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RESEARCH AND EVALUATION COMPETENCY: TRAINING THE LOCAL CLINICAL SCIENTIST

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Consistent with many of the ideas in this chapter, the San Antonio conference resolution on the research and evaluation competency began as follows:

> *Psychological science is a systematic mode of inquiry involving problem identification and the acquisition, organization, and interpretation of information pertaining to psychological phenomena. It strives to make that information consensually verifiable, replicable, and universally communicable. Professional psychologists systematically acquire and organize information about psychological phenomena, and often engage in the general practice of science. Nonetheless, it is recognized that, because of the particular conditions that frequently limit inquiry in the local contexts of professional psychological practice (e.g., nonrepeatability of phenomena in time, privacy, etc.), the scientific goals of consensual verifiability, replicability, and universal communicability are attainable more in principle than in practice. Despite these practical realities, we endorse a view of the professional psychologist as a local clinical scientist: an investigator of local psychological phenomena who engages in the rigorous, critical, and disciplined thought engendered in striving toward scientific goals. Therefore, research training in professional psychology should be viewed as an essential tool for developing and enhancing critical thinking in students, and it should be integrated throughout the curriculum. All of our graduates are expected to function as local clinical scientists; some of our graduates may engage more directly in the application of research methodology in roles such as program evaluator. The application or diffusion of research results into practice is an important*

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process that should be enhanced and encouraged through research training. (McHolland, chap. 21, p. 164)

In this chapter, we discuss the place of research training in the professional psychology curriculum. We address two classes of concerns. First, we pay heed to traditional concerns about the professional's ability to generate, interpret, and integrate scientific findings into professional practice. Second, we attempt, in preliminary fashion, to develop an image of the professional psychologist as a local clinical scientist, an individual whose task is to develop localized descriptions of clinical case phenomena that are scientifically accurate and that facilitate decisions about the relevance (fit) of various theoretical and research findings to that case.

The chapter is divided into four sections: the notion of local clinical scientific inquiry, research training goals, knowledge base in scientific and research methodology and practice, and pedagogy. Our intention is not to develop a definitive argument for any given proposition but rather to raise issues for discussion in the professional community.

What is Local Clinical Scientific Inquiry?

Our vision of the local clinical scientist is captured by the image of a professional investigator who enters the typically ambiguous clinical situation (an open system) equipped with both technical skills and capacities for localized inquiry. The ultimate goal is veridical assessment of the situation and effective problem solving within the boundaries of accepted professional practice. In professional psychology, a local clinical scientist rarely finds the professional knowledge and technical skill base completely adequate to the task; therefore, skills in local investigation and in problem solving (thinking on one's feet) assume unusual importance.

We propose that the needs of this investigator guide the development of the scientific research methods curriculum in professional psychology programs as well as the development of other parts of the curriculum. The overarching goal of such training is to develop critical investigators of local (as opposed to universal) realities (a) who are knowledgeable of research, scholarship, personal experience, and scientific methodology; and (b) who are able to develop plausible, communicable formulations for understanding essentially local phenomena using theory, general world knowledge including scientific research, and, most important, their own abilities as skeptical scientific observers.

Although largely compatible with traditional scientific methodological training, this view calls for differing educational practices because it emphasizes (a) being a generalist of knowledge and method as opposed to a specialist; (b) focusing on local realities in which data are gathered as they apply to a particular case and may be limited in the extent to which they generalize to other cases; and (c) developing an active inquiring mind as opposed to concentrating on technical expertise with scientific methods. In effect, methodological training neither can be put aside, nor can it simply continue to echo traditional university training. Rather, it must be explicitly integrated with the interests of the active professional.

The idea that clinical inquiry differs from standard scientific inquiry is not new to discussions of professional psychology training. As stated at the Boulder conference,

> *Much of the time, thinking in a practical, clinical setting requires suspension of highly critical, analytical concern over constructs, especially where immediate problems of human welfare are involved. The clinical psychologist ordinarily functions in a social setting in which abstract ideas cannot be debated at all times, but where practical decisions must be reached by a number of persons with differing backgrounds and skills. Realization of the need for adaptability should, in the long run, free the clinical psychologist from feelings of guilt over the "unscientific" demands of clinical reality, if at the same time he has had the opportunity to learn how to analyze personality concepts in terms of their systematic implications. There cannot be overindoctrination in the scientific attitude. There can be an illusory oversimplification of the problems faced by the clinical psychologist who is also a scientist. (Raimy, 1950, p. 86)*

Nonetheless, we believe that the implications of such thinking largely have been undeveloped, and a significant difference in emphasis is needed in modern practitioner training.

Historically, training has emphasized skills necessary for scientific knowledge production, whereas scientific skills related to local clinical analysis have received relatively less explicit attention. In contrast to traditional training models, we propose that professional psychology programs develop and expand the early insight that the professional psychologist is a local clinical scientist (e.g., Shakow, 1976). We take as self-evident the need to continue also to train clinicians who will be devoted to the production of scientific psychological knowledge. The major difference between the traditional training model and the model we propose is that, in our model, the capacities necessary for local clinical science and scientific knowledge production do not need to be developed fully in the same individuals.

We also differ from the Boulder formulation because we do not agree with the grim implication that scientific "adaptability" to local circumstances requires "suspension of highly critical, analytic concern [in response to the] 'unscientific' demands of clinical reality" (Raimy, 1950, p. 86). Indeed, the essence of the training problem is to help students conceