, the first therapeutic community less than 15. The field was immersed in the process of inventing itself. National conferences were organized, first as national methadone conferences, then as national drug abuse conferences to which all drug abuse workers were invited and at which papers based on experience vied successfully with papers based on empirical research. Arguably, some of the early feeling that if "you walk the walk, you can talk the talk" still remains in the drug abuse field.

Thus, research journals are not readily accessible, either physically or psychologically, to drug abuse treatment staffs. Nor would they be the best medium of exchange if they were physically present.

A number of authors (Backer 1991; Boyer and Langbein 1991; Glaser et al. 1983; Sorensen and Guydish 1991) argue for the importance of interpersonal contact to encourage technology transfer, and several studies support this position (Fairweather 1980; Fairweather et al. 1974; Hall et al. 1988; Sorensen et al. 1988; Stevens and Tomatzky 1980). The studies by Hall and colleagues are perhaps the most instructive because they were targeted to drug abuse treatment personnel. Hall and colleagues (1988) report adoption rates for an innovative treatment intervention to be 28 percent for programs receiving training at the

program site, 19 percent for programs involved in sending single individuals to training workshops, 4 percent for programs receiving only printed materials (i.e., manuals), and 0 percent for programs for which materials were available only in the research literature. Adoption rates for some, but not all, elements of the intervention were 3 1 percent for the site visit, 26 percent for the workshop, 6 percent for printed material, and 0 percent for research literature. Differences in adoption rates for programs receiving a site visit or workshop were not significant, but the adoption rates for these two methods were significantly greater than the rates for programs receiving only printed materials or research literature.

Credibility

To make an impact on a program, the research findings must be credible both in terms of the message and the message-giver (Braskamp et al. 1982). Several studies emphasize that research methodology must be able to withstand inspection and critique (Boyer and Langbein 1991; Chelimsky 1987; Patton et al. 1977; Siegel and Tuckel 1985). For example, Lobosco and Newman (1992) report that quantitative data has more influence on educators than qualitative data. The researcher, too, must be viewed as credible and objective (Boyer and Langbein 1991; Patton et al. 1977).

By the same token, the advocacy of research findings and program change by figures influential to program staff can increase the credibility of findings and the value placed on program change (Boyer and Langbein 1991). Indeed, Sorensen and Guydish (1991) suggest that professional societies as well as State and national organizations should assess the evidence for the efficacy of drug abuse treatment interventions. These assessments would place the weight of independent expertise behind both the research and the intervention.

Replicability

The intervention studied and found efficacious in one setting must be viewed as replicable in other settings. Replicability is dependent on the availability of the necessary financial and human resources (Backer 1991; Glaser and Smith 1971; Glaser et al. 1983; Leviton and Hughes 1981). Innovation that demands funds or personnel which exceed program resources is likely to be ignored.

In addition, the perceived ability to replicate an intervention depends on the extent to which the study population and setting appear comparable to those of the proposed transfer site. Thus, one objective of technology transfer efforts is to demonstrate comparability to assure program staff of the feasibility of adopting novel strategies.

Acceptability

Even when an initiative is relevant, timely, credible, and replicable, program staff must be psychologically ready to accept the new initiative and the programmatic change it will entail. New initiatives can be threatening to established organizations and their staffs (Davis and Salasin 1977; Leviton and Hughes 1981; Siegel and Tuckel 1985; Weiss 1973). Siegel and Tuckel(1985) emphasize that an entrenched organization can have an investment in maintaining the status quo. In general, they argue, incremental change is likely to meet less resistance than the effort to impose more sweeping change.

Moreover, the introduction of new initiatives may be seen as questioning the contributions and competencies of a service delivery staff who have viewed themselves, and have been viewed by others, as capable and productive. At a minimum, the introduction of new initiatives will demand new learning and the development of additional work skills. This may engender resistance in some and stimulate anxiety in many. Those engaged in research utilization efforts should train staff in the needed skills while reassuring them about their job performance.

RESEARCH UTILIZATION OF NIDA'S OUTREACH/INTERVENTION INITIATIVE

In 1987, NIDA began two major initiatives designed to slow the spread of human immunodeficiency virus (HIV) infection among injecting drug users (IDUs). One was directed toward the treatment community and involved support for projects investigating the efficacy of strategies intended to make treatment more effective. The second went beyond the boundaries of traditional treatment settings to explore the efficacy of outreach/intervention strategies undertaken in the community and designed to reduce risk-taking behaviors by IDUs who would not, or could not, access treatment.

The latter initiative represented a sharp break with traditional treatment and prevention programs. Consequently, to maintain funding beyond the scheduled terminations of these demonstration programs, NIDA needed to work closely with potential funding sources to ensure the continuation of promising outreach/intervention projects. To this end, NIDA formed a partnership with the National Association of State Alcohol and Drug Abuse Directors (NASADAD) and established a committee containing the directors of the State drug abuse authorities whose programs were slated for the earliest termination NIDA coordinated its effort with the Center for Substance Abuse Treatment (CSAT).

NIDA shared findings regarding its outreach/intervention initiative with the drug abuse policymaking and planning communities through a newsletter developed to report findings briefly and in a language free of research jargon. The newsletter was delivered at no cost to all organizations, State and Federal agencies, and officials interested in the relationship between drug abuse and HIV infection, In addition, NIDA sponsored annual meetings to report its findings and progress.

NIDA realized that it had to assume responsibility for technology transfer efforts. Research publications, while lending credibility to the outreach/intervention initiative, would not reach policymakers or service providers. The essential role of translating research findings into clinical applications had to be undertaken by the Federal agency. There simply were no other actors with the mandate or interest to do so. At the same time, NIDA encouraged its investigators and their staffs to contact State drug abuse authorities to make them aware of individual programs.

Findings indicated that the outreach/intervention programs showed a capacity to recruit out-of-treatment drug users and effected large-scale change in their needle-using behavior and some aspects of their sexual behavior. Three outreach/intervention models emerged as particularly effective in modifying risk-taking behavior. (One of these models was a compilation of several components found to be effective.) All programs had been directed to develop implementation manuals describing the conduct of the interventions, and NIDA worked with principal investigators and their staffs to refine the manuals of the three most promising models. The manuals were reviewed by service and policy staff who were not affiliated with the program. Modifications were made in the wording and structure as necessary. To lend credibility to the intervention, each manual contained a brief description of the research finding. In conjunction with NASADAD, CSAT, and the committee of

State drug abuse authorities, NIDA then embarked on a program of technology transfer, making use of the manuals in association with workshops to take potential users through program implementation.

The following discussion describes NIDA's outreach/intervention initiative using the six factors to be considered in research utilizations.

Relevance

The connection between HIV infection and injection drug use was well known by the time results from NIDA's outreach/intervention initiative became available. Moreover, the drug abuse treatment community had, by and large, accepted responsibility for playing a role in HIV prevention, though that role typically was restricted to making treatment accessible and as effective as limited budgets permitted. Indeed, the concern of drug abuse treatment with a holistic approach to client care precluded ignoring this latest and most significant risk to client health and survival. Moreover, health care agencies already had adopted an outreach/intervention strategy to prevent the spread of disease through communities, and some State drug abuse authorities had begun to adopt outreach initiatives in relation to HIV infection. Still other drug abuse authorities had knowledge or experience regarding outreach designed to involve drug users in drug abuse treatment.

In short, HIV infection was widely perceived as a dramatic new concern to which the drug abuse community had to respond. The core technology NIDA proposed-outreach/intervention-while not the preferred strategy (i.e., not drug abuse treatment), was nonetheless known to be appropriate and effective in containing the spread of disease and reaching out-of-treatment drug users.

Timeliness

The drug abuse community knew that time was not on their side in meeting the challenge of HIV infection. The Centers for Disease Control and Prevention (CDC) was reporting IDUs to be one of the fastest growing populations infected with acquired immunodeficiency syndrome (AIDS). Communities, particularly in the East, were witnessing dramatic increases in rates of AIDS tied, in significant part, to the IDU population. For most, the time to act was now; for some, the time to act was yesterday.

Clarity

As has been indicated, NIDA distributed newsletters and scheduled conferences designed to share research findings in user-friendly language and format. The workshops it organized around successful models were the culmination of that user-friendly effort at technology transfer. An initial round of seven regional 1-day workshops were held with State drug abuse authorities responding to an invitation issued jointly by NIDA and NASADAD. The workshop was an orientation session regarding outreach/intervention strategies found effective in NIDA's research. In all, representatives from 34 States and Puerto Rico attended. At those sessions, an overview of the outreach/intervention initiative highlighted four major points: (1) a substantial mmority of IDUs (41 percent) had never entered drug abuse treatment, in spite of long histories of injection drug use; (2) outreach/intervention strategies could locate tens of thousands of out-of-treatment IDUs; (3) those IDUs were amenable to efforts to modify their risk-taking behavior: and (4) there existed detailed strategies that had been successful in reducing the risk-taking behaviors of IDUs.

Each principal investigator or intervention/outreach program manager provided manuals detailing the implementation of the model with which he or she was associated. The presenter described the research findings and the outreach/intervention strategy, including the resources required to implement that strategy.

At the conclusion of the three presentations, NIDA indicated its willingness to provide State drug abuse authorities with in-State training workshops in the implementation of any or all the strategies about which they had heard and whose manuals they now possessed. Two days would be devoted to workshops in the implementation of each strategy chosen. NIDA would pay for the trainers and the development of the training workshops; the States would pay for the training facility and for travel and accommodations for workshop participants. The State drug abuse authorities were urged to send only those persons who held a level of administrative responsibility that guaranteed they could develop an outreach/intervention program if they found it appropriate to their needs.

In all, 17 training workshops were held for over 300 programs and more than 500 participants. The training workshop was developed by an experienced staff of trainers under contract to NIDA, the principal investigators and their staffs, and NIDA staff. Currently, an evaluation is

underway to determine the nature and extent of implementation of the outreach/intervention strategies provided.

Credibility

Efforts were made to lend credibility to the technology transfer activity chiefly through sharing research findings, interpersonal contact with the principal investigators and staff associated with the intervention, and the support evident from the State drug abuse authority, NIDA, CSAT, and CDC. In addition, NIDA (1) developed journal publication plans jointly with grantees in the outreach/intervention program, (2) developed a NIDA publication to report the initiative's effectiveness (NIDA 1994), and (3) edited a research volume describing major findings from the outreach/intervention initiative (Brown and Beschner 1993).

Replicability

NIDA's strategy from the outset was to encourage State drug abuse authorities to expend scarce dollars on outreach/intervention programs to fulfill their acknowledged responsibility to serve all drug users in the community. Nonetheless, NIDA did not underestimate the difficulties in having the States undertake an additional initiative. Indeed, a number of States declined to send participants to the training workshops because they felt unable to initiate new programs.

Two unexpected events occurred to free up Federal dollars for outreach/ intervention programming. First, in the reorganization of ADAMHA into SAMHSA and NIDA, approximately $10 million was transferred to CSAT as seed money for the development of an outreach/intervention program. CSAT conferred with NIDA about the structure of that program and, as a part of its grant announcement, stressed the importance of the three models developed in NIDA's program and gave information that allowed applicants and others to obtain the manuals.

Second, in making dollars available for drug abuse treatment under the provisions of block grant legislation for 1993, Congress required the States to provide outreach to drug abusers not in treatment. The resulting regulations, as promulgated by the Department of Health and Human Services, state that "the Secretary requires the States to use outreach models that are scientifically sound, so as to optimally maximize these outreach programs" (Department of Health and Human Services 1993,

p. 17064). The regulations then list the three manuals developed in association with NIDA as "examples of scientifically sound models" (Ibid.). The infusion of resources and the congressional mandate greatly increased the replicability of outreach/intervention models.

Acceptability

The training workshops made use of group discussion, group exercises, and role playing to give information on and develop experience in the outreach/intervention strategy chosen. The goal was to make individuals feel comfortable with the strategy (i.e., to gain acceptance of the new initiative). Organizational readiness already had been undertaken through work with the State drug abuse authorities. However, the use of workshop training, instead of individual site visits, meant that NIDA could not address either organizational resistances at the local level or the nuances involved in adapting the outreach/intervention to local conditions. As a followup to the workshops, technical assistance through site visits was available from principal investigators or their staffs, at the requestor's expense. (However, technical assistance was rarely requested.)

REMOVING SYSTEMIC IMPEDIMENTS TO TECHNOLOGY TRANSFER

The point has already been made that the drug abuse research and service delivery communities rarely talk to each other. It is not that they have nothing to say. It is not always that they don't know how to say it, although that remains an issue. The research community, by and large, has little interest and no incentive to communicate with their service delivery colleagues. Rewards in the research community, in terms of jobs, tenure, promotion, and salary, are earned through journal publication and grant acquisition, not community service. The typical researcher feels he or she has fulfilled all responsibility for technology transfer by publishing findings in the research literature, despite the shortcomings of that medium. Thus, the translation of research findings into action steps becomes the responsibility of the funding agency.

Drawing the research community into the process of technology transfer would require a modification in the grants process that permitted the addition of incentives for technology transfer efforts. For example, grant programs that, in the final year of funding, report success for a treatment or prevention initiative would become eligible for a 1 -year supplement.

Those funds would be earmarked for work by the investigator and his or her staff to develop, in conjunction with the funding agency, a detailed manual for the implementation of that intervention as well as the planning, development, and conduct of a technology transfer strategy targeted to appropriate audiences in the service delivery community. The decision to award supplemental funding could be made by a committee of the research staff at the funding agency or by a group of agency staff and members of the agency's grant review committees. Their decision would be based on the adequacy of the research conducted and the robustness of findings.

By providing research funds tied to technology transfer, the funding agency could advance the utilization of its research findings and influence research practice. The addition of a financial incentive could further stimulate the involvement of some members of the research community in areas of applied research and effect greater response by that community to the needs and issues of the service delivery community. Research has demonstrated that modifying rewards systems can lead to changes in behavior.

In addition to creating a structure encouraging researcher involvement in technology transfer initiatives, NIDA can develop the subject of technology transfer as an area of study. In spite of an expenditure of tens of millions of dollars on many thousands of studies in drug abuse, there remains only a single study on the efficacy of different strategies of technology transfer with drug abuse treatment staffs. Even with the availability of videotapes, audiotapes, and a burgeoning computer technology, only the efficacy of technology transfer strategies based on the print medium and interpersonal communication has been studied, and only a minimal effort has been made in that area. In making technology transfer the object of a research concern, the funding agency highlights the significance it attaches to that activity.

Whether as a subject for research or as a program initiative, technology transfer can only be facilitated through the active intervention of the funding agency. Indeed, the commitment of research dollars to those tasks, by an agency from which research dollars are competitively sought, gives a clear signal of that agency's interest in technology transfer.

CONCLUSION

In the field of drug abuse, the Government must take responsibility for developing technology transfer initiatives. Separate industries of research and of service delivery exist, and there is typically little incentive or opportunity for the two of them to communicate. Moreover. there is no technology transfer industry to effect that communication. Only the Government, with its oversight and support of both research and service delivery, can play such a role.

In accomplishing technology transfer objectives, the issues that must be confronted are relevance, timeliness, clarity, credibility, replicability, and acceptability of research findings for *service* program activity. The single study on technology transfer in the drug abuse field suggests those issues are best addressed by direct contact through workshops or site visits. However, there remains a need for further research on technology transfer to drug abuse service providers in order to develop credible and effective strategies for allowing the clinical application of research findings. Moreover, the use of additional incentives must be explored to draw the research and service delivery communities into more effective partnership on behalf of the client populations those communities have been organized to serve.

REFERENCES

Argarwala-Rogers, R. Why is evaluation research not utilized? In: Guttentag, M., ed. *Evaluation Studies Review Annual.* Vol 11. Beverly Hills, CA: Sage, 1977.

Averch, H. Notes on improving research utility. Inquiry 23:231-234, 1975.

Backer, T.E. *Drug Abuse Technology Transfer*. Rockville, MD: National Institute on Drug Abuse, 1991.

Banta, H.D., and Bauman, P. Health services research and health policy. *J Comm Health 2:* 12 I- 132, 1976.

Boyer, J.F., and Langbein, L.I. Factors influencing the use of health evaluation research in Congress. *EvaI Rev* 15:507-532, 1991.

Braskamp, L.A.; Brown, R.D.; and Newman, D.L. Studying evaluation utilization through simulations. *Eval Rev 6:* 114-126, 1982.

Brown, B.S. Networking between research and service delivery. *Inter J Addict* 22:301-317, 1987.

Brown, B.S., and Beschner, G.M. *Handbook on Risk of AIDS-injecting Drug Users and Sexual Partners.* Westport, CT: Greenwood Press, 1993.

Carter, R.K. Clients' resistance to negative findings and the latent conservative function of evaluation studies. *Am Social* 6:118-124, 1971.

Chelimsky, E. The politics of program evaluation. In: Cordray, D.S.; Bloom, H.S.; and Light, R.J., eds. *New Directionsfor Program Evaluation.* San Francisco: Jossey-Bass, 1987.

Cox, G.B. Managerial style: Implications for program evaluation information. *Eual Rev* 1:499-508, 1977.

Davis, H.R., and Salasin, S.E. Applied social research: In combat with waste and suffering. *Int J Comp Social* 19:107-113, 1977.

Dawson, J.A., and D'Amico, J.J. Involving program staff in evaluation studies: A strategy for increasing information use and enriching the data base. *Eval Rev 9:* 173-188, 1985.

Department of Health and Human Services. "Substance Abuse Prevention and Treatment Block Grants." *Federal Register* March 31, 1993.

DiMaggio, P., and Useem, M. Decentralized applied research: Factors affecting the use of audience research by arts organizations. *J Appl Behav Sci* 15:79-94, 1979.

Fairweather, G.W. *The Fairweather Lodge:* A *Twenty-Five Year Retrospective.* San Francisco: Jossey-Bass, 1980.

Fairweather, G.W.; Sanders, D.H.; and Tomatzky, L.G. *Creating Change in Mental Health Organizations.* New York: Pergamon, 1974.

Falcone, D., and Jaeger, B.J. The policy effectiveness of health services research: A reconsideration. *J Commun Health* 2:36-51, 1976.

Florio, D.H.; Behrmann, M.M.; and Goltz, D.L. What do policy makers think of educational research and evaluation: Or do they? *Educ Eval Policy Anal* 1:61-88, 1979.

Glaser, E.M.; Abelson, H.H.; and Garrison, K.N. *Putting Knowledge to Use: Facilitating the Diffusion of Knowledge and the Implementation of Planned Change.* San Francisco: Jossey-Bass, 1983.

Glaser, E.M., and Smith, F.M. "Utilization of Applicable Research and Demonstration Results." Report prepared for the National Institute of Mental Health. Los Angeles: Human Interaction Research Institute, 1971.

Glaser, E.M., and Taylor, S.H. Factors influencing the success of applied research. *Am Psychol* 28:140-146, 1973.

Guba, E.G. Problems in utilizing the results of evaluation. *J Res Dev Educ* 8:42-54, 1975.

Hall, S.M.; Sorensen, J.L.; and Loeb. P.C. Development and diffusion of a skills-training intervention. In: Baker, T.B., and Cannon, D.S., eds. *Assessment and Treatment of Addictive Disorders. New* York: Praeger, 1988.

Leitko, T.A., and Peterson, S.A. Social exchange in research: Toward a "New Deal." *J Appl Behav Sci* 18:447-462, 1982.

Leviton, L.C., and Hughes, E.F.X. Research on the utilization of evaluations. Review and synthesis. *Eval Rev* 5:525-548, 1981.

Lobosco, A.F., and Newman, D.L. Stakeholder information needs: Implications for evaluation practice and policy development in early childhood special education. *Eval Rev* 16:443-463, 1992.

National Institute on Drug Abuse. *The National AIDS Demonstration Research (NADR) Project: Effectiveness of AIDS Outreach Intervention/Prevention Research Project on Out-of-Treatment Injecting Drug Users.* Rockville, MD: National Institute on Drug Abuse, 1994.

Nielsen, V.G. Why evaluation does not improve program effectiveness. *Policy Stud J* 3:385-389, 1975.

Patton, M.O.; Grimes, P.S.; Guthrie, K.M.; Brennan, A.N.J.; French, B.D.; and Blyth. D.A. In search of impact: An analysis of the utilization of Federal health evaluation research. In: Weiss, C.H., ed. *Using Social Research in Public Policy Making.* Lexington, MA: Lexington Books, 1977.

Siegel, K., and Tuckel, P. Utilization of evaluation research: A case analysis. *Eval Rev* 9:307-328, 1985.

Smith, M.F. Evaluation utilization revisited. In: McLaughlin, J.A.; Weber, L.J.; Covert, R.W.; and Ingle. R.B., eds. *New Directions for Program Evaluation.* San Francisco: Jossey-Bass, 1988.

Sorensen, J.L.. and Guydish, J.R. Adopting effective interventions. In: Sorensen. J.L.; Wermuth, L.A.: Gibson, D.R.; Choi, K.H.; Guydish, J.R.; and Batki, S.L.. eds. *Preventing AIDS in Drug Users and Their Sexual Partners.* New York: Guilford Press, 1991.

Sorensen, J.L.; Hall, S.M.: Loeb, P.; Allen, T.; Glaser, E.M.; and Greenberg, P.D. Dissemination of a job seekers' workshop to drug treatment programs. *Behav Ther* 19:143-155. 1988.

Stevens, W.F., and Tomatzky. L.G. The dissemination of evaluation: An experiment. *Eval Rev* 4:339-354, 1980.

Weiss, C.H. Between the cup and the lip. *Evaluation* 1:49-55, 1973.

Williams, S.R., and Wysong, J.A. The uses of research in national health policy: An assessment and agenda. *Med Care* 13:256-267, 1975.

Windle, C., and Bates, P. Program evaluation: A suggested approach. In: Davidson, P.O.; Clark, F.W.; and Hamerlynk, L.A., eds. *Evaluation of Behavioral Programs.* Champaign, IL: Research Press, 1974.

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A Field-Based Dissemination Component in a Drug Abuse Research Center

James L. Sorensen and Wayne W. Clark

INTRODUCTION

Often an artificial separation exists between the professionals who are conducting research investigations and the people who can apply these findings in clinics. Sometimes clinical practice may be several years behind the most current findings of research. Furthermore, research shows relevant studies seldom reach the desks of policymakers (Millman et al. 1990), and officials do not appear to rely heavily on policy analysis from research organizations (Lester 1993). At the Federal level, the commitment to disseminate knowledge has waxed and waned over the years (Backer 1991). Signs of another upswing in both interest in, and need for, knowledge utilization activities are visible (Backer et al. 1991).

When research areas such as drug treatment effectiveness develop quickly, coordinating findings closely with clinical practice becomes more important. This coordination is not always easy because researchers and clinicians frequently seem to work in separate worlds with little time to talk with each other. With the growth of substance abuse treatment and research funds, a recent knowledge explosion has occurred in the substance abuse area. Even a well-informed clinician or researcher may have difficulty staying current in the other's area. Consequently, increasing calls have ensued to transfer the information and technology between the research and clinical areas of expertise (Johnson 1993).

One approach to bridging the gap between research and practice is to build dissemination techniques and other communications activities into ongoing research projects. This chapter describes the implementation of one such strategy in the field.

SAN FRANCISCO TREATMENT RESEARCH UNIT

The functions of community liaison, policy development, and dissemination to practitioners were integrated into the activities of a center for drug abuse research. The setting for these activities was the San Francisco Treatment Research Unit (TRU). The TRU was a research center funded by the National Institute on Drug Abuse (NIDA), which focused on reducing intravenous drug use as a means of lowering the risks of acquiring or spreading human immunodeficiency virus (HIV). The project's long-term objective was to improve the effectiveness of outpatient treatments for people addicted to opiates, cocaine, and other abused drugs. The San Francisco TRU was created in response to a request for applications (RFA) from NIDA. The NIDA RFA was somewhat unique in asking respondents to combine treatment support with research-to move the field along more quickly. A side benefit was that the RFA brought research and treatment people more closely together. In fact, closing the gap between researchers and clinicians was an opportunity presented in the RFA, which stated, "The application also should include an information dissemination plan, to assure that research findings are communicated to the treatment field in a timely, efficient fashion" (National Institute on Drug Abuse 1988, p. 4).

Dissemination activities were built directly into the specific aims of the San Francisco TRU. These aims were (1) to conduct high-quality research that evaluates innovative outpatient treatment strategies for drug abuse as a means of acquired immunodeficiency syndrome (AIDS) risk reduction; (2) to stimulate treatment research in associated community clinics to improve the efficacy of outpatient treatment of opiate and cocaine abuse: and (3) to foster collaboration and communications among scientists and practitioners as a way to stimulate new research for improving the efficacy of drug abuse treatment. Thus, there was an explicit request to build dissemination activities into treatment research units, and the San Francisco TRU proposal included an explicit and central place for dissemination.

COMMUNITY LIAISON, POLICY, AND DISSEMINATION COMPONENT

Following through on the preceding third aim, the TRU organized a component that would create a link with the community, address policy implications, and disseminate research developments to program

professionals and scientists in the public arena. Within the TRU, the leadership of the community liaison, policy, and dissemination (CLPD) component was shared between the principal investigator of the TRU and the director of San Francisco's drug and alcohol treatment system (the authors). They were assisted by a full-time dissemination coordinator (a master's level position), a psychiatrist/attorney whose involvement writing policy analyses was part time. a policy assistant, and administrative/clerical staff. The administrator of the TRU was actively involved in making arrangements to allow the component to accomplish its goals. Within the organization of the TRU, the CLPD component was on an equal footing with research components; for example, one author was a coinvestigator in the TRU with full participation in the TRU Executive Committee.

Community Liaison

One activity of the CLPD component was to tie the TRU closely with the community. The authors' research (Sorensen et al. 1988) and that of others (e.g., Backer et al. 1986). indicated that personal contact is more likely than printed materials to produce the adoption of treatment innovations. One author helped to form personal links between researchers and the substance abuse and AIDS treatment projects. Several activities helped to accomplish these community liaison aims. First, community colloquia, which were aimed at reaching 35 to 100 practitioners in the San Francisco Bay area, occurred twice yearly. The goal was not so much to showcase TRU research as to give special attention to emerging problems that were central to the field. In the 5 years of the TRU, five community colloquia occurred. The colloquia topics and attendance appear in table 1.

The colloquia generated considerable interest among both treatment staff and researchers. Several policy papers stemmed from presentations at the colloquia, with topics including chronic pain (Clark and Sees 1993; Sees and Clark 1993) and tuberculosis (Clark et al., in process). Colloquia also spawned at least one grant application. "Tuberculosis Chemoprophylaxis in Injection Drug Users: Methadone Treatment Versus Standard Care."

In addition to community colloquia, several aspects of professional linkages and networking through interpersonal contact were designed into this component. The dissemination coordinator often represented the

TABLE 1. *Community colloquia sponsored by the San Francisco Treatment Research Unit.*

Date	Topic	Attendance
4-91	Use of antidepressants in drug treatment programs	70
11-91	Responding to recommendations of the national AIDS Commission The twin epidemics of substance abuse and HIV	90
5-92	Ethical issues in the treatment of substance abusers with HIV disease	117
11-92	The tuberculosis problem with substance abusing clients	50
4-93	The use of pain medications with substance abusing clients	175
4-94	Substance abuse treatment in an age of health care reforms	105
	Attendance total	607

TRU at informational meetings and local conferences. The involvement of the county drug program administrator as a broker for emerging and new treatment issues, moreover, helped keep the TRU "on the radar" for local policymakers.

Policy Development

The CLPD component also identified policy issues and developed statements for programs. For example, in California, the laws about pregnancy and chemical dependency were in flux, and the CLPD component published a policy analysis (Clark and Weinstein 1993). This component wrote policy articles about general treatment issues that were disseminated to the field. During the years of the TRU, CLPD component staff conducted several policy analyses which are listed in table 2.

TABLE 2. *Policy analyses completed by the component.*

1.	Workplace drug testing (Clark 1990a, *b;* Clark and Sees 1992)
2.	Chemical dependency and pregnancy (Clark and Weinstein 1993)
3.	Safe use of benzodiazepines (Clark and Boatwright 1991)
4.	Smoking cessation in drug treatment (Sees and Clark 1993)
5.	Administration of substance abuse treatment (Clark et al. 1993)
6.	Control of tuberculosis in sustance abusers (Clark et al., in process)

Although several of these policy analyses were local in scope and, thus, presented only at community meetings, others had national implications and were published in professional literature. One author also collaborated on policy analysis efforts that linked local and Federal initiatives (e.g., Clark et al. 1993).

Dissemination Activities

One aim of the CLPD component was to disseminate research developments to professionals, scientists and the public. Dissemination activities focused on encouraging the adoption of innovations. The component achieved these innovations with an annual dissemination forum, the development of instructional videotapes, and articles about TRU research that appeared in newsletters targeted for treatment staff.

Dissemination Forums. The TRU sponsored a forum annually about treatment research developments for 100 to 400 San Francisco Bay Area professionals. This conference provided updates about promising treatment research developments, giving special attention to innovations developed through the San Francisco TRU. The topics of these forums follow (table 3).

The dissemination forums were consistently well attended, with 100 to 400 local treatment professionals, program administrators, legislative staff, and others. The forums not only briefed these participants about the current issues, they also provided a mechanism for disseminating research

TABLE 3. *Annual dissemination forums of the San Francisco Treatment Research Unit.*

Date	Topic	Attendance
8-90	Developments from the 6th International Conference on AIDS	135
8-91	Psychosocial treatment of the addictions: current developments	165
8-92	Women, substance abuse, and HIV	400
8-93	Detoxification in the age of HIV disease	130
8-94	Research and treatment developments in substance abuse	220
	Attendance total	1,050

findings from the TRU. For example, the 1993 forum featured results of several TRU studies conducted in the innovative 6-month detoxification research clinic (Banys et al., in press; Reilly et al., in press; Sees et al. 1993; Tusel et al. 1993). The 1991 forum resulted in a special lo-article series in "Psychology of Addictive Behaviors" (volume '7, issues 2 and 3), entitled "Psychosocial treatments of drug abuse: Current developments."

Videotape. Development of an instructional videotape was another dissemination activity. The original TRU proposal planned to produce one video annually, beginning in year 2 of the grant. The purpose of these videos was to inform practitioners about innovations shown as efficacious in slowing the spread of HIV. The TRU is currently in the final stages of producing a videotape, "Medical Management of HIV Disease in Drug Treatment Programs," which is intended for professionals in drug abuse treatment programs, along with a companion video that focuses on educating patients. The production of videotapes, however, was extremely labor-intensive, and HIV terminology changed rapidly. Based on this experience, project personnel chose to deemphasize this aspect of dissemination, focusing instead on using a science writer's newsletter articles directed at treatment staff.

Newsletter Articles. Articles in local, State, and national professional newsletters constituted another dissemination activity. Contact with the Science Writer Program at the University of California, Santa Cruz, sparked the writing of newsletter articles, an idea not originally anticipated (Wilkes 1990). Beginning in its second year, the TRU empioyed a science writer intern-and subsequently graduates of the Science Writer Program-to produce articles aimed at treatment staff. These articles featured research findings from the San Francisco TRU and other laboratories, written in lay person's language. To date seven articles have appeared in newsletters directed to counseling staff and policymakers (table 4). These articles have been intended for a broader audience than those of Journal publications: they extended the reach of publications by making a wider variety of practitioners aware of research developments.

TABLE 4. *Newsletter articles by science writer and interns.*

Topic	Publication outlet
Antidepressant shows promise in decreasing cocaine use	"Cocaine Working Group Newsletter"
HIV disease in methadone maintenance therapy	"NIDA Notes"
NIDA creates unique centers to study drug abuse treatment	"NIDA Notes"
Relapse	"NIDA Notes"
Reducing risk among female partners of injection drug users	"Focus on AIDS Research"
Researchers make strides in fluoxetine/cocaine dependence studies	"The Counselor"
Shifting bleach recommendations: the counselor's dilemma	"The Counselor"

The research projects used as topics for the science writer's articles were selected through an organized process that first screened to select only published or "in press" articles. Those articles with a combination of applicability to the field and likelihood of reaching large audiences through their publications were then featured. These newsletter articles helped to redistribute information about the TRU. Some were picked up and further distributed in other newsletters, for example, "Invest" published by NIDA.

CONCLUSIONS: TAKING RESPONSIBILITY FOR TECHNOLOGY TRANSFER

The combined activities of the CLPD component were successful both in fostering collaboration and communication among scientists and practitioners and in stimulating new research about the effectiveness of drug abuse treatment. Although the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) Reorganization Act of 1992 delegated to the Substance Abuse and Mental Health Services Administration much of the responsibility for dissemination of information on interventions known to be efficacious, the former ADAMHA institutes continue communications about research developments through dissemination activities. Nonprofit foundations may be another significant source of funding for knowledge utilization activities, as discussed by Backer and Shaperman (1993).

A need exists for research about the most effective ways to disseminate innovations proven efficacious. One way to accomplish this task is through sponsoring health services research, which was mandated by the ADAMHA Reorganization Act. Field-based programs, such as the present one, may be more timely in spreading the word locally.

Several limitations to this approach became evident. The research enterprise moves slowly, and some frustration occurred due to the desire to disseminate information before the results had been analyzed thoroughly. Research does not always yield useful results that deserve quick dissemination. Innovative research is frequently not a single activity but, instead, a constellation of efforts leading in a certain direction.

Similarly, one ideal of the program had been to foster two-way communications. The component planned to have seminars involving

small groups of practitioners who would meet with research staff and help scientists to plan their research ideas, with the goal of eventual application to treatment programs" This aspect of collaboration really did not evolve, in part because most TRU researchers are trained as clinicians and already are familiar with the issues facing drug treatment staff. Although interest was expressed by practitioners, most dissemination was one way: from the TRU to the treatment community.

An additional limitation worth mentioning is dissemination requires effort. Scientists may have heard complaints about their working in an ivory tower, or they may have been chastised for publishing in obscure research journals rather than in outlets aimed at the public. When the CLPD component began approaching newsletters, the authors' belief was naive-if the TRU showed interest in disseminating research, the world would beat a path to their door. This belief was far from reality. Newsletters have their own editors, editorial boards, writers, and publication lags. Acceptance of an article in a good newsletter can be as difficult as acceptance in a reputable academic journal. The public system is equally as competitive as academia, and academicians are on unfamiliar turf.

The community liaison policy and dissemination activities of the San Francisco TRU are only one example of what could be accomplished in bringing research and the treatment communities more closely together. Many other aspects of dissemination could be incorporated into programs such as this one with sufficient resources. For example, the Center for AIDS Prevention Studies in San Francisco has made excellent inroads into teaching community-based organizations to conduct research about important social problems as they affect the prevention of AIDS. In addition, the TRU had a local focus. If a national program such as NIDA or the National Institute of Mental Health provided more centralized resources for dissemination of findings of their treatment research centers and other research projects, doing so would be useful. NIDA has begun one such program with its Community and Professional Education Branch (David 1991). Continuing such efforts to promote wide adoption of drug abuse research findings is important.

The authors emphasize that, given the opportunity, researchers can integrate dissemination as a principal part of their research. This procedure can shorten the distance between researchers and practitioners.

REFERENCES

Backer, T.E. Knowledge utilization: The third wave. *Knowl Creat Diffus Util* 12:225-240, 1991.

Backer, T.E.; Liberman, R.P.; and Kuehnel, T.G. Dissemination and adoption of innovative psychosocial interventions. *J* Consult *Clin Psychol* 54:111-118, 1986.

Backer, T.E.; Salasin, S.E.; and Rich, R.F. Federal policy and knowledge utilization: Issues for the new decade. *Knowl Creat Diffus Util* 12:220-224, 1991.

Backer, T.E., and Shaperman, J. Knowledge utilization and foundations supporting health research and demonstrations: Initial explorations. *Knowl Creat Diffus Util* 14:386-400, 1993.

Banys, P.; Tusel, D.J.; Sees, K.L.; Reilly, P.M.; and Delucchi, K.L. Low-(40 mg) versus high- (80 mg) dose methadone in a 180-day heroin detoxification program. *J Subst Abuse Treat,* in press.

Clark, H.W. The medical review officer (MRO) and workplace drug testing. *J Psychoactive Drugs* 22:435-455, 1990a.

Clark, H.W. The role of physicians as medical review officers in workplace drug testing programs: In pursuit of the last nanogram. *Western J Med* 152:514-524, 1990b.

Clark, H.W., and Boatwright. D.E. Safe use of benzodiazepines and other drugs: The pharmacist's duty to counsel. *Am J Hosp Pharm* 48:1291-1296, 1991.

Clark, H.W.; Nelson, L.J.; Sees, K.L.: and Sorensen, J.L. Ethics, public policy, and the control of tuberculosis among substance abusers. In process.

Clark, H.W., and Sees, K.L. Drug testing and the toilet bowl blues. [Letter to the editor]. *JAMA* 268:2377, 1992.

Clark, H.W., and Sees, K.L. Opioids, chronic pain, and the law. *J Pain Sympt Manag* 8:297-305, 1993.

Clark, H.W., and Weinstein, M. Chemical dependency. In: Paul, M., ed. *Occupational and Environmental Reproductive Hazards: A Guide for Clinicians.* Baltimore: Williams & Wilkins, 1993.

Clark, W.; Sorensen, J.L.; and Morin, S.F. Administration of substance abuse treatment: Local and national developments. *Psychol Addict Behav* 7:110-119, 1993.

David, S. Developing a technology transfer program for the National Institute on Drug Abuse. *Knowl Creat Diffus Util* 12:289-297, 1991.

Johnson, E.M. Technology transfer: Knowledge for helping. In: Harris, L., ed. *Problenzs of Drug Dependence,* 1992. National Institute on Drug Abuse Research Monograph No. 132. NIH Pub. No. 93-3505. Washington, DC: Supt. of Docs., U.S. Govt. Print. Off., 1993.

Lester, J.P. The utilization of policy analysis by state agency officials. *Know1 Creat Diffus Util* 14:267-290. 1993.

Millman, J.; Samet, S.; Shaw, J.; and Braden, M. The dissemination of psychological research. *Am Psychol* 45:668-669, 1990.

National Institute on Drug Abuse. *Research Demonstration Program to Reduce the Spread of A IDS by itnproving Treatment for Drug Abuse.* Request for Applications No. DA-89-01. Washington, DC: U.S. Department of Health and Human Services, 1988.

Reilly, P.M.: Sees. K.L.; Shopshire, M.S.; Hall, S.M.; Delucchi, K.L.; Tusel, D.J.; Banys, P.; Clark, H.W.; and Piotrowski, N. Self-efficacy and illicit opioid use in a 180-day methadone detoxification treatment. *J Consult Clin Psychol,* in press.

Sees, K.L., and Clark, H.W. When to begin smoking cessation in substance abuse. *J Subst Abuse Treat* 10:189-195. 1993.

Sees, K.L.; Delucchi, K.L.; Reilly, P.M.; Tusel. D.J.; Banys, P.; and Clark, H.W. Attrition from a randomized trial comparing psychosocial treatments in a 180-day methadone detoxification clinic. In: Harris, L., ed. *Problems of Drug Dependence,* 1992. NIDA Research Monograph No. 132. NIH Pub. No. 93-3505. Washington, DC: Supt. of Docs., U.S. Govt. Print. Off., 1993.

Sorensen, J.L.; Hall, S.M.; Loeb, P.; Allen, T.; Glaser, E.M.; and Greenberg, P.D. Dissemination of a job seeker's workshop to drug treatment programs. *Behav Ther* 19:143-155, 1988.

Tusel, D.J.: Reilly, P.M.; Banys, P.; Sees, K.L.; and Delucchi, K.L. 180-day methadone detoxification treatment: A six-month follow-up. In: Harris, L. ed. *Problems of Drug Dependence,* 1992. NIDA Research Monograph No. 132. NIH Pub. No. 93-3505. Washington, DC: Supt. of Docs., U.S. Govt. Print. Off., 1993.

Wilkes, J. Scientists should spend more time communicating with the public. *Scientist* 1:8-13, 1990.

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Technology Transfer in the Criminal Justice Field: Implications for Substance Abuse

Paul Gendreau

INTRODUCTION

This chapter sets out to accomplish three things. First, it makes the case that there has been a failure in technology transfer from the criminal justice to the substance abuse field. Second, it suggests that one of the root causes that challenges technology transfer in this instance is a phenomenon known as knowledge destruction. Examples of how knowledge destruction functions in the criminal justice area and may apply to the substance abuse field are provided. Third, it outlines strategies for combating knowledge destruction and effecting technology transfer at the organizational and Individual levels.

TECHNOLOGY TRANSFER FROM CRIMINAL JUSTICE TO SUBSTANCE ABUSE

The grounds for suggesting that the dissemination of knowledge has not been readily transferred from the criminal justice to the substance abuse literature requires some background. The author was involved in the "addiction-prone" personality debate of a quarter century ago. (For a summary of some of the classic studies in this regard, see Shaffer and Burglass 1981). The author's contention at that time was that the psychodynamics of drug addicts who had serious involvement with the law were, to all intents and purposes, indistinguishable from that of other offenders. While it is recognized that the proposition that drug addiction is simply a result of a criminal lifestyle, attitudes, and beliefs likely will never be adequately resolved empirically (Nurco et al. 1985; Speckart and Anglin 1986), the consensus now is that antisocial values and behaviors form a very significant component of most substance abusers' personality makeup (Nathan 1988; Nurco et al. 1993).

Given that there is such a substantial overlap between the clientele served by both systems, it seems odd that, for so many years, the criminal justice

offender assessment and treatment literature has been virtually ignored by substance abuse treatment professionals. Indeed, the gulf between the two fields still exists. At the practitioner level. indications of failure of technology transfer have been further reinforced by a detailed program evaluation of 101 offender substance abuse programs in Canada, where it was found that only 10 percent of the programs received a passing grade on their knowledge of offender assessment and treatment techniques (Gendreau et al. 1990). In addition, the author's recent review of the substance abuse literature for developing programs for substance-abusing offenders in prisons revealed only three substance abuse research groups cited the relevant criminal justice findings in the professional journals.

The basis for making an issue in this matter is that the criminal justice literature has generated an ample database of several hundred studies attesting to the fact that criminal behavior can be predicted with a reasonably high degree of accuracy (70 to 85 percent range). As a result, some very useful classification methodologies and psychometric assessment instruments have been developed for various purposes (e.g., predicting violence and general recidivism). In addition, researchers have uncovered several principles associated with successful and unsuccessful offender treatment programs. These principles are based on just over 400 studies that employed true experimental designs or matched/comparison groups controls. Successful programs reported reductions in criminal behavior ranging from 20 to 60 percent for 1 - to 2-year followups.

The aforementioned literature has been published in well-recognized periodicals and texts and dates back about 15 years (Gendreau and Ross 1979; Palmer 1978; Ross and Gendreau 1980), with periodic updates appearing over the ensuing years (Andrews and Bonta 1994; Andrews et al. 1990; Cullen and Gendreau 1989; Garrett 1985; Gendreau and Ross 1984, 1987; Gendreau et al. 1994; Lipsey 1992; Loeber and Stouthamer-Loeber 1987; Palmer 1992). Since 60 to 70 percent of all offenders have past or current substance abuse histories, and substance abuse is also a potent predictor of criminal behavior (Gendreau et al. 1995), surely some of this knowledge base is deserving of transfer to the substance abuse area.

THE CHALLENGES OF KNOWLEDGE DESTRUCTION

The obvious question is, Why has this knowledge not been transmitted to the substance abuse field? Two likely reasons that account for this state of affairs are self-evident. Brown has discussed these in a contribution to this volume. First, many substance abuse treatment personnel are paraprofessionals who "walk the walk and talk the talk" and are not inclined to read their own professional journals, let alone that of another discipline. Second, it is simply a matter of personal contact. What people know often is determined by who they know and the system in which they work. For example, of the three aforementioned research groups, the senior researcher from each of these has had longstanding professional contact with the author, and two of them initially began their careers studying offender samples. Members of the substance abuse field have little personal contact with criminal justice professionals.

There is, however, another rationale that prevents technology transfer. It has become prevalent in the social sciences and the humanities and is commonly known as theoreticism (Crews 1986); this chapter will focus on a component of it called knowledge destruction (Andrews and Wormith 1989). The illustration of the principles of knowledge destruction will be taken from the criminal justice field, specifically the topic of offender assessment and treatment. After presenting the knowledge destruction justifications, this chapter will discuss the possibility that knowledge destruction may contribute to the reluctance of the substance abuse field to incorporate the relevant criminal justice literature.

Knowledge Destruction: Definition

Essential to understanding how knowledge destruction works is recognizing the fact that information can be accepted or rejected according to the *personal* values of the observer. Personal values, obviously, emanate from one's identity and the social and cultural context one lives in. Information sources can be very circumscribed, and it is easy for a person to accept only a limited set of ideas that reinforces those existing set of values and beliefs that are comfortable and nonthreatening.

Therefore, it is not surprising that deductive, rather than inductive, reasoning becomes the preferred choice of logic for assessing facts. Positivism is derided. This is the essence of theoreticism (Crews 1986), and it is a very seductive process. Knowledge destruction, in turn, refers

to the specific pseudoscientific arguments used by theoreticists to discount research findings not to their liking (Andrews and Bonta 1994).

Knowledge Destruction: The Historical Context and How It Functions

Before specifying how knowledge destruction works in the offender assessment and treatment area, one must appreciate the fact that knowledge destruction does not exist in a vacuum. Understanding the historical context is crucial in this regard. Within the criminal justice field the historical context is as follows (Andrews and Wormith 1989).

Shortly after World War II, criminology became an independent discipline and embraced sociological conceptualizations of mankind and society. Biological and psychological explanations of criminal behavior were looked upon with suspicion, even ridiculed (Jeffery 1979; Rowe and Osgood 1984). According to Hirschi, who generally is regarded as the preeminent sociological theorist on crime:

> [T]he thrust of sociological theory has been to deny the relevance of individual differences.. . [The] thrust of criticism has been to discount research findings apparently to the contrary. Devastating reviews of the research literature typically meet with uncritical acceptance.. .[N]ew criminologies are constructed in a research vacuum (Hirschi and Hindelang 1977, pp. 571-572).

These themes are still current today in many standard criminological textbooks.

The motives behind knowledge destruction were both professional and moral. They were professional in that much of sociological theory posited that political economy and social location (i.e., offenders' parents' socioeconomic status, education level) are the best predictors of criminal behavior, and they were moral in that if offenders are thought to have defining characteristics on various psychological dimensions, then the potential for abuse by the system exists. The reasoning is that if offending behavior can be predicted, then offenders will be unfairly targeted not only for criminal justice processing but also for treatment. As the long-time editor of one of the influential criminological journals said, "[P]sychobiological arguments are bleak in their implications,

leading to . penological policies of repression and terror" (Gibbons 1986. p. 5 10). In short. the prediction of criminal behavior is fruitless, delinquents are not different from anybody else (Schur 1973), and treatment does not work (Martinson 1974)!

What then are the types of arguments that have been forthcoming from knowledge destruction to support the antiprediction and antitreatment views? The following are the most popular that the author has collected over the years from debates in the published literature, in public forums, and from the persuasive writings of Gottfredson (1979), Andrews and Bonta (1994). and Andrews and Wormith (1989). There are two categories of knowledge destruction arguments: methodological and philosophical.

Methodological Knowledge Destruction Arguments

1. Appeal to faulty theory: No theory can explain all the findings from a set of studies.

2. Contaminate the treatment (e.g., the positive effects of treatment are only due to the personal skills of the therapist or some other non-treatment-specific factor).

3. Stress the criterion problem: Why was not another outcome measure used (e.g., self-report of criminal behavior rather than rearrest)?

4. Emphasize potential errors in measurement (e.g., no one measure of criminal behavior is absolutely reliable or valid, followup periods are too short).

5. Treatment effects are not large enough. Reductions in recidivism of 30 percent, which are frequently reported, are closer to 0 percent than 100 percent.

6. Many of the current reviews of the predictors of criminal behavior and treatment of offenders that are positive are based on meta-analytic analyses. This type of analysis is dismissed as statistical gymnastics.

Philosophical Knowledge Destruction Arguments

1. Massive efforts to deal with crime have failed. To think otherwise is to live in a chimerical and utopian world. The problems are intractable.

2. Treatment involves a monopoly of values and requires more control than absolute freedom. Treatment is hypocrisy flourishing under a cloak of benevolence.

3. The positive results of treatment may not be found in later years as the social context of knowledge changes.

4. Evidence is needed that is better than that generated by contemporary social science: Centuries of human experience have been ignored.

Finally, the classic knowledge destruction argument is that findings that have demonstrated offender treatment programs reduced recidivism were based on the fact that the designers of the programs wrote the published reports themselves (Bailey 1966).

These arguments demonstrate how antiscience and antiprofessional knowledge destruction can be. Each knowledge destruction argument readily dismisses data that does not appeal to one's preferred construction of reality. Moreover, since certain professions are associated with the generation of specific types of information (e.g., psychology and behavioral interventions), the credibility of professional training also is thrown into doubt.

The author believes that the implications of the aforementioned arguments are considerable and that knowledge destruction has contributed to the "MBA syndrome" of criminal justice management. According to Hamm and Schrink (1989), the new generation of prison and probation administrators are generalists with little or no training in the helping professions or are outright political appointees who cannot contribute a well-reasoned, empirically based body of relevant knowledge to the issues at hand. The consequences can be dismal indeed. Struckhoff (1978, p. 337) put it bluntly: "A correctional system without a high-calibre professional component is basically a fraud...[S]ome states have foundered so badly they have given up." Indeed, many criminal justice jurisdictions have totally abandoned any intelligent approach to

assessment and have embraced “get tough” policies that have been more costly and had no effect on offenders’ recidivism (Gendreau et al. 1993).

In conclusion, policymakers and administrators who have little expertise in the criminal justice field may be particularly resistant to acquiring new knowledge. Not only can the prospect be personally threatening, but the discipline needed and time required to obtain the necessary knowledge may be beyond the capacity of most.

Implications for the Substance Abuse Field

The existence of knowledge destruction arguments in the criminal justice field. however. does not mean they necessarily occur to the same extent in the substance abuse field. The indepth analysis needed to answer this question probably has not been carried out. Therefore, the author’s thesis is tentative and rests on the intuition that, if pressed, some substance abuse professionals who resist technology transfer from the criminal justice area, or any other area, would employ variations on several of the themes noted above. Methodological arguments 1, 3, 5, and 6 and philosophical arguments I and 3 would be the most likely candidates in this regard.

The next question is whether knowledge destruction affects policy in the substance abuse field. Again, the author suspects that it does and that the MBA syndrome also applies, but possibly to a lesser extent because of the history of the medical model in the addictions area. On the other hand, there is a large paraprofessional component in the field. The substance abuse area has become highly political, so it is plausible that there may be a sizeable coterie of poorly informed policymakers. It is an issue that demands some sort of empirical enquiry.

STRATEGIES FOR ENABLING TECHNOLOGY TRANSFER

This section provides a brief outline on how the author and a colleague have attempted to disseminate knowledge at the organizational level in the criminal justice area. The criterion for success was whether the team was able to assist agencies to establish new programs or procedures that lasted for at least 2 years after the consultation was completed. The agencies were in the prison. parole, community corrections, and police bureaucracies. It should be noted that knowledge destruction probably was not a major problem, if at all, in come of the settings. It is left to the

reader who is immersed in substance abuse issues to judge the applicability of these findings to encouraging technology transfer in his or her sphere.

In 1979 the team reported on its first 19 attempts at technology transfer (Gendreau and Andrews 1979); currently 65 case studies have been done. It must be emphasized that the following guidelines are based on subjective, retroscopic assessments of the reasons associated with successful versus unsuccessful attempts at technology transfer. Also, it is not possible to pinpoint cause and effect because the factors at play covaried. Generally, however, the attempts were successful in the majority of cases when the following criteria were met:

1. The team was action-oriented and worked intimately in a hands-on fashion with agency staff in establishing and maintaining the program for a period of time. Agency staff took ownership of the process in fairly short order.

2. The agency had a senior administrator who identified with and championed the changes.

3. The initiatives for change did not come from the top down in a heavy-handed manner.

4. The sociopolitical and program values of the agency and the team were moderately congruent.

5. The new initiatives were cost-effective and sustainable, and funding came from within the host agency.

None of the above could have occurred unless, at the individual level, practitioners had heard of the information in the first place. Therefore, the team has continued its efforts to assist technology transfer by promoting the accessibility of its knowledge base to the practitioner. The methods the team uses have changed little over the years (Gendreau and Andrews 1979). The most important of these are oral presentation methods such as workshops and nonacademic conference presentations; the use of professional associations to lobby for changes; university-based training programs; and encouraging responsible, professional media coverage. The team also publishes extensively in a variety of forums in a style that is accessible to those practitioners who rarely scan research journals. The team may also be reaching policymakers, if the

requests for information and consultations are a reliable index. Surveys have reported that policymakers receive most of their information from newsletters, digests. and the media (Light and Newman 1992).

These activities are tremendously time consuming but, so far, the team has found no shortcuts. In this regard the author believes the team has much in common with other contributors to this monograph (Backer, this volume; Clark, this volume) who have accomplished technology transfer in their respective fields

REFERENCES

Andrews, D.A., and Bonta, J. *The Psychology of Criminal Conduct.* Cincinnati: Anderson, 1994.

Andrews, D.A., and Wormith, J.S. Personality and crime: Knowledge destruction and construction in criminology. *Justice Q* 6:289-309, 1989.

Andrews, D.A.; Zinger, I.; Hoge, R.D.; Bonta, J.; Gendreau, P.; and Cullen, F.T. Does correctional treatment work? A clinically-relevant and psychologically-informed meta-analysis. *Criminal* 28:369-404, 1990.

Bailey, W.C. Correctional outcome: An evaluation of 100 reports. *J Crim Law Criminol Police Sc* 57:153-160, 1966.

Crews, F. In the big house of theory. *The New York Review of Books,* May 29, 1986, pp. 36, 41.

Cullen. F., and Gendreau, P. The effectiveness of correctional rehabilitation: Reconsidering the "nothing works" doctrine. In: Goodstein, L., and Mackensie, D.L.. eds. *The American Prison: Issues in Research Policy. New* York: Plenum, 1989. pp. 23-44.

Garrett, C.J. Effects of residential treatment on adjudicated delinquents: A meta-analysis. *J Res Crime Delinq* 22:287-308, 1985.

Gendreau, P., and Andrews, D.A. Psychological consultation in correctional agencies: Case studies and general issues. In: Platt, J.J., and Wicks, R.W., eds. *The Psychological Consultant.* New York: Grune and Stratton, 1979. pp. 177-212.

Gendreau, P., and Ross, R.R. Effective correctional treatment: Bibliotherapy for cynics. *Crime Delinq* 25:463-489, 1979.

Gendreau, P., and Ross. R.R. Correctional treatment: Some recommendations for successful intervention. *Juv Fam Court J* 34:31-40, 1984.

Gendreau, P., and Ross, R.R. Revivification of rehabilitation: Evidence from the 80's. *Justice Q* 4:349-407, *1987.*

Gendreau, P.; Cullen, F.T.; and Bonta, J. Intensive rehabilitation supervision: The next generation in community corrections. *Fed Probat* 58:72-78, 1994.

Gendreau, P.; Goggin, C.; and Annis, H. Survey of existing substance abuse programs. *Forum Correct Res* 2:6-8, *1990.*

Gendreau, P.; Little, T.; and Goggin, C. "A Meta-analysis of the Predictors of Adult Offender Recidivism: Assessment Guidelines for Classification and Treatment." Report prepared for the Ontario Ministry Secretariat, Solicitor General of Canada, 1995.

Gendreau, P.; Paparozzi, M.; Little, T.; and Goddard, M. Punishing smarter: The effectiveness of the new generation of alternative sanctions. *Forum Correct Res* 5:31-34, 1993.

Gibbons, D.C. Breaking out of prisons. *Crime Delinq* 32:503-514, 1986.

Gottfredson, M.R. Treatment destruction techniques. *J Res Crime Delinq* 16:39-54, 1979.

Hamm, MS., and Schrink. J.L. The conditions of effective implementation: A guide to accomplishing rehabilitative objectives in corrections. *Crim Justice Behav* 16:166-182, 1989.

Hirschi, T., and Hindelang, M.J. Intelligence and delinquency: A revisionist review. *Am Social Rev* 42:571-587, 1977.

Jeffery, C.R. *Biology and Crime.* Beverly Hills, CA: Sage, 1979.

Light, S.C., and Newman, T.K. Awareness and use of social science research among executive and administrative staff members of state correctional agencies. *Justice Q* 9:289-319, 1992.

Lipsey, M. W. Juvenile delinquency treatment: A meta-analytic inquiry into the variability of effects. In: Cook, T.D.; Cooper, H.; Cordray, D.S.; Hartmann, H.; Hedges, L.V.; Light, R.J.; Louis, T.A.; and Mosteller, F., eds. *Meta-analysis for Explanation. New* York: Russell Sage Foundation, 1992. pp. 83-127.

Loeber, R., and Stouthamer-Loeber, M. Prediction. In: Quay, H.C., ed. *Handbook of Juvenile Delinquency. New* York: Wiley, 1987. pp. 325 382.

Martinson, R. What works? Questions and answers about prison reform. *Public Interest* 35:22-54, 1974.

Nathan, P.E. The addictive personality is the behavior of the addict. *J Consult Clin Psychol* 56:183-188, 1988.

Nurco, D.N.; Ball, J.C.; Shaffer, J.W.; and Hanlon, T.E. The criminality of narcotic addicts. *J New Mental Dis* 173:94-102, 1985.

Nurco, D.N.; Kinlock, T.; and Balter, M.B. The severity of preaddiction criminal behavior among urban, male narcotic addicts and two nonaddicted central groups. *J Res Crime Delinq* 30:293-316, *1993.*
Palmer. T. *Correctional Intervention and Research: Current Issues and Future Prospects.* Lexington, MA: Lexington Books, 1978.
Palmer, T. *The Re-emergence of Correctional Intervention.* Newbury Park, CA: Sage, 1992.
Ross. R.R., and Gendreau, P.. eds. *Effective Correctional Treatment.* Toronto. Canada: Butterworth. 1980.
Rowe, D.C., and Osgood, D.W. Heredity and sociological theories of delinquency: A reconsideration. *Am Social Rev* 49:526-540, 1984.
Schur, E.M. *Radical Nonintervention: Rethinking the Delinquency Problem.* Englewood Cliffs, NJ: Prentice Hall, 1973.
Shaffer, H., and But-glass, M.E., eds. *Classic Contributions in the Addictions. New* York: Bruner/Mazel, 1981.
Speckart, G., and Anglin, M.D. Narcotic use and crime: An overview of recent research advances. *Contemp Drug Probl* Winter:741-769, 1986.
Struckhoff, D.R. Deprofessionalizing corrections is bad business. *Offender Rehabil* 2:333-338, 1978.

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Creating Strong Attitudes: Two Routes to Persuasion

Richard E. Petty

INTRODUCTION

Numerous attempts have been made to produce changes in the drug use behavior of individuals by providing information about the undesirability of drugs and the potential harmful consequences associated with them. For example, the U.S. Government has sponsored multimedia antidrug campaigns, such as "Cocaine, the Big Lie," developed by the National Institute on Drug Abuse (NIDA) (Forman and Lachter 1989), and local school and police organizations routinely conduct influence programs in small-group settings (e.g., Project DARE) (DeJong 1987). In addition to influencing the drug use of individuals, it might also be important to change the drug treatment behavior of professionals in the field when new treatment methods are developed. What does the accumulated literature in social psychology say about changing the behavior of individuals, whether they are drug users or drug treatment professionals?

Social scientists have identified a number of factors that serve as determinants of behavior (Bandura 1986; Fishbein and Ajzen 1975; Triandis 1980). Among the most important factors are:

- A person's attitudes and goals,
- Perceptions of the attitudes of others (norms),
- Feelings of self-efficacy and actual competence, and
- Prior behaviors and habits.

This chapter focuses on the first of these factors, a person's attitudes. Changing individual attitudes is important for several reasons. First, attitudes often have a direct impact on people's behaviors. Second, if the attitudes of a large number of individuals change, then societal norms presumably will change as well. Normative pressure can produce behavior change even if an individual's own attitudes do not change. Third, unless people's attitudes are changed, they may lack the motivation necessary to acquire the new skills or break the old habits that allow new behaviors to occur.

Among the attitudes relevant to drug abuse prevention are attitudes toward (1) oneself (e.g., low self-esteem may contribute to drug use), (2) authority figures (e.g., parents, Government officials, and teachers who eschew drug use or who advocate new treatment approaches), (3) peers (e.g., friends and colleagues), (4) the drugs themselves (e.g., are they seen as harmful or exciting?), and (5) new drug treatment programs (e.g., are they seen as beneficial or ineffective'?). The attitude construct has achieved a preeminent position in research on behavior change because of the assumption that a person's attitude is an important mediating variable between the acquisition of new knowledge and behavioral change. For example, initial drug abuse prevention efforts were often based on the view that providing the facts about drugs would lead to dislike of drugs and behavioral avoidance (Moskowitz et al. 1984; Wallack and Corbett 1987). In fact, assessments of drug prevention efforts sometimes have focused on the new knowledge acquired rather than on attitude and behavior change per se. However, knowledge change in the absence of attitude change is unlikely to result in behavior change.

Over the past 50 years, numerous theories of attitude change and models of knowledge-attitude-behavior relationships have developed (Eagly and Chaiken 1993; Petty et al. 1994). There are a number of ways to integrate the thousands of studies on attitude change in the social psychological literature. One such approach, made popular by McGuire (1985, 1989), is presented in this monograph (McGuire, this volume). The present chapter outlines an alternative approach to organizing the persuasion literature.

THE ELABORATION LIKELIHOOD MODEL OF PERSUASION

The goal of any psychological theory of attitude change is to explain how different variables, such as those associated with the source of the message (e.g., expertise), the message itself (e.g., number of message arguments), the recipient (e.g., intelligence), or the persuasion context (e.g., presence of distractions) influence the amount of attitude change produced. That is, by what psychological mechanisms do certain variables have their effects? The Elaboration Likelihood Model (ELM) of persuasion (Petty and Cacioppo 1981, 1986), which is depicted schematically in figure 1, attempts to provide an integrative framework for understanding the antecedents and consequences of attitude change.

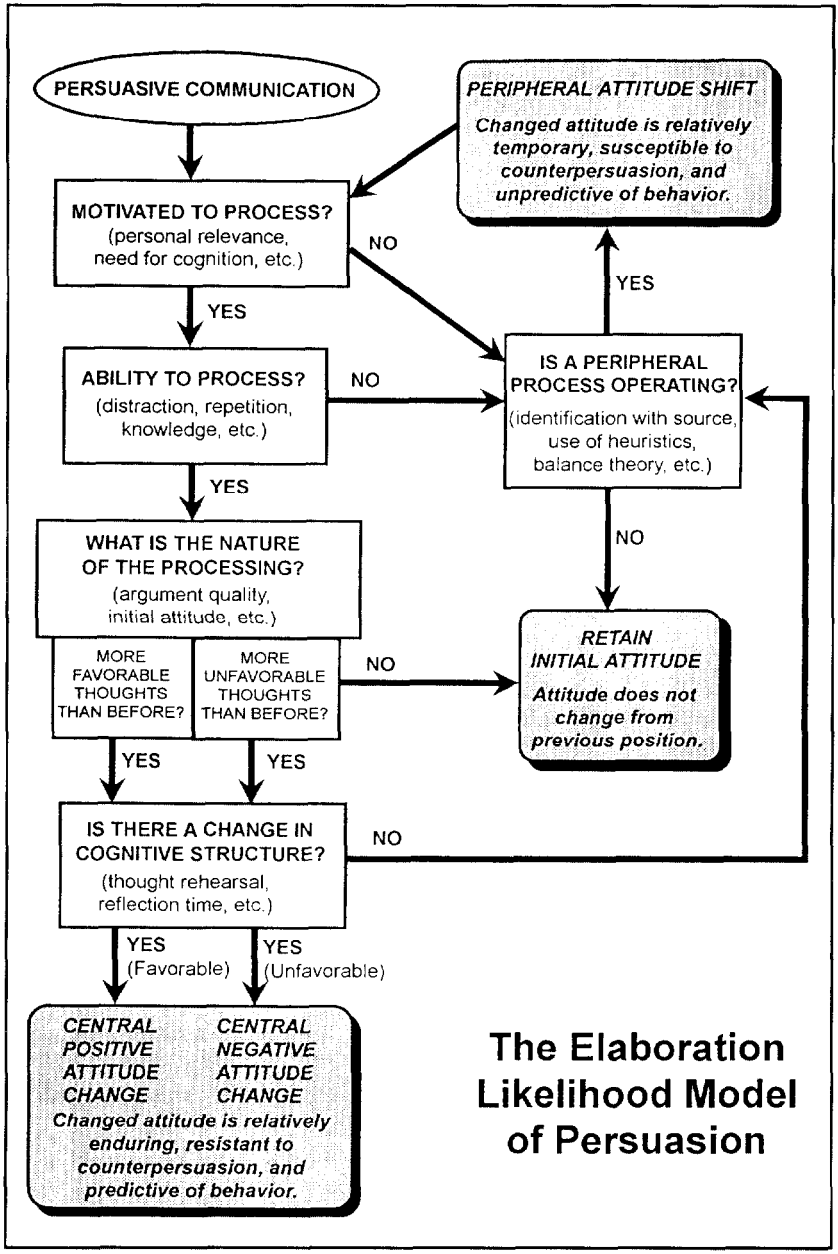

FIGURE 1. *The Elaboration Likelihood Model of persuasion. This figure depicts the antecedents and consequences of central and peripheral routes to attitude change.*

SOURCE: Adapted from Petty and Cacioppo 1986.

At its most rudimentary level, this model suggests that there are basically two relatively distinct routes to persuasion, the central route and the peripheral route. Many of the prior theories of attitude change focused on either one or the other of these routes. Understanding these routes is important, according to the ELM, because important consequences depend on which route to persuasion is followed. This model also suggests that attitude change is accomplished by variables that invoke one of a finite set of psychological processes.

Central Route

According to the ELM, the central route to persuasion involves effortful cognitive activity whereby the person draws upon prior experience and knowledge to scrutinize and evaluate the issue-relevant arguments presented in the communication (regardless whether the source is the mass media or a friend, parent, colleague. or teacher). Under the central route, the person actively evaluates the message. relates it to his or her own life, and generates favorable or unfavorable thoughts in response to it. For this to occur, the person must possess sufficient motivation and the ability to think about the merits of the information. Many variables can influence a person's motivation to think about a message, such as whether the message is perceived to be personally relevant (Petty and Cacioppo 1979a). In addition, many variables can influence a person's ability to think about a message, such as how much distraction is present in the persuasion context (Petty et al. 1976). If a person is both motivated and able to think about the underlying arguments in a message, this careful and systematic processing will result in an attitude that is well articulated and integrated into the person's belief structure.

Peripheral Route

In stark contrast to attitude change under the central route, some theories of persuasion place little credence on the arguments in a message or on issue-relevant thinking. Instead, they postulate a peripheral route whereby simple cues in the persuasion context either elicit an affective state, such as happiness, that becomes associated with the advocated position, as in classical conditioning (Staats and Staats 1958), or trigger a relatively simple inference that a person can use to judge the validity of the message. For example, a message from an expert can be judged by the inference that experts are generally correct (Chaiken 1987) without the need for the recipient to devote much effort to assessing the actual merits and implications of the information. Public service

announcements attempt to use this strategy when they rely on the audience accepting a conclusion simply because it is associated with a well-liked celebrity or sports figure. Peripheral approaches can be very effective in producing changes in attitudes, at least in the short term.

To illustrate the two routes to persuasion, consider the results of an experiment in which researchers varied the quality of the arguments in a persuasive message and the variable that served as a peripheral cue-the expertise of the message source (Petty et al. 1981). The subjects in this study-college students-received one of four messages: (1) a message with compelling arguments presented by an expert source, (‘2) a message with specious arguments presented by an expert source, (3) a message with compelling arguments presented by a nonexpert source, or (4) a message with weak arguments presented by a nonexpert source. The message was easy to understand and was presented without any distractions. Thus, all of the recipients were able to think about the message if they desired. However, the experiment manipulated the motivation of the students to think about the message they received by leading some of them to believe that the proposal, which advocated a change in an important university regulation, would take effect next year and, therefore, would have an impact on all current students. Other students were told that the proposal would not take effect for 10 years, which meant it would have no implications for current students. When the message was highly relevant to the students, their attitudes toward the proposal were based on the quality of the arguments in the message. The expertise of the source made little difference. That is, when the message was highly relevant, subjects followed the central route to persuasion and carefully evaluated the merits of the issue-relevant information presented. However, when the message was irrelevant, attitudes were not influenced by message quality, but by the salient expertise cue. These low-involvement subjects followed the peripheral route to persuasion (see figure 2). Many such simple cues have been shown to be highly effective in changing attitudes when people are either unmotivated or unable to think about the message. These cues can be associated with the source of the communication (e.g., attractiveness), the message (e.g., the mere number of arguments it contains), the message recipient (e.g., what mood the person is in), or the persuasion context (e.g., the presence of rewards) (Petty and Cacioppo 1986; Petty et al. 1994).

In sum, a number of variables that are potentially under the control of health professionals constructing drug-relevant communications can have an impact on persuasion by influencing a message recipients’ motivation

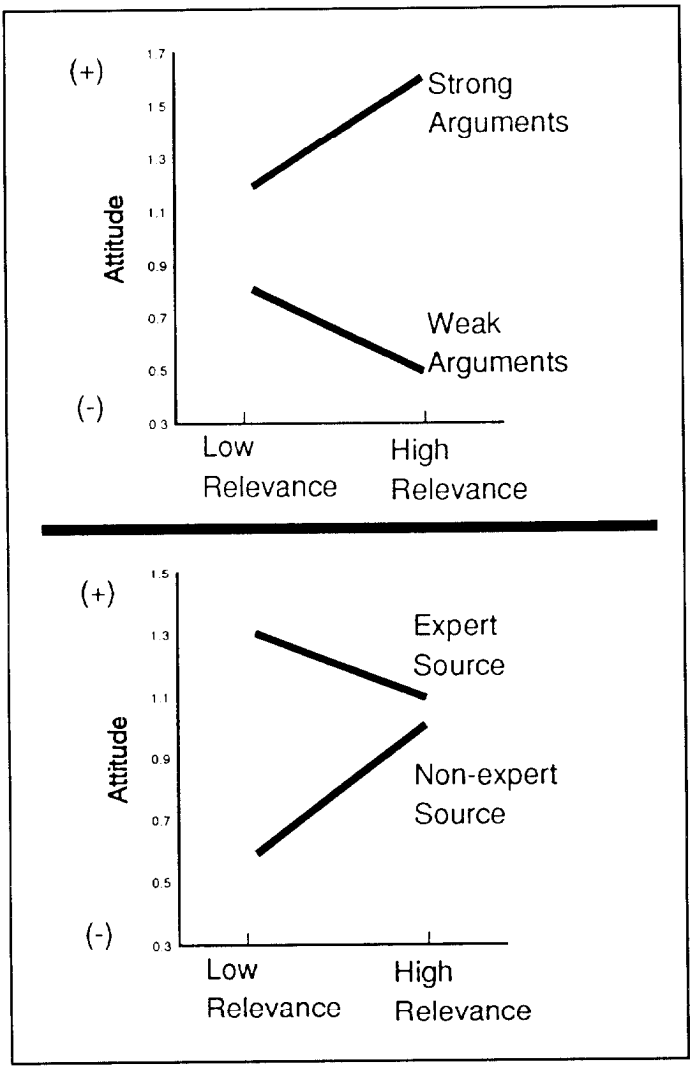

FIGURE 2. *Personal relevance and the route to persuasion. This figure shows that when personal relevance is high, uttitudes are more influenced by the quality of the arguments than when relevance is low (top panel). However, when personal relevance is low, attitudes are more influenced by the expertise of the source than when relevance is high (bottom panel).*

SOURCE: Adapted from Petty et al. 1981.

or ability to think about the communication. In addition to variables such as the personal relevance of the message or the presence of distractions that tend to affect information-processing activity in a relatively objective manner, some variables are important because they influence the *nature* of the thoughts that come to mind. Sometimes these variables influence the nature of the thinking that takes place by introducing a systematic bias to the information-processing activity. For example, telling a highly involved audience that a message is attempting to persuade them motivates active resistance and counterarguing rather than objective processing (Petty and Cacioppo 1979b). On the other hand, when people are motivated to think and are in a pleasant mood, they are biased toward generating favorable rather than unfavorable thoughts (Petty et al. 1993). Finally, in addition to variables influencing the amount or nature of information-processing activity, variables also can serve as simple cues inducing change without much effortful thinking about the substantive merits of the information provided.[1]

Consequences of the Route to Persuasion

Why does it matter if a particular variable induces attitude change by the central route (i.e., by increasing the likelihood of thinking about the substantive merits of a particular position) or by the peripheral route (i.e., by serving as a simple acceptance cue)? The ELM holds that the route to persuasion is important because attitudes formed or changed by the central route tend to have different consequences and properties than attitudes modified by the peripheral route (Petty et al., in press). For example, central route attitudes are more accessible than peripheral route attitudes-that is, they come to mind more quickly. Because these attitudes come to mind easily and are typically accessible upon the mere presentation of the relevant attitude object, they are more likely to influence behavior (Fazio 1990). For example, if a person's antidrug attitude comes to mind spontaneously on appropriate occasions, drugs are more likely to be avoided than if the negative attitude requires considerable cognitive effort to be retrieved. Studies have shown that attitudes formed or changed as a result of effortful thinking are more predictive of behavioral intentions than attitudes formed or changed with little thinking (Petty et al. 1983; Verplanken 1991). Not surprisingly, the attitudes of people who are highly involved with a health issue are more predictive of their behavioral intentions regarding the issue than are the attitudes of people who are less involved (Hoverstad and Howard-Pitney 1986).

Research also suggests that attitudes formed by the central route are more persistent over time and more resistant to counterpersuasive attempts. For example, two studies (Haugtvedt and Petty 1992) produced similar attitude changes in people who differed in their need for cognition. Need for cognition is measured by having people respond to a scale developed to assess individual differences in the tendency to engage in and enjoy effortful cognitive activity (Cacioppo and Petty 1982). In each study, all participants were presented with a message containing strong arguments presented by a credible source. Individuals with a high need for cognition and individuals with a low need became more favorable toward the position taken in the message following exposure, but presumably for different reasons. That is, individuals with a high need for cognition, who characteristically enjoy thinking, were expected to change because of then careful thinking about the strong arguments that were presented. Individuals with a low need for cognition, who act as cognitive misers, were expected to change because of the positive source cue. In one study, when attitudes toward the issue were examined just 2 days after the initial persuasive message, recipients with a low need for cognition had returned to their original attitude positions, but those with a high need persisted in their new attitudes. In a second study, subjects' new attitudes were challenged just a few minutes after they were created. Subjects with a high need for cognition resisted the attacking message to a greater extent than did those with a low need. Attitude change is not particularly valuable if the new attitude does not come to mind easily, persist over time, resist countervailing pressures, and predict behavior. Thus, attitude changes induced by the central route are preferable to attitude changes induced by the peripheral route.

In research on drug abuse prevention and on the diffusion of new drug abuse programs, many source, message, recipient, and contextual variables have been, and will continue to be, examined. The ELM notes that it is critical to understand the processes by which these variables work. For example, some health education programs have noted that peer-led discussion groups can be superior to groups led by authority figures (Jordheim 1975). Even if research demonstrates that peers are more effective than authorities in changing attitudes, it would be important to know if this was because a peer source served as a simple positive cue (e.g., "I like and trust people who are similar to me") or if a peer source enhanced the attention to and the processing of the substantive arguments. If peers work by serving as simple cues to acceptance, they can be effective in the short term, but if they work by

increasing thinking about and acceptance of the substantive arguments raised, then the attitude changes induced will be stronger.

USING THE ELM IN DRUG ABUSE SETTINGS

Why Knowledge or Attitude Change Need Not Produce Behavior Change

Figure 3 demonstrates many of the ELM principles by diagramming the reactions of six hypothetical individuals to an antidrug public service announcement presented on television. The campaign sponsors want young people to learn that using marijuana is dangerous because it can lead to the use of hard drugs. The spot features a popular celebrity who tells about two friends who were seriously harmed by drugs (Petty et al. 1991).

As depicted in the figure, person A gets nothing from the message (and will not be considered further). Persons B, C, D, and E all understand the gist of the message and would pass a typical recall or comprehension test on the specifics of the communication. Importantly, current models of persuasion such as the ELM suggest that it is unlikely that one can judge the effectiveness of a message solely by examining the knowledge acquired from the communication. Rather, an individual's idiosyncratic thoughts and interpretations of the message are critical. For example, person B actively counterargues the message, thinking that the people described in the message are atypical. Person C thinks that the people in the message may be typical but that he is invulnerable to the threat. Thus, both persons B and C dismiss the message as irrelevant to them, but for different reasons. Persons D and E have the initial response desired by the campaign sponsors: both come to think that drug use could be dangerous to them. However, person D likes danger and excitement and thinks that the drug might be desirable. Person E, who shows the expected response of disliking danger, comes to dislike the drug. (See Fishhein and Middlestadt 1987 for further discussion of the role of idiosyncratic beliefs in changing attitudes about drugs.) The important point is that only one of the four people who processed the message and would pass a typical knowledge test showed attitude change in the desired direction. Thus, having the motivation and ability to process a message is not sufficient to produce attitude change in the intended direction. The substance of the message must elicit the desired profile of thoughts.

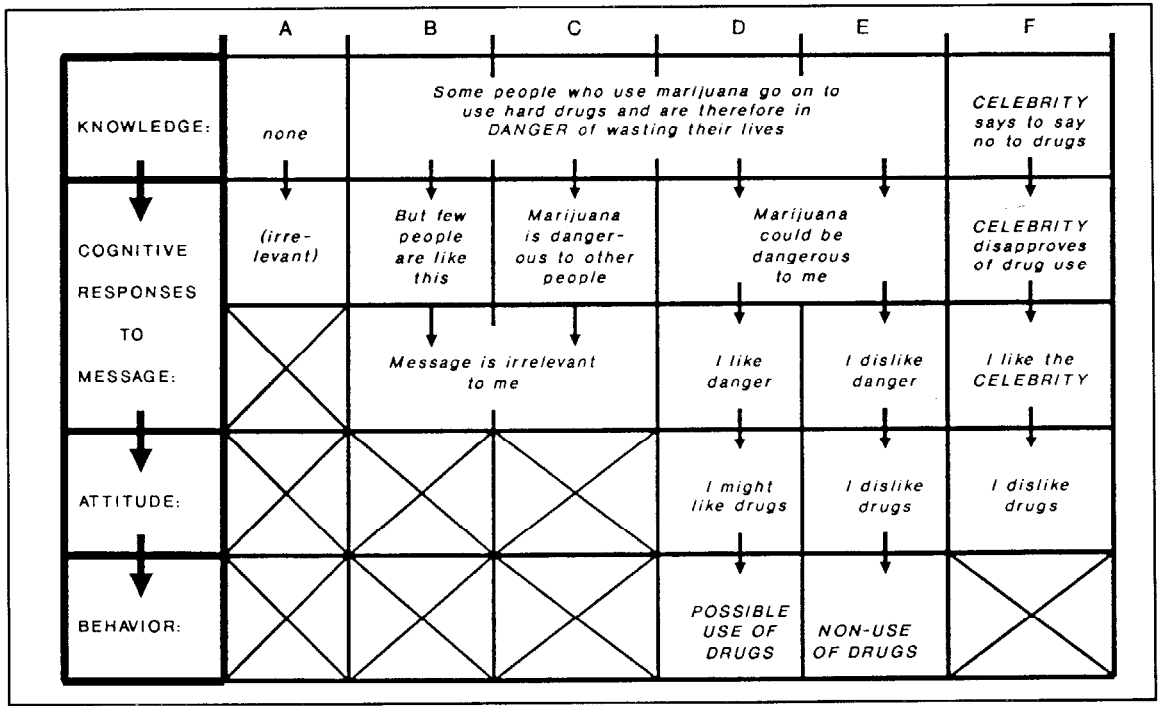

FIGURE 3. *Idiosyncratic reactions to an antidrug public service announcement. The figure depicts the possible knowledge, thoughts, attitudes, and behavior of six hypothetical individuals in response to an antidrug television commercial.*

SOURCE: Adapted from Petty et al. 1991.

Person F misses the point about the potential danger of drugs entirely (and thus would fail the comprehension test) but does learn that the featured celebrity does not like drugs. Because person F likes the celebrity, she also comes to dislike the drug mentioned in the announcement. Finally, persons E and F have the same attitude; however, as anticipated by the ELM, some attitude changes have greater implications for subsequent behavior than others. Person E's antidrug attitude, induced through the central route of persuasion, produces drug avoidance. but person F's antidrug attitude, induced through the peripheral route, does not.

In short, figure 3 demonstrates that:

- Attitude change can occur in the absence of the presumably critical knowledge (person F);

- The critical knowledge can be acquired without producing any attitude change (persons B and C);

- The same knowledge can lead to opposite attitudes, depending on how people evaluate the information (persons D and E); and

- Attitudes that are ostensibly the same can have different implications for behavior (persons E and F).

This analysis may help to explain why previous research on drug education has often found that knowledge change was insufficient for attitude and behavior change, or that attitude change was not followed by behavior change (Kinder et al. 1980; Rundall and Bruvold 1988).

Using the ELM To Develop Attitude Change Treatments

How can the ELM be used to develop effective persuasion treatments? A useful first step would be to elicit peoples' thoughts and ideas on the topic of the persuasion attempt. These thoughts and ideas would be content analyzed to determine why people hold the attitudes that they do. What are the key dimensions along which the target audience assesses the issue? What factors would likely induce resistance to attitude change? By using these thought listings, a persuasive message can be developed that targets the relevant beliefs.

Step 2 is message construction. Here, the goal is to create a persuasive message that is compelling for the target audience. Once an initial message is developed, it needs to be tested in step 3 by instructing a sample of individuals from the target audience to list their thoughts about it. These thoughts are content analyzed to ascertain which aspects of the communication elicit favorable thoughts and reactions and which are resisted and counterargued. Based on this analysis, the message is refined in step 4. The goal is to produce a message that maximizes favorable thoughts and minimizes negative thoughts when people think about it.

In step 5, ability and motivational factors are considered. Regarding ability, the goal is to ensure that the message is comprehensible to the target audience and is presented in an environment that is free of distraction and that fosters thinking. This is relatively easy. Motivating careful information-processing activity can be more challenging. However, this can be accomplished by increasing the personal relevance of the materials and increasing personal involvement by having people self-generate arguments and engage in various role-playing exercises.

In the final step, the full persuasion treatment is tested to examine the extent to which the message produces attitude change in the desired direction. In addition, the strength of the attitudes produced should be examined. As noted earlier, strength can be assessed in a number of ways. For example, one can assess the extent to which the attitude is congruent with the person's beliefs. how stable the attitude is over time, how well the attitude stands up to attack when it is challenged, or how quickly the attitude comes to mind. These procedures to assess attitude strength are especially useful when comparing two competing persuasion treatments. According to the ELM analysis, if one persuasion treatment produces 2 units of change in the desired direction and the newly changed attitude is strong (e.g., stable over time, resistant to change), whereas another persuasion treatment produces 4 units of change and the attitude is weak (e.g., not persistent, not resistant), the former treatment will generally be preferable. In fact, a key insight of the ELM is that producing 4 units of attitude change through the peripheral route may not be as desirable as producing just 2 units of attitude change through the central route.

CONCLUSION

Research on social influence has progressed a long way from the early notion that providing antidrug information alone will prevent drug use. Social influence is a complex, though explicable. process. The extent and nature of a person's thoughts in response to external information may be more important than the information itself. In addition, attitudes can be changed in different ways (central versus peripheral routes), and some attitude change processes result in attitudes that are more accessible, stable, resistant, and predictive of behavior than other change processes.

NOTES

1. It is important to note that, according to the ELM, any one variable can serve in multiple roles in different situations. For example, when the likelihood of thinking is very low, positive mood serves as a simple peripheral cue and increases attitude change regardless of the merits of the arguments presented. When the likelihood of thinking is very high, positive mood biases the nature of the thoughts that come to mind. When other variables in the persuasion setting have not created a very high or a very low elaboration likelihood, a person's mood can determine how much thinking he or she does (Petty et al. 1994; Wegener and Petty, in press).

REFERENCES

Bandura, A. *Social Foundations of Thought and Action.* Englewood Cliffs, NJ: Prentice-Hall, 1986.

Cacioppo, J.T., and Petty, R.E. The need for cognition. *J Pers Soc Psychol* 42:116-131, 1982.

Chaiken, S. The heuristic model of persuasion. In: Zanna, M.P.; Olson, J.; and Herman, D., eds. *Social Influence: The Ontario Symposium.* Hillsdale. NJ: Lawrence Erlbaum Associates, 1987. pp. 3-39.

DeJong, W.A. Short term evaluation of Project DARE: Preliminary indications of effectiveness. *J Drug Educ* 17:279-293, 1987.

Eagly. A.H., and Chaiken, *S. The Psychology of Attitudes.* Fort Worth, TX: Harcourt, Brace, Jovanovich, 1993.

Fazio, R.H. Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. In: Zanna, M., ed. *Advances in E.xperimental Social Psychology.* Vol. 23. New York: Academic Press, 1990. pp. 75-109.

Fishbein, M., and Ajzen. I. *Belief Attitude, Intention, and Behavior: An Introduction to Theory and Research.* Reading, MA: Addison-Wesley, 1975.

Fishbein, M.. and Middlestadt, S. Using the theory of reasoned action to develop educational interventions: Applications to illicit drug use. *Health Education Res* 2:361-371, 1987.

Forman, A.. and Lachter, S. The National Institute on Drug Abuse cocaine prevention campaign. In: Shoemaker. P., ed. *Communication Campaigns About Drugs: Government. Media and the Public.* Hillsdale. NJ: Lawrence Erlbaum Associates, 1989. pp. 13-20.

Haugtvedt, C., and Petty, R.E. Personality and attitude change: Need for cognition moderates the persistence and resistance of persuasion. *J Pers Soc Psychol* 63:308-319, 1992.

Hoverstad, R.. and Howard-Pitney, B. Involvement in heart health issues: A field experiment. In: *Advances in Health Care Research.* Snowbird, UT: American Association for Advances in Health Care Research, 1986. pp. 18-21.

Jordheim, A.E. A comparison of the effects of peer teaching, and traditional instruction in venereal disease education with criterion measures of knowledge, attitudes, and behavioral intentions. Abstract. *Diss Abstr Int* 35:5970B-5971B, 1975.

Kinder, B.N.; Pape, N.E.; and Walfish, S. Drug and alcohol education programs: A review of outcome studies. *Int J Addict* 15: 1035-1054, 1980.

McGuire, W.J. Attitudes and attitude change. In: Lindzey, G., and Aronson, E., eds. *Handbook of Social Psychology.* Vol. 2. 3d ed. New York: Random House, 1985. pp. 233-346.

McGuire, W.J. Theoretical foundations of campaigns. In: Rice, R., and Paisley, W., eds. *Public Communication Campaigns.* Newbury Park, CA: Sage. 1989. pp. 43-65.

Moscowitz, J.M.; Malvin. J.H.; Schaeffer, G.A.; and Schaps, E. An experimental evaluation of a drug education course. *J Drug Educ* 14:9-22, 1984.

Petty, R.E.; Baker, S.M.; and Gleicher, F. Attitudes and drug abuse prevention: Implications of the elaboration likelihood model of persuasion. In: Donohew, L.: Sypher. H.; and Bukoski, W., eds. *Persuasive Communication and Drug Abuse Prevention.* Hillsdale, NJ: Lawrence Erlbaum Associates, 1991.

Petty, R.E., and Cacioppo, J.T. Issue-involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *J Pers Soc Psychol* 37:1915-1926, 1979a.

Petty, R.E., and Cacioppo, J.T. Effects of forewarning of persuasive intent on cognitive responses and persuasion. *Pers Soc Psychol Bull* 5:173-176, 1979b.

Petty, R.E., and Cacioppo, J.T. *Attitudes and Persuasion: Classic and Contemporary Approaches.* Dubuque, IA: Wm. C. Brown, 1981.

Petty, R.E., and Cacioppo, J.T. *Communication and Persuasion: Central and Peripheral Routes to Attitude Change. New* York: Springer/Verlag, 1986.

Petty, R.E.; Cacioppo, J.T.; and Goldman, R. Personal involvement as a determinant of argument-based persuasion. *J Pers Soc Psychol* 41:847-855, 1981.

Petty, R.E.; Cacioppo, J.T.; and Schumann, D. Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *J Consum Res* 10:135-146, 1983.

Petty, R.E.; Haugtvedt, C.; and Smith, S. Elaboration as a determinant of attitude strength. In: Petty, R.E., and Krosnick, J.A., eds. *Attitude Strength: Antecedents and Consequences.* Hillsdale, NJ: Lawrence Erlbaum Associates, in press.

Petty, R.E.: Priester. J.P.; and Wegener, D.T. Cognitive processes in attitude change. In: Wyer, R.S., and Srull, T.K., eds. *Handbook of Social Cognition.* Hillsdale, NJ: Lawrence Erlbaum Associates, 1994.

Petty, R.E.; Schumann, D.; Richman, S.; and Strathman, A. Positive mood and persuasion: Different roles for affect under high and low elaboration conditions. *J Per Soc Psychol* 54:5-20, 1993.

Petty, R.E.; Wells, G.L.; and Brock, T.C. Distraction can enhance or reduce yielding to propaganda. *J Pers Soc Psychol* 34:874-884, 1976.

Rundall, T.G., and Bruvold, W.H. A meta-analysis of school based smoking and alcohol use prevention programs. *Health Educ Q* 15:317-34. 1988.

Staats, A.W., and Staats, C. Attitudes established by classical conditioning. *J Abnorm Soc Psychol* 67:159-167, 1958.

Triandis, H.C. Values, attitudes, and interpersonal behavior. In: Howe, H., and Page, M., eds. *Nebraska Symposium on Motivation.* Vol. 27. Lincoln, NE: University of Nebraska Press, 1980.

Verplanken, B. Persuasive communication of risk information: A test of cue versus message processing effects in a field experiment. *Pers Soc Psychol Bull* 17:188-193, 1991.

Wallack, L.. and Corbett, K. Alcohol, tobacco, and marijuana use among youth: An overview of epidemiological, program and policy trends. *Health Educ Q* 14:223-249, 1987.

Wegener, D.T.. and Petty, R.E. Effects of mood on persuasion processes: Enhancing, reducing, and biasing scrutiny of attitude-relevant information. In: Martin, L.L.. and Tesser. A., eds. *Striving and Feeling: Interactions Between Goals and Affect.* Hillsdale, NJ: Lawrence Erlbaum Associates, in press.

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Transferring Research Findings on Persuasion to Improve Drug Abuse Prevention Programs

William J. McGuire

INTRODUCTION

The behavioral science knowledge whose transfer is discussed here consists of the basic research findings on persuasive communication and social influence, a topic domain heavily studied in the social and behavioral sciences for a half century. The area to which the basic research findings on persuasion are to be transferred is the development of more effective programs to prevent drug abuse.

PREVENTION AS THE BEHAVIORAL AND YOUTH AS THE AUDIENCE FOCUS

The persuasive communication knowledge base can be applied to reducing the drug abuse problem primarily via prevention and particularly in youth. Most practitioners recognize that prevention is not the only approach to solving drug abuse problems: one could aim at supply interdiction as well as demand reduction, and demand reduction could involve treatment of the already addicted as well as prevention in the nonaddicted. This chapter focuses on the latter branch, preventing the unaddicted person from getting addicted because it is a goal especially amenable to persuasion. Once a person has become hooked on drugs (by physiological dependency or by social lifestyle), treatment calls for one-on-one counseling, medical intervention, and social support networks. Mass persuasion serves programs treating the addicted only in peripheral roles such as convincing people to call an 800 helpline number to learn about available treatment programs or convincing them to stay off drugs once they are detoxified. In supply interdiction programs also, persuasion is confined to limited roles such as talking some youths out of getting involved in the street-level distribution process (but with other youths queuing up to take the vacated places). Hence this discussion of persuasion campaigns will be aimed at demand reduction more than

supply interdiction and, within demand reduction. at prevention more than at treatment.

The high-risk population on whom this chapter focuses is youth, not simply to stay within the mandate of the Kauffman Foundation (one of the sponsors of this technical review), but more because the familiar adage. “There are no old drug addicts.” has a kernel of truth. Illegal substance abuse is a young person’s game: if people can be gotten through youth without their getting hooked on illegal drugs they are probably home free, drug free. Admittedly addiction to legal (prescription) drugs (e.g., Valium) often starts later in life, but in that area the prime prevention audience is the prescribing physicians as well as the consuming public.

A BRIDGE BETWEEN POPPER’S WORLD 2 AND WORLD 3

Over the years conferences on substance abuse have brought together two groups: applied professionals engaged in developmg campaigns to persuade (young) people to stay off drugs and basic researchers studying the persuasion process. These two groups have complementary domains of expertise whose integration seems very promising. The professional practitioners at these meetings exhibit a remarkable command over the facts of substance abuse, able to thumb through their printouts to answer questions about who uses which drugs at what time of day in Newark, NJ, or what percentage of the Chicago jail inmates arrested for various crimes was found to have been on which drugs during the past month. However, these practitioners tend to lack general theoretical formulations which would facilitate their using these factual data to devise effective abuse reduction programs. The other group of participants, the basic researchers on persuasion. show the opposite pattern of information, possessing a rich lore of theories relevant to prevention of drug abuse (e.g., dissonance theory, attribution theory, theory of reasoned action, heuristic processing theory, social judgment theory, evaluation likelihood theory) but are unfamiliar with the realities, with the factual data on drug abuse. Bringing together two groups of professionals who have such complementary knowledge patterns promises a productive synthesis. The technology transfer on which this chapter focuses involves bridge building between these two domains of expertise.

The Information Overload Problem

The promising synthesis is hard to achieve: The two groups of specialists converge at these conferences from different institutional settings and tend to return to their noncommunicating cultural worlds to continue on their separate ways. Organizational structures can promote collaboration, but as the highly interdisciplinary social scientist John Dollard asserted, ultimately interdisciplinary collaboration must be achieved within one skull. For effective technology transfer there is need not only for institutional structures that bring the two types of specialists together, but also for a conceptual framework that provides antidrug practitioners and their basic research collaborators with sufficient cognitive control over the basic research findings to allow their creative use in developing effective prevention campaigns.

The practitioners already are burdened with mastering the facts in their own applied area of drug abuse reduction, and so it seems too much to ask that they also master the basic research literature on persuasion so thoroughly as to be able to make maximum creative use of it. The basic research literature on the persuasion process is intimidatingly rich. "Psychological Abstracts" now summarizes about 50,000 books and articles per year, an annual harvest that has been accumulating for over 60 years. A half-million empirical studies are now available in the computerized databases. Samples of the "Psychological Abstracts" taken several times over the years indicate that between 5 percent and 8 percent of the studies reported have close relevance to social influence and persuasion. Thus, over 25,000 persuasion studies have now accumulated, with 1,000 or 2,000 new ones added each year. Even the basic researcher on persuasion, for whom the vast literature on social influence is primarily written, is able to keep up with only a small fraction of it. How then can professional developers of programs to reduce substance abuse be asked to keep up with this vast literature on top of their other responsibilities?

An Informational Retrieval and Organizing Solution

A solution is suggested by Popper's analysis of the informational universe in terms of Worlds 1, 2, and 3. World 1 is the actual world with which people are trying to cope, in this case the actualities of substance abuse. World 2 is one's own personal mastery, as an individual prevention professional in this field, including the relevant knowledge regarding drug abuse prevention that one can retrieve from one's own

cognitive repertory and personal records. World 3 is the culture's depository of knowledge regarding the World 1 in question, including the World 2 knowledge in oneself and in one's colleagues in the culture with whom one is networked, plus the information on the topic stored in archival depositories that one can access. For the individual practitioner to make effective use of the culture's World 3 scientific research on persuasion in devising programs to reduce substance abuse, it is not necessary to enter the 25.000 studies into one's personal World 2 but only to have the tools to exploit this World 3 archived information as needed.

For the individual professional to transfer the culturally available World 3 knowledge to creative World 2 working cognition as needed calls for three kinds of mechanisms: (1) The vast World 3 compendium of information on social influence must be archived and made accessible (e.g., on CD-ROM): (2) efficient search procedures must be available to allow the prevention professional to efficiently select from this vast body of social influence research the findings that can help solve the specific problems met in constructing antidrug campaigns; and (3) a conceptual framework is needed to represent the retrieved information in a form that allows the practitioners to use it creatively to solve specific problems which arise in developing programs to reduce substance abuse. This conceptual framework must serve by presenting options and providing bases for choosing among the options.

The discussion in this chapter concentrates on the third of these three transfer mechanisms. The first two mechanisms, accessing and selecting the needed information from data depositories, are readily available and will be generally familiar to many readers of this monograph. For those wishing to know more about these first two transfer mechanisms, a useful practitioner's handbook is the new edition of Reed and Baxter (1992). The focus here is exclusively on the less familiar and more specific third mechanism, namely, providing a conceptual framework that allows the practitioner to use the retrieved persuasion information creatively. As an organizing framework that allows the substance abuse program designer to make good use of the basic research on persuasion, the communication/persuasion matrix is proposed.

THE COMMUNICATION/PERSUASION MATRIX

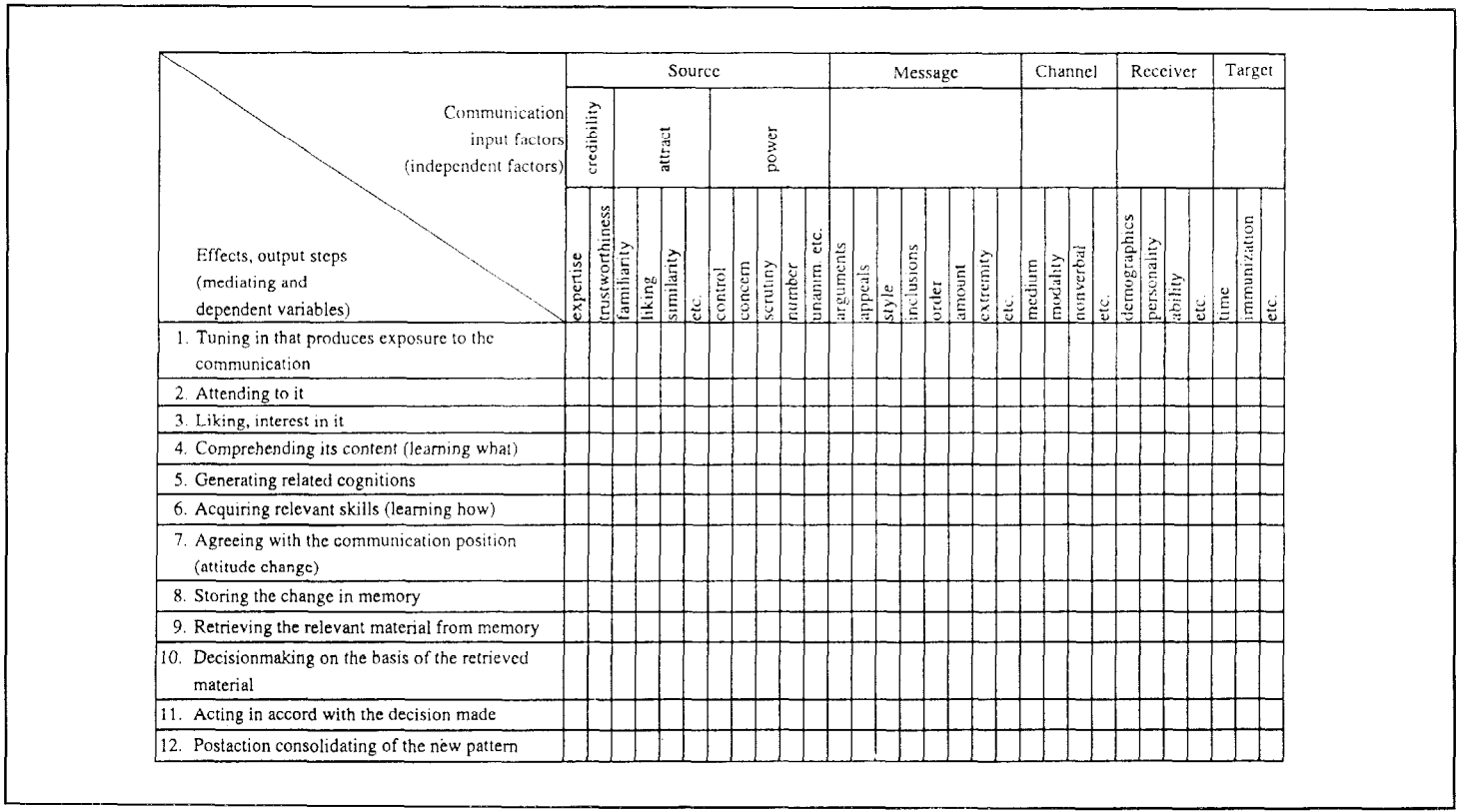
Basic and applied antidrug abuse professionals now have access to an informational feast in the numerous computerized databases that make available the vast research literature, including databases such as Druginfo/Alcohol Use and Abuse (University of Minnesota), the Addiction Research Service (Brown University and Dartmouth Medical School), ERIC, PsycINFO, Sociological Abstracts, and MEDLINE. Indeed the ocean of electronically available information may leave the researcher who has asked for information feeling like the sorcerer's apprentice-in danger of being inundated by the flood of literature retrieved. Fortunately, most of the databases offer sophisticated, highly selective search procedures, and the researcher who persists in using these databases becomes skilled in retrieving most of the relevant studies with a minimum of irrelevant ones. The communication/persuasion matrix is a powerful tool both for guiding an efficient search and especially for making efficient use of the studies once they are retrieved.

The Nature of the Communication/Persuasion Matrix

When one is faced with so intimidating a cognitive task as transferring the vast research literature on social influence into a form that presents useful options to designers of prevention campaigns, a useful general procedure is to break down the formidable overall problem into components and subcomponents that make the total task more manageable by allowing it to be solved piece by piece. Here, as often, a useful first cut is an input/output analysis.

Input (Communication) Variables. Inputs to the communication/persuasion process are the independent variables, the various components and subcomponents out of which a communication campaign can be constructed. A popular input analysis utilizes Lasswell's (1948) interrogative depiction of communication as a matter of who says what via which medium to whom for changing what behavior. Information theory jargon translates this interrogative formulation into five broad categories of communication input variables-source, message, channel, audience, and target behavior-each of which can be subdivided successively as illustrated in figure 1. For example, source variables can be divided (and subdivided) into credibility (including expertise, trustworthiness, etc.), attractiveness (including familiarity, similarity, liking, beauty, etc.), and power (including means control, scrutiny, etc.)

FIGURE 1. *The communication/persuasion input/output matrix.*



Communication input factors (independent factors) / Effects, output steps (mediating and dependent variables)	Source											Message								Channel				Receiver				Target		
	credibility		attract				power																								
	expertise	trustworthiness	familiarity	liking	similarity	etc.	control	concern	scrutiny	number	unanim etc.	arguments	appeals	style	inclusions	order	amount	extremity	etc.	medium	modality	nonverbal	etc.	demographics	personality	ability	etc.	time	immunization	etc.
1. Tuning in that produces exposure to the communication																														
2. Attending to it																														
3. Liking, interest in it																														
4. Comprehending its content (learning what)																														
5. Generating related cognitions																														
6. Acquiring relevant skills (learning how)																														
7. Agreeing with the communication position (attitude change)																														
8. Storing the change in memory																														
9. Retrieving the relevant material from memory																														
10. Decisionmaking on the basis of the retrieved material																														
11. Acting in accord with the decision made																														
12. Postaction consolidating of the new pattern																														

Message variables can be divided into types of appeal, forms of arguments, inclusions and omissions, ordering of the included material, style, number of arguments and repetition, extremity of claim, and so forth, each of which subcategories can be further divided.

Output (Dependent) Variables. The output (that is, the mediating and dependent variable) side of the communication/persuasion process consists of the chain of responses by the intended audience that constitute the process of their being persuaded. This process can be analyzed in various ways and at different levels of refinement-from a simple three-step analysis (reception, agreement, and action) to a fine-grained analysis into several dozen steps (McGuire 1978). Figure 1 presents an analysis of intermediate complexity, identifying a dozen successive output steps that make up the process of being persuaded.

Cells in the Matrix Array. This input/output analysis of the communication/persuasion process can be organized into the matrix array shown in figure 1, with the five classes of communication input variables (and several levels of their subcategories) constituting the column headings and the dozen output steps constituting the row headings. In each cell in the rectangle formed by these columns and rows, one can enter the relation between the cell's column heading (one of the communication input variables) and the cell's row output variable [one of the dozen steps making up the process of being persuaded). For example, if one wants to record information about how some message-style input variable (such as literal versus figurative speech) affects some output step such as understanding the arguments (or agreeing with them or remembering them), one enters the obtained relation as found in past research in the cell where these column and row variables intersect. In the case of literal versus figurative speech one enters in the cell the obtained relations showing that similes evoke more agreement than literal statements, and metaphors more than similes. In this way the communication/persuasion matrix can provide a conceptual framework that makes manageable the vast body of basic research findings on persuasion and the social influence process and puts this information into a form that allows efficient transferral to practitioners for use in designing programs to deter people from drug abuse.

Uses of the Communication/Persuasion Matrix

Uses in Diagnosing and Improving an Existing Campaign. The communication/persuasion matrix has a number of uses in developing effective programs to reduce drug abuse. First, when one is trying to

improve an existing prevention campaign. the matrix provides a diagnostic evaluation and suggests modes of improvement. One can use the row output steps as a checklist to analyze the campaign regarding its promise for evoking each of the dozen response steps contributing to persuasion. Where the campaign appears to be weak in evoking one of these output steps, a scan of the cells in that weak output row can identify a cell entry that indicates a large positive relation to its cell heading. This cell-heading input then can be added to the campaign to evoke the initially neglected output step.

Uses in Constructing a New Campaign. A second use is for designing from scratch a new campaign against drug abuse. The column input variables and subvariables of the matrix lay out the communication components from which the new campaign can be constructed. The adequacy of one's initial collection of tentatively selected inputs then can be evaluated by tracing down each of their columns of cells and using the cell entries in each column to ascertain whether these inputs together elicit each of the dozen needed output steps. Typically one finds that the tentative initial set of communication inputs for the new campaign will be deficient in eliciting one or more of the dozen row response steps needed for persuasion to occur. Then one can scan the cell entries in the missing-response rows to identify other column input variables whose addition to the campaign promises to be especially evocative of the initially neglected output response.

Uses in Retrievable Storage of New Persuasion Findings. A third use of the matrix is to retrievably store the new findings one comes upon as one chronically or sporadically tracks the research literature on persuasion. Instead of accumulating an indeterminable list of relations between miscellaneous independent and dependent variables, one can rather store each newly discovered relation of interest in the appropriate matrix cell constituted by the relation's independent variable column and the dependent variable row. Input-output matrices constitute an efficient method of information storage and retrieval.

Uses in Identifying Areas Needing Further Research. Fourthly, the communication/persuasion matrix is useful to policymakers charged with funding areas of basic research that promise high transfer to areas of applied social needs such as the reduction of drug abuse. These policy-makers can use the matrix by noting blank cells as indication that little is known about the relation between the column input and the row output (McGuire 1994). Funding priorities then can be set to channel research

toward relatively neglected but promising relations, in preference to research on variables whose cell entries indicate that their relations are comparatively well understood.

Uses in Adjusting the Level of Detail. A fifth advantage of the communication/persuasion matrix is that its analysis of the communication inputs into various levels of components and subcomponenrs provides a zoom search feature. This feature allows one to begin constructing or evaluating a substance abuse prevention campaign by analyzing it in terms of broad input categories, as shown in figure 1, in order to get the big picture. Subsequently one can zoom in to fine-tune the campaign in terms of various sub-subcomponent inputs once the general line of the campaign has been laid out. For example, when fine-tuning the audiovisual presentation style of the communicator of the drug abuse prevention message, one may want to assure that this speaker is sending the right nonverbal cues to evoke the audience's perception that the person is credible, likable, and powerful. One can zoom in on the "nonverbal cues" subcategory under the "channel" category in figure 1 and expand it by singling out a fuller, more refined subcategorization of nonverbal cue inputs that project the speaker's credibility, likableness, and power.

For example, zooming into a more refined, fuller list of subcategories of nonverbal cues, as shown in figure 2, the columns of the matrix remind one that these can be visual or vocal: and that the visual can include facial expression, posture, kinesics (gestures and other movements), proxemics (e.g., closeness, body orientation), and adornment (e.g., clothes, hair-style). Facial expression can be subdivided into eyes, forehead, and mouth; eyes can include eye contact (gaze) and pupil dilation. If the program designer's diagnosis of the campaign has indicated weakness in the perceived likability of the expert source being interviewed, then the designer can look across the "perceived likability" row of the fine-grained nonverbal cues columns of figure 2 and note that in the cell where the "perceived likability" row and the "gaze" column intersect, the entry in this cell indicates that likability increases as eye contact goes up from 0 percent to about 80 percent (but may decline with further contact in the 80 percent to 100 percent range, which may be perceived as threatening rather than liking). Hence the visuals can be modified to increase the interviewee's eye contact toward 80 percent in order to increase likability. However, the program designer inspecting the entries in the cells in this "eye contact" category may note in the "perceived power" row that perceived power goes up with eye contact while speaking but down with

FIGURE 2. *Effect of various types of nonverbal cues (column headings) on the speaker's perceived credibility, likability, and power (row headings)*

Effect on Perception of the Speaker	Types of nonverbal cues											
	Visual nonverbal cues									Vocalic nonverbal cues		
	Facial expression			Posture		Kinesis		Proxemics	Adornment	Speed	Intensity	Grammar
	Eye Contact	Forehead	Mouth	Openness	Symmetry	Gestures	Movements					
Perceived credibility												
Perceived likability												
Perceived power												

eye contact while listening. Hence the expert source being interviewed should look away while being questioned but maintain high eye contact while replying. The zoom capacity given by the communication/persuasion matrix also facilitates the campaign director's delegating meaningful and manageable subtasks to the different members of the campaign team.

Uses in Avoiding Common Fallacies. This matrix has a sixth use in that it saves the practitioner from several fallacies commonly made in persuasion campaigns by exposing these errors and revealing corrective possibilities. The final section of this chapter will review a half-dozen such common persuasion campaign fallacies that the matrix helps prevent.

Shortcomings of the Matrix

Deficiencies in the Column Inputs (Independent Variables). Like other information transfer mechanisms, the communication/persuasion matrix has weaknesses, and these appear on both the input and output sides of the matrix. On the input side one of the problems is nonequipotentiality of the input categories. For example, the "message" category includes many more heavily studied variables than the "channel" or "destination" categories. Information theory shows that equipotentiality is optimal for efficient information transmission. In this case one can achieve such transmission by dropping to sub- or sub-sublevels of the richer categories. A more serious input shortcoming is that many of the input variables interact (e.g., how a "message" variable such as the level of fear appeal will affect persuasive impact depends upon "receiver" variables like the chronic or acute anxiety level of the high-risk subpopulation). This interaction complication interferes with the information-processing ideal that one should be able to concentrate separately on each component while ignoring the other components.

Deficiencies in the Row Outputs (Mediating and Dependent Variables). The matrix has weaknesses on the output side also. For example, the 12 response steps listed in figure 1 exaggerate the elaborateness with which audiences usually process persuasive communications. In many domains of life the person is likely to settle for quick-and-dirty processing of the incoming messages. In their chapters in this monograph, Petty and Fishbein describe alternative routes to persuasion involving fewer processing steps. It is also likely that there are direct connections between behavioral steps shown as far apart in figure 1. It is likely even that the commonsense sequence of steps shown in figure 1 is

sometimes reversed (McGuire 1985). Such weaknesses in the communication/persuasion matrix should encourage one to improve (or even replace) the model but should not inhibit one from using the model for what it is worth. At the least, the model saves one from a great deal of the floundering around and from the demoralization that is likely if one is inundated by a tidal wave of research information without having any conceptual framework within which to process it. More important, the matrix helps to prevent a half-dozen errors commonly made in persuasion campaigns.

CAMPAIGN FALLACIES THAT THE COMMUNICATION/PERSUASION MATRIX REDUCES

When they work without the guidance of a conceptual framework, designers of persuasion campaigns-ranging from commercial advertisers of detergents to public health professionals responsible for drug abuse prevention programs-all tend to make common errors from which they might have been saved by using the communication/persuasion matrix. Here half a dozen such common fallacies in persuasion campaigns will be described, and how they can be avoided when transfer of basic research findings is guided by the communication/persuasion matrix will be indicated.

The Great-Expectations Fallacy

The long series of steps which constitute the row headings of figure 1 indicates that any persuasion campaign to discourage drug abuse must accomplish the difficult task of evoking a whole series of responses, each one of which the campaign is likely to evoke with a probability falling far short of the 1.0 certainty level. For example. the probability that a prevention campaign will evoke step 11 (actually refraining from drug abuse) in the target population is the product of the probabilities of its evoking the 10 preceding steps. Because the probability of eliciting each step is likely to be less than 1.00, their joint probability attenuates rapidly. For example, even if the campaign works by a peripheral route involving only five response steps and even if one assumes the campaign's probability of evoking each of the five steps to be a respectable 0.50, still the probability of an effect on the final payoff step 11, behaviorally refraining from drug abuse, would be only 0.03.

This attenuated-effects reality, starkly revealed by the communication/persuasion matrix, helps policymakers and program constructors

appreciate and avoid the fallacy of great expectations. The net impact of any one campaign will inevitably be slight, and the differential effects among competing campaigns will be even slighter, considering that this payoff impact is on a late behavioral output step (e.g., step 11) in the figure 1 rows. The realization that the effect size of any one campaign is likely to be modest should not cause one to give up but rather to mount a full-court press of multiple programs that will chip away at the problem. Technology transfer here does not promise a rose garden but rather a harvest after one tills the soil with sweat on the brow.

The Distal-Measure Fallacy

Another error often made in developing a persuasion campaign is to evaluate the campaign (or one of its components), absolutely or relative to an alternative campaign, in terms of its effect on an intermediate row step that is quite distal from the payoff step. For example, the true payoff response step for commercial advertisers is step 11, the public's actually purchasing the product. Yet when ad agencies do copy testing to choose among alternative ads, the most commonly used measures of efficacy are ad liking and ad recall, steps 3 and 4 in the figure 1 chain of output (row) responses needed for a successful campaign. The campaign is evaluated in terms of such early steps, so distal from the payoff step 11 purchasing response, because ad liking and ad recall (steps 3 and 4) are much easier to measure than purchasing (payoff step 11). However, if a campaign designer does copy testing to judge the relative efficacy of several alternative ads to deter drug abuse and uses ad recall or ad liking as the test criterion, then he or she may find a preference ordering among the several ads which will be reduced or even reversed by operation of the other row steps that intervene between these two convenient but distal steps 3 and 4 evaluation measures and the ultimate payoff step 11.

Once forewarned by the communication/persuasion matrix of the likelihood of this distal-measure fallacy when these early row steps are used to evaluate a persuasion campaign or choose among campaign options, the matrix suggests a corrective: one can reduce this fallacy by also evaluating the ad's comparative effects on the intervening steps 5 through 10. Even when resource limitations prevent measuring these intervening steps empirically. one at least can do thought experiments to estimate the relative effects on the alternative options of these intervening steps.

The Neglected-Mediator Fallacy

Without a framework like the communication/persuasion matrix, campaign designers seeking to transfer basic research on persuasion to the construction of an effective health promotion campaign often overlook the likelihood that an input variable added to the campaign to evoke one of the needed row output responses may have the undesirable side effect of reducing persuasive impact by interfering with another of the figure 1 mediating responses. For example, the campaign designer who adds a captivating musical background to the ad in order to increase attention to and liking for the message (steps 2 and 3) tends to overlook the possibility that the music might be a distraction that interferes with message comprehension (step 4) or might evoke related cognitions (step 5) that interfere with message acceptance (step 7). The availability of the communication/persuasion matrix allows the campaign designer to run the proposed music input through its likely effect on each of the string of a dozen row output steps to get a fuller perspective on how the addition will affect the bottom-line persuasive impact via mediating response steps in addition to the interestingness step 3 that motivated its addition.

The Compensatory Principle

Several examples have been given where input variables increase persuasive impact via one of the mediating output steps but reduce net persuasive impact via other output steps. Such compensatory situations are surprisingly prevalent in the relations of communication input variables to net persuasive impact. A personality characteristic that makes audience members vulnerable to persuasion via one mediating output step tends to protect them from persuasion via other output steps. For example, a target person's low self-esteem might make him or her more persuadable by increasing that person's tendency to agree with arguments but might make the target immune to persuasion by decreasing attention to and comprehension of the arguments.

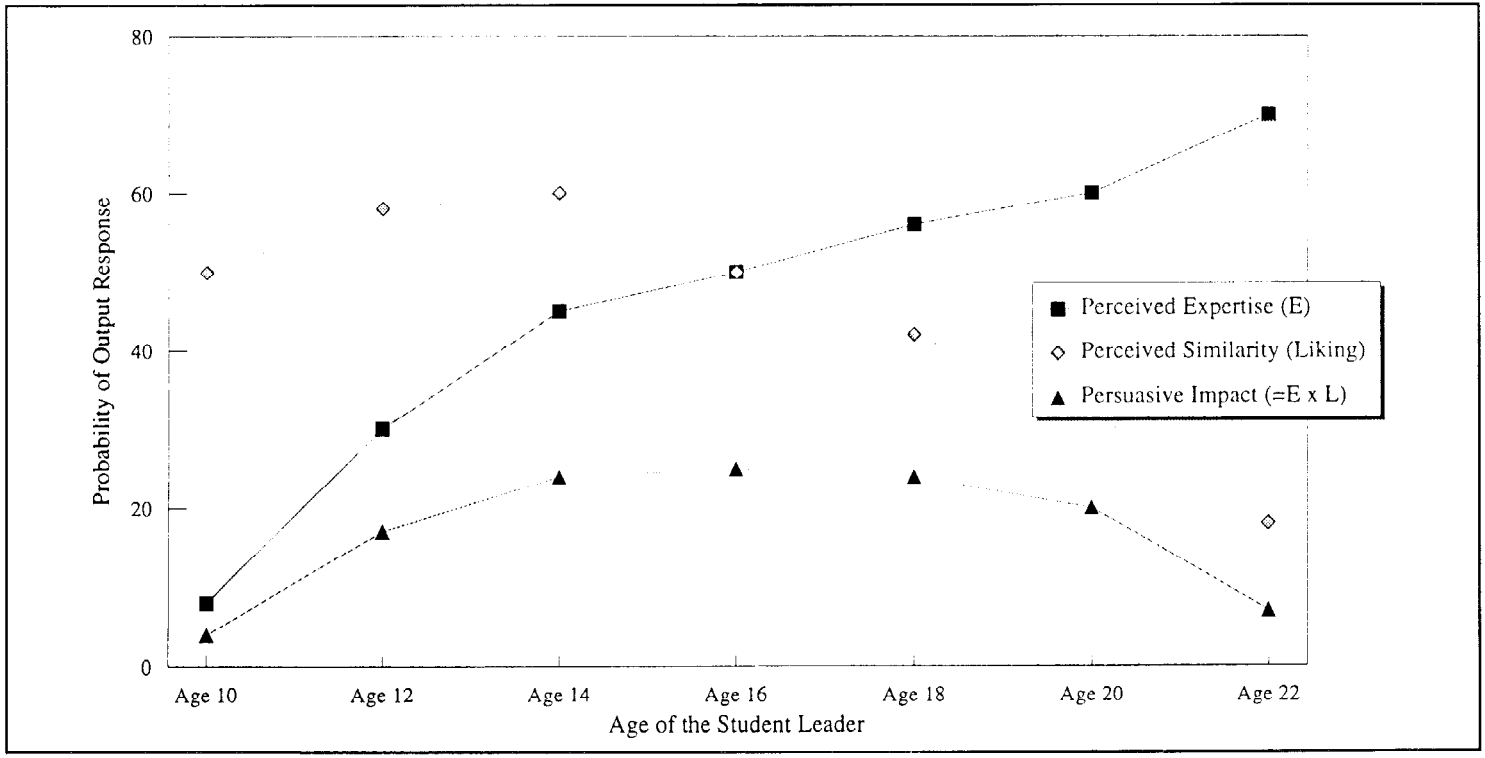
Developers of prevention campaigns who appreciate this complex set of interrelations can cope with (and even take advantage of) these complexities by modifying the campaign to increase the amount of variance contributed by the mediating step that enhances the input variable's impact and by decreasing the amount of variance contributed by its inhibiting mediating step.

The Golden-Mean Implication

The preceding compensatory postulate asserts that many campaign inputs are related to the payoff step 1 1 effectiveness in opposite directions via different mediating row response steps, as shown in figure 1. It follows algebraically that, under a wide range of conditions, such campaign inputs will have an inverted-U relation to campaign effectiveness; that is, maximum campaign impact is achieved by setting such input variables at an intermediate level rather than at an exceedingly high or low level. Even a seemingly clear-cut input variable such as source status, which might be expected to have a monotonic increasing relation to campaign effectiveness, is likely to have an inverted-U relation such that an intermediate level of source status tends to be optimal for persuasive impact. Source status increases persuasive impact by making the source seem more credible but decreases impact by making the source seem unattractively dissimilar to the target audience and distant from the audience's concerns. It follows algebraically under most conditions that a source perceived as intermediate in status (a bit higher than the audience's status) would have the most impact, more than either a low-status source or a very high-status source. In general, this golden-mean implication of the communication/persuasion matrix reveals as fallacious the assumption that "if some is good, more is better." For inputs as varied as the source's age discrepancy from audience, or the level of fear motivation aroused by the message, or the number of arguments presented, a more appropriate principle is that "if some is good, more may be too much." A high-status source such as the U.S. Surgeon General has high impact, but may have even greater impact if the source takes a humanizing pratfall or has funny whiskers.

An illustrative input variable is the age gap between the high-risk target children and the student leaders who are giving messages against drug abuse. Assume a Kauffman Foundation Student-Taught Awareness and Resistance (STAR) project includes a module aimed at 14-year-olds in which student leaders advocate certain techniques for resisting peer pressure to experiment with drugs. How old should these student leaders be (relative to the target 14-year-olds) to maximize persuasive impact? As illustrated in figure 3, the older the leaders are, the more expert they would be perceived (thus tending to heighten their persuasive impact), but also the more dissimilar to themselves they would be perceived by these younger 14-year-old targets (thus tending to lower their persuasive impact). Combining these two functions algebraically yields the solution that, under a wide range of conditions, the net persuasive impact (equals

FIGURE 3. *Effects of the age of student-leader spokespersons on how they are perceived by and persuade the 14-year-old middle-school children to adopt peer-pressure resistance techniques.*



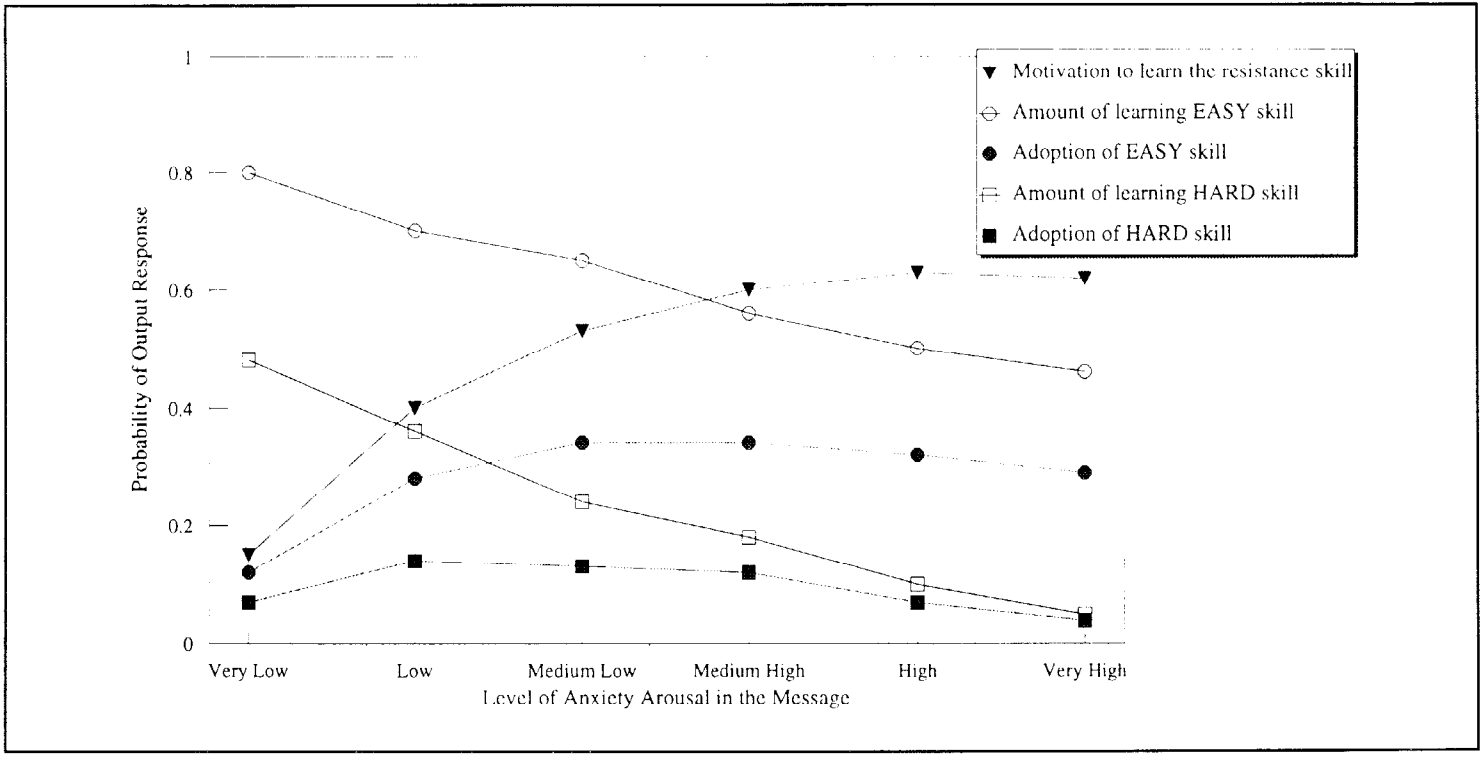
probability of perceived expertise multiplied by probability of perceived similarity) will be nonmonotonically related to the spokesperson's age, maximizing when the student leader is 2 or 3 years older than the 14-year-old audience, and declining as the leader becomes an age peer or younger, and also declining as the leader becomes 4 or more years older than the targets.

The Situational-Weighting Implication

A sixth implication of the communication/persuasion matrix allows one to be specific about the golden-mean fifth implication which asserts that any column input variable is likely to have maximal persuasive impact when set at some intermediate level rather than at a very high or very low level. The situational-weighting implication helps specify what level is optimal. For example, the nonmonotonic relation between the input variable and the net persuasion impact often arises because the input variable affects message comprehension (step 4) in the opposite direction from that in which it affects agreement (step 7). This relation is the case for input variables as diverse as amount of eye contact, audience anxiety level, and amount of animation used.

In such cases an analysis of the circumstances of the campaign allows one to ascertain whether the optimal intermediate level on the input variable is toward the high or the low end by analyzing whether comprehension or acceptance is the main barrier to campaign effectiveness. For example, if one is developing a campaign to help young people resist peer pressure to experiment with drugs and one is deciding how vividly to paint the dangers involved, one should analyze the circumstances of the campaign, especially as regards the extent to which the main determinant of campaign effectiveness is mastery of the peer-resistance techniques (step 6) versus willingness to use these techniques once mastered (step 7). If the campaign has to teach complex peer-resistance techniques, one might better lower the message's fear arousal because fear increases acceptance at the expense of interfering with this difficult skill learning. On the other hand, if the resistance skills being conveyed are easy to grasp but require considerable motivation to be utilized, then a high level of fear arousal would be indicated. Figure 4 shows graphically why the level of anxiety arousal in the message that is optimal for inducing use of resistance skills is higher when the skill is easy than when it is hard to master.

FIGURE 4. *Optimal level of anxiety-arousal in the message as a function of whether the resistance skill being taught is easy or hard to master.*



Devising an effective persuasion campaign is often a complex and challenging process. Utilizing these implications of the communication/persuasion matrix makes these complications more manageable by laying them out explicitly and indicating modes of coping with them.

CONCLUSIONS

Because this monograph was initiated by the National Institute on Drug Abuse's (NIDA) Technology Transfer Program to identify processes for transferring the findings of basic research to forms in which they are maximally useful for practitioners, this chapter has focused on process rather than content. That is, the chapter describes the process by which the vast scientific literature on persuasive communication can be translated into a form usable by practitioners responsible for developing effective programs to prevent substance abuse. The chapter has focused on process and has discussed content only in providing illustrations of the processes. Rather than discussing the content of this literature that is to be transferred, the chapter has focused on the communication/persuasion matrix as a useful conceptual framework in which to array the basic research findings on persuasion, once retrieved, so they can be applied effectively to the process of developing effective prevention programs to reduce substance abuse. This presentation has been limited to describing a communication/persuasion framework that allows practitioners to organize past and present basic research, to keep up with future research, and to use it effectively to develop prevention campaigns, but has not described the content of the empirical findings and of the theoretical models that would be transferred.

Those interested in the content of the persuasion literature, in the form of confirmed empirical relations and theoretical principles, can find illustrative content in the chapters in this monograph by Petty and Fishbein. Also, this relevant content has appeared in other publications. The booklength "Handbook of Social Psychology" chapter on attitude change (McGuire 1985) summarizes most of the persuasion findings in terms of this communication/persuasion matrix. The article in the British "Health Education Research" journal (McGuire 1991) presents 16 guiding-idea theories of the person that can be used to introduce motivational content into campaigns to prevent drug abuse; that article tries to answer a question that even Freud did not dare ask, "What do drug addicts want?" The chapter in the recent Australian review of drug abuse problems (McGuire 1992) describes a seven-step procedure for using these contents

to develop public health persuasion campaigns to prevent drug abuse. The chapter in the volume on disseminating clinical health information (McGuire 1994) presents a detailed analysis of the social influence process in terms of the communication/persuasion matrix and works systematically through the input columns and the output rows shown in figure 1 to identify a wide range of recent content advances relevant to what a public health prevention campaign should include in order to be effective. That latter chapter also identifies a variety of recent content advances as being particularly deserving of funding by health agencies such as NIDA. An overview of the recommended process for developing a public health program is provided in McGuire (1984).

REFERENCES

Lasswell, H.D. The structure and function of communication in society. In: Bryson, L., ed. *Communication of Ideas. New* York: Harper, 1948.

McGuire, W.J. The communication/persuasion matrix. In: Lipstein, B., and McGuire, W.J., eds. *Evaluating Advertising: A Bibliography of the Communication Process. New* York: Advertising Research Foundation, 1978.

McGuire, W.J. Public communication as a strategy for inducing health-promoting behavioral change. *Prev Med* 13:299-319, 1984.

McGuire, W.J. Attitudes and attitude change. In: Lindzey, G., and Aronson, E.. eds. *The Handbook of Social Psychology.* 3d ed. Vol. 2. New York: Random House, 1985.

McGuire, W.J. Using guiding-idea theories of the person to develop educational campaigns against drug abuse and other health-threatening behavior. *Health Educ Res Theory Prac* 6:173-184, 1991.

McGuire, W.J. Designing a persuasion campaign to reduce substance abuse. In: White, J.; Ali, R.; Christie, P.; Cormack, S.; Caughwin M.; Mendoza, J.; and Sweeney, R., eds. *Drug Problems in Our Society: Dimensions and Perspectives.* Parkside, South Australia: Drug and Alcohol Services Council, 1992.

McGuire, W.J. Using mass media communication to enhance public health. In: Sechrest, L., ed. *Effective Dissemination of Clinical Health Information. Conference Report.* Rockville, MD: Agency for Health Care Policy and Research, 1994.

Reed, J.G., and Baxter, P.M. *Library Use: A Handbook for Psychology.* 2d ed. Hyattsville, MD: American Psychological Association, 1992.

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Developing Effective Behavior Change Interventions: Some Lessons Learned from Behavioral Research

Martin Fishbein

INTRODUCTION

The behavioral sciences have made a major contribution to the understanding of behavior and behavior change. This chapter summarizes some key findings, or lessons learned, from behavioral research that have important implications for the design, implementation, and evaluation of interventions directed at producing behavioral change.

LESSONS LEARNED

Behavior Can Be Changed

First, research has demonstrated that behaviors that were assumed to be difficult to change can be changed. The past 10 years have witnessed major changes in various sexual practices among some segments of the gay community, as well as major changes in needle-use behavior (both cleaning and sharing) among some intravenous drug users (IVDUs). Although the behavioral sciences cannot take credit for most of the early risk reduction behavior changes in these populations, there is growing evidence that well-designed interventions can be effective in producing such change (Kelly et al. 1993). For example, Jemmot and colleagues (1992) developed a 5-hour intervention program for African-American adolescent males that focused on education in acquired immunodeficiency syndrome (AIDS), condom-use attitudes and intentions, and skills training. A 3-month followup assessment revealed that, relative to control respondents, intervention participants were more likely to use condoms and avoid unprotected sex. At the community level, early findings from the Centers for Disease Control and Prevention's (CDC) AIDS Community Demonstration Projects (CDC, in press) have shown that using community volunteers to deliver theory-based small-media materials (i.e., newsletters and pamphlets containing role model stories

designed to change beliefs, attitudes, perceived norms, and self-efficacy) can produce significant increases in both condom use and bleaching among hard-to-reach, high-risk populations.

Information Can Produce Behavior Change

Second, contrary to popular belief, there is abundant evidence that information in and of itself can produce behavior change (Ball-Rokeach et al. 1984; Fishbein et al. 1980; O'Donnell et al., in press). Although it is quite true that providing people with knowledge about a disease and how it is transmitted may have little or no impact on their behavior, other types of information (e.g., about the consequences of performing the behavior, groups who support behavioral performance, or ways to overcome barriers to behavioral performance) can be effective. Indeed, what the behavioral sciences can offer AIDS prevention efforts is an understanding of the kinds of information necessary to change behavior.

Specific Behaviors

Third, the most effective interventions will be those directed at changing specific behaviors (Fishbein 1993). Changing people's intentions to reach goals (e.g., to avoid AIDS, to stay healthy) or to engage in categories of behavior (e.g., to practice safe sex, to negotiate condom use) does not ensure change in any specific behavior. In contrast, changing someone's intention to perform, or not perform, a specific behavior (e.g., to always use a condom for vaginal sex with one's main partner, to tell one's main partner to always use a condom) usually will be followed by a change in that behavior.

The distinction between goals. behavioral categories, and behaviors is not always obvious. For example, while condom use is a behavior for men, it is a goal for women. But even among men, condom use is not a specific behavior but a behavioral category. That is, one does not simply use a condom. Instead, condoms are used for given sexual activities with specific partners, and the factors influencing the use of a condom for vaginal sex with one's main partner or spouse, for example, are quite different than those underlying the use of condoms for vaginal sex with an occasional or one-time partner or the use of condoms for anal sex with one's main partner. For this reason, different interventions will be necessary to change or reinforce different condom-use behaviors.

Immediate Determinants of Intention and Behavior

Fourth, there is a growing consensus that only a limited number of variables need to be considered in attempts to influence or maintain behavior (Fishbein et al. 1992). Many of these variables are contained in three theories that influenced much of the initial theory-based behavioral research in the AIDS arena: the Health Belief Model (Becker 1974), Social Cognitive Theory (Bandura 1986), and the Theory of Reasoned Action (Fishbein and Ajzen 1975).

According to the Health Belief Model (Becker 1974, 1988; Janz and Becker 1984; Rosenstock et al. 1994), two major factors influence the likelihood that a person will adopt a recommended preventive health action. First, the person must feel personally threatened by the disease; that is, he or she must feel personally susceptible to a disease with serious or severe consequences. Second, the person must believe that the benefits of taking the preventive action outweigh the perceived barriers to, or costs of, preventive action.

Social Cognitive Theory (Bandura 1986, 1989, 1991) also argues that two major factors influence the likelihood that one will take preventive action. First, as in the Health Belief Model. a person must believe that the benefits of performing the behavior outweigh the costs (i.e., a person should have more positive than negative outcome expectancies). Second, and perhaps most important, the person must have a sense of personal agency, or self-efficacy, with respect to performing the preventive behavior. That is, the person must believe that he or she has the skills and abilities necessary to perform the behavior under a variety of circumstances-that he or she *can* perform the preventive behavior in question.

From the perspective of the Theory of Reasoned Action (Ajzen and Fishbein 1980; Fishbein 1980; Fishbein and Ajzen 1975; Fishbein et al. 1991). there is one primary determinant of behavior: the person's intention to perform it. This intention is itself viewed as a function of two determinants: the person's attitude toward performing the behavior, which is based on his or her beliefs about the consequences of performing the behavior (e.g., his or her beliefs about the costs and benefits of performing the behavior), and the person's perception of the social, or normative, pressure exerted upon him or her to perform the behavior.

To a large extent, these theories represent a public health, a clinical, and a social psychological approach, respectively, to the prediction and understanding of behavior. While there is no real competitor to the Health Belief Model in the public health domain, there are other, well-established, clinical and social psychological behavioral theories. For example, in the clinical domain, the Theory of Self-Regulation and Self-Control (Kanfer 1987) has received considerable attention. Within the field of social psychology, the Theory of Subjective Culture and Interpersonal Relations (Triandis 1980) is often viewed as a major competitor to the Theory of Reasoned Action.

The Theory of Self-Regulation and Self-Control (Kanfer 1987; Kanfer and Kanfer 1991; Kanfer and Schefft 1988) describes how self-regulatory processes (i.e., self-observation, self-evaluation, and self-reinforcement) lead either to satisfaction with behavioral performance and continuation of the behavior or to dissatisfaction, which in turn leads to self-corrective action or termination of the behavior. Although more of a process than a predictive model, the theory identifies intentions, self-efficacy, outcome expectancies, and affective states (such as mood and emotion) as important determinants of behavior.

According to the Theory of Subjective Culture and Interpersonal Relations (Triandis 1972, 1977, 1980), the likelihood of performing a given behavior is determined by intentions, habits, and facilitating factors. Intentions, in turn, are viewed as a function of perceived consequences of performing the behavior (i.e., outcome expectancies), social influences (including norms, roles, and the self-concept), and emotions.

Taken together, these five theories have developed or contain almost all of the variables that have been utilized in attempts to understand and change a wide variety of human behaviors. In a recent meeting of the developers or principal proponents of these theories sponsored by the National Institute of Mental Health (Fishbein et al. 1992), consensus was reached on eight variables that appear to account for most of the variation in any given behavior: intentions, skills, environmental constraints, outcome expectancies (or attitude), norms, self-standards, emotional reactions, and self-efficacy. Generally speaking, it appears that for a

person to perform a given behavior. one or more of the following must be true:

1. The person forms a strong positive intention, or makes a commitment, to perform the behavior;

2. There are no environmental constraints that make it impossible for the behavior to occur:

3. The person possesses the skills necessary to perform the behavior;

4. The person believes that the advantages (benefits, anticipated positive outcomes) of performing the behavior outweigh the disadvantages (costs, anticipated negative outcomes)-in other words, the person has a positive attitude toward performing the behavior;

5. The person perceives more normative pressure to perform the behavior than to not perform the behavior;

6. The person perceives that performance of the behavior is more consistent than inconsistent with his or her self-image or that it does not violate personal standards;

7. The person's emotional reaction to performing the behavior is more positive than negative; or

8. The person perceives that he or she has the capabilities to perform the behavior under a number of different circumstances-in other words, the person has self-efficacy with respect to executing the behavior in question.

The first three factors are viewed as necessary and sufficient for producing any behavior. That is, for behavior to occur, one must (1) have a strong positive intention to perform the behavior in question, (2) have the skills necessary to carry out the behavior, and (3) be in an environment that is free of constraints such that the behavior can occur. For example, if a male IVDU is committed to using bleach every time he shares injection equipment, has bleach available, and has the skills necessary to use the bleach, the probability is close to 1.0 that he will bleach before sharing. Similarly, if this same person has formed a strong intention to always use a condom for vaginal sex with his spouse, has a condom available, does not experience strong resistance to condom use

from his spouse, and has the necessary skills to use the condom, the probability again will be close to 1.0 that he will use a condom when he engages in vaginal sex with his spouse.

The remaining five variables are viewed primarily as factors influencing the strength and direction of intention. For example, it can be argued that one will not form a strong intention to perform a behavior unless one first believes that he or she has the skills and abilities necessary to perform that behavior-that he or she *can* perform the behavior. In other words, self-efficacy may influence the strength of one's intention. Similarly, it can be argued that one will not form a strong intention to perform a given behavior unless one has a strong positive attitude toward performing that behavior (i.e., unless one believes that the advantages of performing the behavior outweigh the disadvantages). It is important to recognize, however, that one or more of these variables may also have a direct influence upon behavior. For example, by influencing the amount of effort one expends, and by influencing one's persistence in the face of barriers, self-efficacy may have a direct impact upon behavior.

It is also important to recognize that behavioral performance can influence one or more of these five variables. One may form a positive intention to perform, and may in fact perform, a given behavior partly because the person believes that performance of the behavior will lead to a positively valued outcome. When the person performs the behavior, however, this outcome may not occur. Clearly, this information will influence the person's behavioral beliefs (or outcome expectations), which may in turn influence intentions and future behavioral performances.

To summarize briefly, intention. skills, and the absence of environmental constraints are viewed as necessary and sufficient for producing any behavior. In contrast, attitudes, norms, self-standards, emotional reactions, and self-efficacy are viewed primarily as influencing the strength and direction of intention, although they also may have a direct influence upon behavior. Thus, it appears that intentions are most proximal to behavior; the other seven variables may best be seen as either influencing the formation and strength of intentions or influencing the likelihood that one will act upon his or her intentions.

This theoretical analysis points out the necessity of measuring intentions prior to developing an intervention. Clearly, very different interventions will be necessary if a person (or group) has not yet developed a strong

intention (or made a commitment) to perform a given behavior, than if the person has formed a strong intention but is unable to act on it. For example, if a person has formed a strong intention to perform a given behavior but is not acting upon that intention, the intervention should be focused upon improving skills or removing or helping one to overcome environmental constraints. In contrast, if a person has not yet formed a strong intention to perform a given behavior, the goal of the intervention should be to strengthen the person's intention to perform that behavior. This could be accomplished by changing self-efficacy, outcome expectancies (or attitudes), norms. self-standards, or emotions vis-a-vis that behavior. The issue then becomes choosing which variable to target in the intervention.

Behavior and Population Considerations

Fifth, behavioral research has demonstrated that the relative importance of these variables as determinants of intentions and behavior depends upon both the behavior and the population under consideration. While some behaviors may be primarily Influenced by attitudinal considerations, others may be primarily influenced by norms, while still others may depend primarily on self-standards, emotion, or self-efficacy. Similarly, a given behavior may be primarily under attitudinal control in one population. but under normative control in another population.

For example, while normative considerations were found to be most important in determining condom-use intentions among a sample of sexually experienced male college students in the Midwestern United States, these same intentions were primarily under attitudinal influence among a comparable sample of sexually experienced male college students in Mexico City (Fishbein 1990). Thus, an intervention that might be successful in the United States (i.e., one directed at changing perceived norms) would be relatively ineffective in Mexico. Only by assessing and investigating the relationships among the eight potential determinants of behavior can one identify the one or two variables that most strongly influence intentions to perform-and the actual performance or—a given behavior in a given population. These empirically determined variables should then serve as the primary focus of an intervention. Little will be accomplished by directing an intervention at a given variable if the variable is unrelated or only weakly related to the behavior one is trying to change. Given the limited resources available for prevention programs, it is essential that interventions focus upon changing those variables that have the greatest

probability of influencing the likelihood that members of a given population will engage in the desired behavior.

Substantive Content

Sixth, in addition to varying in relative importance, the substantive content of some of these variables also changes as a function of the behavior and the population under consideration. It is important to distinguish between variables that have fixed contents and those that have variable contents. To a certain extent, this distinction parallels the distinction between etic (i.e., universal) and emic (i.e., population-specific) considerations. That is, for some variables (e.g., intention) item content is fixed, and the assessment question is not what to measure but how to best measure the construct in a given population. For other variables, however (e.g., behavioral beliefs, perceived barriers), item content depends upon the population being considered, and one must first work with a representative sample of the population being studied to determine item content.

Thus, prior to developing any fixed-item assessment instrument, formative qualitative research utilizing standardized elicitation procedures (Ajzen and Fishbein 1980) and focus groups (Kruger 1988) is necessary to identify four broad classes of variables: (1) perceived outcomes of performing the behavior; (2) relevant referents (either individuals or groups) vis-a-vis the behavior; (3) perceived facilitators of, and barriers to. behavioral performance; and (4) characteristics, qualities, and attributes of people who do and people who do not perform the behavior. In addition, it is sometimes necessary to consider a fifth class of variables, namely, (5) action alternatives.

Outcomes are necessary for developing measures of behavioral beliefs. Relevant referents are necessary for developing normative measures. Barriers and facilitators are necessary for assessing both environmental constraints and self-efficacy, and personal characteristics are necessary for assessing self-image and violations of self-standards. Action alternatives help identify relevant behaviors that either define a behavioral category (e.g., safe sex) or that identify skills or courses of action necessary for goal attainment.

As indicated above, outcomes, referents, barriers, facilitators, personal characteristics, and action alternatives will vary from behavior to behavior as well as from population to population. For example, while

pregnancy prevention is clearly an outcome of using a condom for vaginal sex, it is not an outcome of using a condom for oral or anal sex. Similarly, while many respondents say that using a condom for anal sex makes them feel cleaner, this outcome is rarely elicited when one is considering condom use for vaginal or oral sex.

Of even more interest are population-specific differences. For example, as part of the CDC's (in press) AIDS Community Demonstration Projects, a sample of commercial sex workers was asked to indicate the advantages and disadvantages of always using a condom for vaginal sex with their clients. As reported by Fishbein and colleagues (1991). while African-American, white, and Hispanic sex workers were equally likely to say that using a condom for vaginal sex with clients will "protect me from AIDS and other sexually transmitted diseases," will "prevent pregnancy," and will "reduce my partner's sexual satisfaction," some outcomes appeared to be population specific. While the Hispanic sex workers frequently mention that using a condom for vaginal sex "is painful" (i.e., creates friction, can lead to urinary tract infections, can break and get stuck inside), this outcome was rarely mentioned by African Americans or whites. Similarly, while African-American sex workers frequently said that using a condom would "reduce my sexual pleasure," this outcome was rarely given by Hispanic or white sex workers. Finally, while white sex workers often said that using a condom for vaginal sex with their clients "makes them last longer," this outcome was rarely elicited from African Americans or Hispanics. Thus, it is essential that open-ended elicitation questions be asked within a given population for each of the specific behaviors one is attempting to understand.

DEVELOPING EFFECTIVE INTERVENTIONS

The above lessons learned from behavioral research have important implications for developing behavior change interventions. It must be realized that behavior change interventions, like vaccines, take time to develop. Unlike vaccines, however. effective interventions must be tailored to both the behavior and the population being considered. In the commercial world, interventions such as promotions and advertisements are often based on extensive market research that attempts to segment the market, to identify the needs of consumers in different segments, and to identify the strategies that might influence consumer behavior. In addition, the content of promotional messages and advertisements often

are extensively pretested and evaluated. In marked contrast, research of this type is rarely conducted in the development of health-related behavior change interventions. All too often, behavior change interventions are based on intuition concerning what needs to be changed and unverified assumptions about how these changes can be accomplished.

This need not be the case. Based on the lessons from behavioral research outlined above, a general strategy should be followed in developing theory-based interventions.

The first step is to obtain knowledge of the target population. Thus, it is often necessary to begin with ethnographic research to identify the size and mobility of this population, to determine whether there are subpopulations that should be considered, to determine where and when one can gain access to the population (or subpopulations), to understand the language and customs of these subpopulations, and to determine the prevalence of behaviors that are putting these subpopulations at risk.

The second, and perhaps most important, step is to identify and define the behavior or behaviors one wishes to change or reinforce. As described above, interventions directed at increasing the probability that one will reach a given goal (e.g., avoid AIDS) or the probability that one will engage in a class of behaviors (e.g., practice safe sex) are less likely to be successful than those directed at changing specific behaviors that are largely under an individual's control.

For example, among IVDUs one might focus on decreasing the probability of sharing needles, or on increasing the probability of always using new or sterile needles. In addition, among male IVDUs one might try to increase condom use with main or occasional partners, and among female IVDUs one might want to increase the likelihood that they will tell their main or occasional partners to always use condoms. Whenever possible, one should use epidemiological data to guide the selection of behaviors to be changed.

Once one or more behaviors have been identified, the third step is to conduct formative research with a representative sample of the target population. This research should have two main goals: to pretest measures of fixed-content variables and to identify the content of variable-content variables. Clearly, the particular variables that one will consider will depend upon the theoretical framework from which one is working. Based on the lessons learned from behavioral research,

however, this formative research should pretest items or scales designed to assess (1) the frequency with which the behavior is performed, (2) the strength of intentions to perform the behavior, (3) relevant skills. (4) attitudes toward performing the behavior, (5) norms concerning the behavior, (6) self-standards with respect to the behavior, (7) emotional reactions to performing the behavior. and (8) self-efficacy with respect to performing the behavior. At the same time, elicitation procedures can be used to identify salient outcomes, referents, facilitators, barriers, and traits. That is, respondents can be asked to indicate (1) the advantages and disadvantages of performing the behavior: (2) individuals or groups who would support or oppose performing the behavior; (3) barriers to and facilitators of behavioral performance; and (4) characteristics, qualities, or attributes of individuals who do and those who do not perform the behavior. Focus groups can be particularly helpful in evaluating the degree to which members of the population understand, can use, and are willing to respond to the fixed-content items.

If the sample is large enough, statistical analyses of the relationships among responses to the fixed-content items can be used to identify the variables that are most closely related to intention and behavior. In addition, analyses of differences in the open-ended responses elicited by those who do and those who do not perform the behavior(s) in question can help to identify specific beliefs, referents, barriers, or traits that should be targeted in the intervention.

If time and money permit, information obtained from this formative research can be used to construct a fixed-alternative questionnaire that contains not only revised items to assess fixed-content variables, but also fixed-alternative items to assess the variable-content variables. Illustrations of items (or scales) to measure all relevant variables can be found in the work of Fishbein and colleagues (1992). This questionnaire, which could be used for both baseline and postintervention assessments, can then be given to a new representative sample of the population under consideration. Statistical analyses of the data obtained from this questionnaire can be used to guide intervention development.

For example, if a protective behavior is being performed with low frequency, the information obtained from this questionnaire can be used to determine whether this is related to weak or nonexistent intentions to perform the behavior or if it reflects a failure of people to carry out their intentions. In the latter case, the intervention should be directed at improving the skills necessary to perform the behavior and/or at

removing environmental constraints or helping people overcome those constraints.

On the other hand, if the data suggest that strong intentions to perform the behavior have not yet been formed, the intervention should be directed at strengthening intentions to perform the behavior. The information obtained from the baseline questionnaire should permit one to determine whether this intention is most strongly related to attitudes, norms, self-standards, emotional reactions, or self-efficacy. The intervention should then be focused upon the one or two variables that are most strongly related to intentions to perform that behavior.

If attitudes are most strongly related to intention, then one should try to identify behavioral beliefs (or outcome expectancies) that distinguish between those who have and those who have not formed intentions to perform the behavior. For example, one might find that those who intended to always use condoms for vaginal intercourse with their spouse believed that this was the responsible thing to do, while those who did not intend to use condoms did not hold this belief. Similarly, those who intended to use condoms might believe that always using a condom when having vaginal intercourse with their spouse will protect them from AIDS, while those not intending to use condoms might believe that always using a condom when having vaginal intercourse with their spouse will not protect them from AIDS. If this were the case, a theoretically based intervention would stress responsibility and the health consequences of always using a condom.

On the other hand, if norms were most highly correlated with intention, one should try to identify differences in perceived norms between those who have and those who have not formed intentions to perform the behavior. For example, one might find that those who intended to always use a condom for vaginal sex with their spouse perceived that their spouse thought they should use a condom, while those who did not hold this intention believed that their spouse was opposed to condom use. Similarly, one might find that those who intended to use condoms believed that their doctor thought they should always use condoms with their spouse, while those without this intention perceived that their doctor thought that consistent condom use with their spouse was unnecessary. In this case, the intervention should focus on providing information designed to change perceptions about the expectations of spouses and doctors.

By using data obtained from formative research or, preferably, from the fixed-alternative questionnaire, it should be possible to determine which variables need to be addressed in the intervention and to identify the particular outcome expectancies, normative beliefs, perceived barriers, or perceived traits that need to be addressed to produce changes in intentions and behavior. One then must develop interventions to produce these changes. That is, one must develop interventions that provide the target population with the information necessary to produce these changes. One also must determine the most effective ways of delivering this information to the target population (i.e., mass media, small media, groups, or one-on-one interactions). In addition, one must determine where and by whom the intervention will be delivered (e.g., in clinics, community-based organizations, other fixed-location sites, "on the streets" by volunteers or outreach workersj. Determining how and where to deliver the intervention also should be guided by findings from the ethnographic research.

The final step is pretesting the intervention. Whether the intervention is directed at improving skills, removing or helping people overcome barriers, or changing one or more cognitive variables, one must test to see if the intervention does what it is supposed to do. The issue here is not necessarily whether the intervention actually produces behavior change, although this is obviously desirable whenever possible. Rather, pretesting is necessary to determine whether the intervention is acceptable to, and understood by, the target population and changes the variables it was designed to change. For example, if the purpose of the intervention is to improve skills. to change outcome expectancies, or to increase self-efficacy, then one should test whether the intervention does, in fact, improve skills, change outcome expectancies, or increase self-efficacy before implementing the intervention. Clearly, if the intervention does not change at least the underlying theoretical determinants of behavior that it was designed to change, it is unlikely to lead to the desired behavior. Unfortunately, this final step is rarely undertaken in behavior change research.

It is important to recognize that some of the above steps can occur simultaneously. For example, if the ethnographic research clearly indicates how and where the intervention should be implemented, then one can begin to develop the mechanics of the intervention (e.g., recruit and train volunteers, train counselors or outreach workers) at the same time one is conducting formative research. While the above process is often time consuming, frustrating, and difficult, it must be recognized

that, just as one cannot simply "throw together" a vaccine, one also cannot simply "throw together" an intervention. Developing effective behavior change interventions requires the willingness to put in the time and effort needed to conduct the necessary research. Equally important, an intervention must be given time to have an effect. Behavioral interventions should not be viewed as a quick fix. Behavior change is not an all-or-nothing phenomenon that occurs immediately or never at all. Expectations must become more realistic about the amount of behavioral change one can expect a given intervention to produce in a given time period.

CONCLUSION

By using the lessons learned from behavioral science research, it is possible to produce effective, theory-based, culturally sensitive, population- and behavior-specific interventions. But effective interventions will only be developed if behavioral scientists are given the time and resources necessary to adequately accomplish this task. This provides both a challenge and an opportunity for the National Institute on Drug Abuse.

REFERENCES

Ajzen, I., and Fishbein, M. *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall, 1980.

Ball-Rokeach, S.J.; Rokeach, M.: and Grube, J.W. *The Great American Values Test: Influencing Behavior and Belief Through Television. New* York: The Free Press, 1984.

Bandura, A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall, 1986.

Bandura, A. Perceived self-efficacy in the exercise of personal agency. *Psychol Bull Br Psychol Soc* 10:411-424, 1989.

Bandura, A. A social cognitive approach to the exercise of control over AIDS infection. In: DiClemente, R., ed. *Adolescents and AIDS: A Generation in Jeopardy*. Beverly Hills, CA: Sage, 1991. pp. 1-20.

Becker, M.H. The health belief model and personal health behavior. *Health Educ Monogr* 2:324-508, 1974.

Becker, M.H. AIDS and behavior change. *Public Health Rev* 16:1-11, 1988.

Centers for Disease Control and Prevention. The AIDS community demonstration projects. *MMWR Reports und Recommendations,* in press.

Fishbein, M. A theory of reasoned action: Some applications and implications. In: Howe, H.E., and Page, M.M., eds. *Nebraska Symposium on Motivation,* 1979. Lincoln, NE: University of Nebraska Press, 1980. pp. 65-116.

Fishbein, M. AIDS and behavior change: An analysis based on the theory of reasoned action. *Interam J Psychol* 24:37-56, 1990.

Fishbein, M. Introduction. In: Terry, D.J.; Gallois, C.; and McCamish, M., eds. *The Theory of Reasoned Action: Its Application to AIDS-Preventive Behaviour.* Oxford, England: Pergamon Press, 1993. pp. xv-xxv.

Fishbein M., and Ajzen, I. *Belief Attitude, Intention and Behavior: An Introduction to Theory and Research.* Reading, MA: Addison-Wesley, 1975.

Fishbein, M.; Ajzen, I.; and McArdle, J. Changing the behavior of alcoholics: Effects of persuasive communication. In: Ajzen, I., and Fishbein. M.. eds. *Understanding Attitudes and Predicting Social Behavior.* Englewood Cliffs, NJ: Prentice Hall, 1980. pp. 217-242.

Fishbein, M.; Bandura, A.: Triandis, H.C.; Kanfer, F.H.; Becker, M.H.; Middlestadt, S.E.; and Eichler, A. *Factors influencing Behavior and Behavior Change: Final Report-Theorist's Workshop.* Rockville, MD: National Institute of Mental Health. 1992.

Fishbein, M.; Middlestadt, S.E.; and Hitchcock, P.J. Using information to change sexually transmitted disease related behaviors: An analysis based on the theory of reasoned action. In: Wasserheit, J.N.; Aral, S.O.; and Holmes, K.K., *eds. Research Issues in Human Behavior and Sexually Transmitted Diseuses in the AIDS Era.* Washington, DC: American Society for Microbiology, 1991. pp. 243-257.

Janz, N.K., and Becker, M.H. The health belief model: A decade later. *Health Educ Q* 11:1-47, 1984.

Jemmot, J.B.; Jemmot, L.S.; and Fong, G.T. Reductions in HIV risk-associated sexual behaviors among black male adolescents: Effects of an AIDS prevention intervention. *Am J Public Health* 82:372-377, 1992.

Kanfer, F.H. Self-regulation and behavior. In: Heckhausen, H.; Gollwitzer, P.M.: and Weinert, F.E., eds. *Jenseits des Rubikon: Der Wille in den Hamanwissenschuften.* Heidelberg: Springer-Verlag, 1987. pp. 286-299.

Kanfer. R., and Kanfer, F.H. Goals and self-regulation: Applications of theory to work settings. In: Maehr, M.L., and Pintrich, P.R., eds. *Advances in Motivation and Achievement.* Vol. 7. Greenwich, CT: JAI Press, 1991. pp. 287-326.

Kanfer, F.H., and Schefft, B.K. *Guiding the Process of Therapeutic Change.* Champaign, IL: Research Press, 1988.

Kelly, J.A.; Murphy, D.A.; Sikkema, K.J.; and Kalichman, S.C. Psychological interventions to prevent HIV infection are urgently needed: New priorities for behavioral research in the second decade of AIDS. *Am Psychol* 48(10):1023-1034, 1993.

Kruger, R.A. *Focus Groups.* Newbury Park, CA: Sage, 1988.

O'Donnell. L.N.; San Doval, A.; Duran, R.; and O'Donnell, C. Impact of video-based STD patient education on condom acquisition. *Am J Public Health,* in press.

Rosenstock, I.M.; Strecher, V.J.; and Becker, M. The health belief model and HIV risk behavior change. In: DiClemente, R.J., and Peterson, J.L., eds. *Preventing AIDS: Theories and Methods of Behavioral Interventions.* New York: Plenum, 1994. pp. 5-24.

Triandis, H.C. *The Analysis of Subjective Culture.* New York: John Wiley and Sons, 1972.

Triandis, H.C. *Interpersonal Behavior.* Monterey, CA: Brooks Cole, 1977.

Triandis, H.C. Values, attitudes and interpersonal behavior. In: Howe, H.E., and Page, M.M., eds. *Nebraska Symposium on Motivation,* 1979. Lincoln, NE: University of Nebraska Press, 1980. pp. 197-259.

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Synthesis of Behavioral Science Learnings About Technology Transfer

Thomas E. Backer and Susan L. David

> A consensus is building that the U.S. spends too much of its research budget on the search for new knowledge and not enough on harnessing the knowledge already gained.
>
> *Time*, November 23, 1992

INTRODUCTION

The success of the National Institute on Drug Abuse (NIDA) Technology Transfer Program can be measured by the extent to which knowledge from NIDA's research is harnessed to improve drug abuse treatment and prevention services in the United States, including those related to human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS). One important path to that goal is through harnessing knowledge from behavioral science about how to get innovations used by practitioners, clients, and communities. Getting this behavioral science knowledge used effectively by NIDA, its researchers, and support contracts is, in fact, another technology transfer problem.

This chapter reviews a set of behavioral science findings derived from the November 1993 NIDA Technical Review, "Reviewing the Behavioral Science Knowledge Base on Technology Transfer." This is not intended to be a complete recapitulation of the arguments and conclusions drawn by the authors of the 14 papers presented in this monograph. Rather, this synthesis sets forth *principles for action* that NIDA may wish to consider in the three arenas of individual/interpersonal, organizational, and communications-based behavior change. The chapter then discusses six overarching issues likely to affect implementation of these principles in the drug abuse field. Finally, this chapter explores some implications of the behavioral science knowledge base for NIDA's current evaluation of its Technology Transfer Program, for possible future expansion of this

program, and for policymakers concerned with AIDS and drug abuse treatment and prevention in the United States.

Methods for translating science into action need to be concerned not only with the environment of *application* (e.g., drug abuse treatment facilities, prevention agencies), but also with the environment of development-the scientific community, which for drug abuse research is primarily situated in universities. The academic research culture has a significant impact on technology transfer. For instance, the reward system in academia is not geared to promote technology transfer; articles in prestigious refereed journals and conference presentations are the coin of the realm, not evidence of field use. The communication channels favored by scientists (e.g., scholarly journals, professional societies, informal interactions on campus) tend to leave out practitioners, though this is changing with the emerging information superhighway and other cutting-edge communication technologies.

Even more important than these information dissemination issues are the challenges of promoting *actual* use of research-based information once it is received in the field. As has been stated repeatedly throughout this volume, *change is hard,* and convincing practitioners, clients, and communities to change means overcoming resistance and anxiety and providing opportunities for reward and involvement. But here science also provides a solution through the behavioral science knowledge base summarized in this monograph. The wisdom presented here comes as much from hard empirical science as from clinical or community experience.

BEHAVIORAL SCIENCE KNOWLEDGE: KEY PRINCIPLES FOR ACTION

Following are some of the main conclusions and recommendations that may positively affect technology transfer and stimulate behavior change. The principles are presented by author in the same order in which the chapters appear in this monograph.

Backer

- Readiness for change is an important element of successful technology transfer, and the readiness of both individuals and

organizations to change through adoption of an innovation can be enhanced.

- Readiness for change can be assessed using a variety of observational, paper-and-pencil, and computer-based assessment devices: making an investment in assessing readiness for change enhances later chances for success.

- Individual readiness for change is an aspect of organizational readiness, particularly in the case of drug abuse treatment and prevention innovations, which primarily are used in the organizational context of a service agency or community rather than by individual practitioners working independently.

- Readiness for change is a cognitive characteristic of innovation adopters. What counts in establishing readiness is what people believe, not what really is. Thus, efforts to measure the adopters' subjective values. attitudes, and beliefs are critical to success.

- Readiness is not the same as lack of resistance to change. Technology transfer efforts are more likely to succeed if they take account of the positive characteristics of high readiness (e.g., enthusiasm for change, willingness to endure some anxiety and startup problems in order to adopt the innovation).

- Assessment of need is not the same as the assessment of readiness. Since readiness for change concerns people's beliefs, technology transfer efforts are likely to fail if they only assess the objective need for change. Under some circumstances that need may be very high, but if readiness for change is low, innovation adoption is unlikely to succeed.

Kavanagh

- Collaboration with persons who will have to live with the results of change in an organizational or community setting is essential to successful technology transfer, and collaboration is most likely to be effective if it results in real empowerment of the relevant audiences.

- The management of diversity (e.g., gender, age, race/ethnicity) is important for the success of a technology transfer effort. Individual characteristics of those who participate in a technology transfer

intervention have to be assessed and responded to for the greatest likelihood of impact.

McCallum

- Risk communication is an essential element for the adoption of innovations both by practitioners and clients; understanding the risks of both the current behavior and that which is being proposed through the technology transfer effort helps to shape both the cognitive and attitudinal elements for change.

- Having clear, precise objectives for a risk communication campaign as part of a technology transfer effort is essential. These objectives must state how the target audience or their communities will be different if the risk communication is effective.

- Critical to effective risk communication is understanding the audience to whom risks are to be communicated, partly because there is an emotional component to risk (as there is to change).

- Risk communication success requires effective messages tested through systematic interaction with target audiences (e.g., via focus groups).

- Credible spokespersons can add to the effectiveness of a risk communication effort.

- A number of media channels are now available to deliver messages related to risk communication or technology transfer efforts, and they must be carefully evaluated for potential impact and cost-effectiveness.

- Outcome evaluation of a risk communication campaign is essential to increase the likelihood of success for future campaigns.

Rogers

- Some innovations diffuse spontaneously, without any specific technology transfer intervention behind them. In such cases, followup activities (e.g., technical assistance on program operation or securing of ongoing funding support) can increase the long-term

success of technology transfer by supporting the impact of what has already occurred.

- Spontaneous diffusion is sometimes the result of an issue moving much higher on the public agenda, as drug abuse did in the late 1980s resulting in greater availability of public and private resources to support innovation adoption and public policy pressure to take action on the given subject.

- Most innovations that are transferred to a number of new adoption sites are reinvented: that is, modifications are made in them to fit varying local circumstances. This flexibility is often critical to success.

Baum

- Complicated and subtle communication systems and interpersonal dynamics typical of all organizations (often called organizational culture) affect the prospects for success of technology transfer interventions. These factors need to be diagnosed when planning for an intervention so that the resulting strategy can attend to them sensitively.

- Efforts to understand and measure organizational culture often fail because they assume that each organization has a single, coherent culture; that staff passively internalize and react to this culture; and that all matters are dealt with at a conscious level. In fact, unconscious dynamics, such as the operation of transference (the tendency to see characteristics of one's own parents in organizational authority figures), can also significantly affect the chances for success of a technology transfer intervention.

Diamond

- Technology transfer often is based on expert authority, which tends to result in control-oriented, information-dominated, top-down, hierarchic, and defensive approaches to innovation transfer, all of which are inimical to success.

- Technology transfer strategies often ignore the inevitability of resistance to change, which is based on a central human conflict between cognitive learning and emotional security.

- Technology transfer methods similarly may ignore the organizational dynamics of change, which acknowledge that change at work implies emotional and cognitive loss among organizational participants.

- Technology transfer interventions are more likely to succeed if provision is made for a "transitional space" to facilitate the innovation's adoption. Transitions involve letting go of the old and embracing the new, both at a cognitive and emotional level. In part, this means acknowledging the real human processes at work whenever people are asked to change.

- In some cases the very rituals of bureaucracy, which exist in part to provide a way of reducing anxiety and increasing certainty, can be used to stimulate effective technology transfer, if the strategies used work with these rituals rather than against them.

- In designing any technology transfer intervention, knowing the taboo subjects in the organization can have a significant impact on later success. For instance, organizations that are averse to conflict may have great difficulty in adopting new technologies because individuals are not allowed to talk about the conflicting feelings and thoughts that are inevitable when some significant change is being contemplated.

- Sometimes technology transfer efforts are mounted because the organization can avoid facing a deeper problem or conflict by adopting some innovation. Technology transfer strategists must be sensitive to this possibility in the field.

Glassman

- Bureaucracies, such as those of service delivery organizations, are traditionally resistant to innovation. To promote change in public bureaucracies, management science has identified strategies that specifically address these resistances so that they can be creatively overcome.

- Technology transfer strategies are more likely to succeed in organizations in which there is "bounded instability," that is, encouragement of a limited amount of instability to allow resources to be reallocated to meet changing objectives, to promote open discussion of different

ways of achieving the organizational mission, and to encourage the free interchange of ideas.

- In the private sector, a new type of organization is emerging in which prospects for effective technology transfer may be greater. These more flexible and innovative organizations empower their work-forces, provide information technology to support them, and encourage processes that cut across boundaries. The public sector is likely to follow this example.

Tenkasi and Mohrman

- Most drug abuse innovations involve procedural knowledge, not hard technology, such as a new medical device. This distinction requires some differences in the types of technology transfer strategies that may be used.

- In the real-world applications of technology transfer, most innovations are not adopted literally: they are put into use through a process of "contextual adaptation," which matches the dimensions of the innovation to the dimensions of the environment. Often there is a creative synthesis of other relevant knowledge related to a specific innovation.

- Knowledge is subjectively as well as contextually consumed: that is, the values and feelings of those who are using the knowledge affect how it actually is put to work in an organizational setting.

Brown

- Critical characteristics of the innovation play a key role in whether real behavior change occurs as a result of technology transfer efforts. The sustained use of an innovation depends upon its relevance, timeliness, clarity, credibility, replicability, and adaptability.

- In order to design an effective technology transfer effort, input on innovation characteristics must be obtained from potential adopters. That is, what counts are the perceptions of the people who will have to change their behavior in order for an innovation to get used, not just the judgments of research scientists or other innovation developers.

- The drug abuse field is unique in that many of its treatment service staff are themselves recovering substance abusers. This factor needs to be addressed in technology transfer programs and approaches.

- To improve understanding of how technology transfer processes work, NIDA should consider increasing funding for empirical research on technology transfer.

- To increase the motivation of researchers to engage in technology transfer, supplemental funding for such activities should be made available for those researchers with successful project results.

- NIDA should also consider providing funding to study how to use interactive technologies as part of technology transfer. These technologies include computer-based learning systems (e.g., training programs using CD-ROM technology), multisite interactive video conferences, and electronic bulletin boards.

Sorensen and Clark

- Operating an information dissemination unit in a NIDA-funded research center can provide many opportunities for increasing the application of research findings in the local treatment community. Opportunities for national technology transfer also are increased by awarding funds to major research projects for such a component.

- Educational formats, such as a colloquium series operated by a NIDA research project, can help stimulate technology transfer to professionals who are accustomed to learning in a structured setting.

- Policy analysis studies and their subsequent publication in refereed policy journals can use research findings to help shape policy on drug abuse treatment.

- Science writers can help to shape nonacademic publications that present research findings in a user-friendly format for communication to practitioners and community leaders.

Gendreau

- Technology transfer efforts can be sabotaged by "knowledge destruction," the tendency of scholars and research scientists to dismiss research findings that do not fit congruently with their values and belief systems. Therefore. strategic planning for technology transfer should include careful examination of any prevailing knowledge destruction tendencies within a given area of work so that preventive responses can be constructed to help safeguard the technology transfer intervention.

- Technology transfer promoted through policy change can also be endangered by the politicization of policymaker positions. Appointed officials often are selected on the basis of ideology and general management training, not for their content expertise in the drug abuse or AIDS field. Planning for technology transfer needs to include realistic examination of the playing field for policy change in order to take account of this possibility and to try to identify policymakers who do have the substantive knowledge necessary to understand the science.

Petty

- Interventions to promote adoption of drug abuse prevention and treatment innovations need to include attention to the individual attitudes and goals of potential adopters, perceptions of the attitudes of others (norms), feelings of self-efficacy and actual competence, and prior behaviors and habits.

- While changing attitudes by a peripheral route (e.g., motivating audiences to accept a message because it is delivered by a celebrity or expert) can have powerful short-term effects on behavior, long-term behavior change is more likely to be produced by a central route (i.e., stimulating the person to engage in cognitive activity to evaluate and hopefully to accept the validity of the message).

- Attitude changes brought about by such central route activities are more accessible; that is, they come to mind more quickly and are thus more likely to influence behavior, and they are more likely to endure.

McGuire

- Technology transfer efforts can be facilitated by the strategic use of an organizing concept based on social psychology theory called the communication/persuasion matrix, which helps to integrate persuasive communication and social influence interventions.

- More successful technology transfer strategies can be generated by bringing together drug abuse practitioners with social influence theorists, since each can supply unique elements to strategy development. Practitioners know what is happening in the field, and theorists have ways of overviewing and conceptualizing these elements to make more efficient strategies possible.

- Many technology transfer efforts fail because they fall prey to the great-expectations fallacy: more is expected of them than is realistic in terms of real behavior change among difficult target populations, such as drug abusers.

- Technology transfer efforts also fail because of the distal-measures fallacy, in which the types of change that are measured as outcomes of technology transfer are not the changes necessary to get technology adopted.

- Technology transfer efforts may fail because of the neglected-mediator fallacy: elements added to a complex transfer strategy for one specific purpose may actually interfere with achieving the overall purpose of behavior change. For instance, public service announcements aimed at teenagers increasingly use rock music scores or visual special effects to get this audience's attention, but such production values may interfere with communicating the message.

- Technology transfer efforts may fail because of compensatory situations; that is, a personality characteristic that makes an audience vulnerable to persuasion for behavior change via one type of intervention may actually protect them from persuasion by other interventions that are part of the overall strategy.

- Technology transfer strategies are more likely to be successful if they follow the golden-mean implication: the overall maximum impact is likely if most or all intervention components are set at a medium range of intensity, thus reducing the likelihood of interference effects.

However, attention to situational weighting (i.e., specific circumstances surrounding the given intervention and its timing) may shape some variation in how this rule is applied (e.g., some special circumstance may strongly suggest emphasizing a particular intervention component).

Fishbein

- It is possible to change complex and significant behaviors, such as those related to preventing drug abuse or HIV infection, using carefully designed behavioral science interventions. Technology transfer programs, therefore, should not be too modest in establishing their operating goals.

- Though it generally is difficult to stimulate behavioral change with information alone, careful audience research can on occasion identify audiences that may respond to information-based interventions, especially when the information has been transformed to carefully fit audience characteristics (also determined by research).

- Behavior change interventions are more likely to work if the targeted behaviors are very specific and carefully defined in the early strategic planning for a technology transfer intervention.

- A relatively small number of variables significantly determines intention to change and actual behavior change, and the complex interrelationships are best understood using unifying models such as the Health Belief Model, Social Cognitive Learning Theory, or the Theory of Reasoned Action. An effective technology transfer program, therefore, should begin with a defined theoretical perspective. following Lewin's dictum, "Nothing is so practical as a good theory."

- The relative importance of the variables that influence behavior change varies according to the characteristics of the people for whom behavior change is desired (e.g., gender, class, ethnicity) and the class of behavior that is being subjected to change intervention (e.g., work performance, sexual behavior). Strategic planning for technology transfer thus needs to include audience definition as well as target behavior definition. The social meanings of these behaviors need to be determined through qualitative research (e.g., focus groups) or input from expert observers.

OVERARCHING ISSUES

The following are six issues that are likely to have an impact on using any of the principles described above in designing or implementing a technology transfer intervention.

Technology Transfer Interventions Take Place in a Larger Context of Change Within a Rapidly Evolving Environment

Drug abuse and HIV/AIDS treatment and prevention agencies are constantly undergoing change in today's world; limited resources, increased demand for services, community pressures, and consumer activism are just a few of the external forces to consider. But perhaps even more importantly, these agencies exist within larger environments: State drug abuse and AIDS authorities, State and local governments, and a Nation wrestling with many of the same challenges. In such a complex environment, any contemplated change must necessarily be seen in a larger context of change.

Effective management of innovation and change increases when this larger context includes global trends in the overall forces of change-the increasing pace of change, diminishing resources, and patterns of destabilization that mean nothing will ever be the same. There is also a need to include in this larger context the increasing importance of personal values and spirituality in innovation and change management for drug abuse prevention and treatment communities.

People and organizations everywhere now face a range and intensity of change that could scarcely be imagined even 5 years ago. Management scientist Vaill describes this poetically: "We're all living in permanent white water" (Backer 1993). Today it seems people are unable to even partly recover from one wave of change before another occurs. Twenty years ago, management science literature was filled with references to "planned change," but now the best one can do is to manage all the change thrust upon society by an increasingly chaotic environment. Innovation production is constant in today's world; more innovative programs and products, which are increasingly sophisticated, are emerging constantly. Moreover, advances in information technology make sharing what is new easier and faster than ever before. The larger environment of change in the world is fundamentally different today than 10 or 5 years ago in at least three significant ways.

- First, the pace of change is increasing. For instance, Drucker says most jobs in the 21 st century have not been conceptualized yet and will depend on technology not invented yet (Backer 1993). Frequently change "sneaks" up on people without their comprehending its profound implications. For example, there are now more English speakers in China than in the United States, forcing business to redefine what is a "market," just as they have had to with the emergence of the "universal teenager."

- Second, an increasing amount of change involves both destabilization and diminishing resources. For example, 850 of the Fortune 1,000 corporations have downsized in the last 3 years, and few public organizations remain unaffected by repeated cycles of budget cuts and decreasing stability.

- Third, the nature of change itself is changing. In "Thriving on Chaos," Peters (1987) discusses a paradigm shift from an old set of rules to not only a new set of rules but also a world in which at least some rules are changing all the time, and in increasingly unpredictable ways. Henderson, the economic futurist, says that today's fundamental logic error is assuming that anything will ever go back to the way it was (Backer 1993). Yet how many activities are subtly geared to the belief that if one tweaks the system just right, equilibrium will return.

Technology Transfer Interventions Must Be Seen Within Their Larger Internal Context

Effective technology transfer involves multiple strategies focused on three broad areas:

- The characteristics of the innovation;

- The characteristics of the *potential user* (e.g., individual clients or practitioners, treatment/prevention agencies, government bureaucracies, communities): and

- The characteristics of the *technology transfer process,* including the personal characteristics of those conducting the change effort.

Effective Technology Transfer Is an Interdisciplinary Effort Drawing Not Only Upon Behavioral Sciences, but Also on Management Science, Policy Studies, and Many Other Disciplines

Given the complexity of desired change, it is not surprising that knowledge from many domains is needed.

Technology Transfer Strategies in the Areas of Drug Abuse and HIV/AIDS Are Highly Contextual and Need to Be Designed, Implemented, and Evaluated in Their Own Context

Successful technology transfer strategies from other content arenas must be carefully appraised before even considering their use in the complicated environment of drug abuse and HIV/AIDS prevention and treatment.

Some Technology Transfer Strategies Must Be Seen in a Larger Time Context

Many factors play into how technology transfer strategies are implemented over a long time frame. For example, organizations have life cycles, and political and consumer activism have time courses. Initial low-level expectations for success, with the likelihood of greater impact 3 to 5 years down the road, may be the appropriate goal for a particular technology transfer effort.

There Are Some Important Barriers to Technology Transfer Success That Have Nothing to Do with the Excellence of the Innovation or the Need for It

In addition to resistance to change and other psychologically based barriers, there are also barriers of larger scope, such as:

- *Access to information.* Often there is limited access to new information because scientists want to complete peer-reviewed publication (which often requires 2 to 3 years) before releasing information to the public.

- *Influence of professional guilds.* If a new technology appears to threaten the status of or the access to opportunity in a profession,

there can be serious systemic resistance to it, regardless of the level of local professional support in the application's environment.

- *Pessimism about the chances for success.* Many practitioners and scientists are skeptical about whether technology transfer efforts will work and thus may be resistant not just to a particular innovation, but to the whole idea of spending their energies on technology transfer.

- *Differing definitions of the goals and challenges of technology transfer itself.* In this monograph many authors distinguished between different categories of technology transfer strategies, but there was an underlying assumption that the ultimate goals and the underlying challenges of these interventions were the same. However, as Baum (personal communication, January 1994) pointed out in a posttechnical review commentary, the 14 papers represent a diversity of goals (i.e., changing "the system" in which services are delivered versus changing the services themselves) and underlying challenges (i.e., convincing people to use a technology that has proven its value versus exploring whether the technology can make a contribution to solving perplexing problems in a treatment or prevention environment).

IMPLICATIONS AND FUTURE INITIATIVES

As mentioned in the introduction. NIDA's Technology Transfer Program is at a crossroads both in terms of its mtemai development and its place within the overall goals and activity structure of NIDA. This monograph has mined the richness of behavioral science research to identify many specific strategies by which technology transfer can be enhanced. However. there are also some overarching themes NIDA may wish to consider in shaping its future technology transfer initiatives.

1. **The central importance of constituent input.** Time and again, the behavioral science knowledge base reveals how important it is for the people who will have to live with change to give input on how change can best occur. NIDA has recently reaffirmed its organizational commitment to its constituencies in the community (e.g., clients and their families, practitioners). In times of diminishing resources and instability, when so much energy is focused on just coping and surviving, getting input from constituents is difficult but ultimately essential, not only to meet policy goals but

also to shape the dimensions of a technology transfer effort so that it will have maximum impact.

Therefore, NIDA may wish to explore ways to integrate its methods for obtaining constituent input on technology transfer. The current NIDA Technology Transfer Program evaluation can appraise approaches such as focus groups and surveys and identify the best and most cost-effective techniques. Upcoming events can afford opportunities for creative dialog in a more unifying environment. NIDA may wish to take the model of constituent input one step further by engaging early involvement by constituents in designing how that input should be provided.

2. **The central importance of well-defined goals.** The behavioral science evidence also indicates that technology transfer success is facilitated by having specific, clearly defined goals that are set in the context of a larger vision. NIDA may wish to encourage an internal dialog, bringing together leaders of its various divisions and the Public Information Branch to discuss how technology transfer can contribute to achieving research objectives and vice versa. At such a meeting, the importance of the NIDA Technology Transfer Program can be reemphasized by NIDA leadership and put in the larger context of parallel activities throughout the National Institutes of Health. Also, findings from the evaluation of NIDA's Technology Transfer Program can be presented to document the impact this program has had thus far.

3. **The central importance of research.** As a research agency, NIDA and its staff hardly have to be convinced that research is important, but the value of increased research on technology transfer needs to be analyzed and conveyed to those who still may be skeptical about the relevance of such a program to a research agency. Good empirical research is being funded by other Federal agencies; for instance, the Agency for Health Care Policy and Research has funded a 3-year empirical study that looks at how the infrastructure of HIV/AIDS service agencies in San Francisco has affected the adoption of innovations.

4. **The central importance of diversity.** Different technology transfer strategies are required for different communities (e.g., Hispanic, African American, Asian American, Native American, elderly, gay, lesbian). NIDA recently has made an expanded commitment to

technology transfer and systems change activities within the Latino communities of the United States. This effort uses a powerful model, first created in 1989. that brings together researchers, practitioners, and community leaders with NIDA (and other Federal agencies sponsoring activities in the areas of drug abuse and HIV/AIDS) to bring science to the community. Variations of this model may be useful with other communities as well.

In meeting the challenges of change through the increased use of innovative drug abuse and HIV/AIDS technologies, NIDA will remain at the forefront of research and practice by addressing these themes of constituency input, internally well-defined goals, increased research, and sensitivity to diversity.

CONCLUSION

Technology transfer today is still somewhat of an art form, even though it is informed and guided by science. That means that the principles for action discussed here must be applied by practitioners, communities, and organizations such as NIDA with a combination of rigor and flexibility-rigor because there is science to be evaluated and applied, flexibility because there is still much that is not known about how to change behavior or how to identify the environmental conditions under which the likelihood of behavior change is greatest. There also is much that IS not known at this time about how the characteristics of the innovation itself affect the likelihood of successful innovation adoption or about how all these factors interact to produce effective technology transfer.

Treatment and prevention agencies, and other entities concerned with technology transfer (including NIDA), may be more likely to succeed in this endeavor if they manifest the combination of rigor and flexibility. Incorporating the contributions of behavioral science in all aspects of planning, design, implementation, and evaluation of technology transfer, and providing the opportunity to users to contribute their own knowledge and perceptions in order to adapt these new technologies to the real-world setting, should ultimately provide the best opportunity to make NIDA research useful and important to those who need it.

REFERENCES

Backer, T.E. "Managing Innovation and Change: Common Messages from Business and Spirituality." Address to California State University, Long Beach, College of Health and Human Services Convocation, August 1993.

Peters, T. *Thriving on Chaos: Handbook for a Management Revolution.* New York: Harper Collins, 1987.

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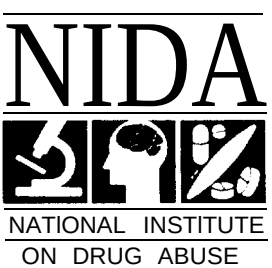

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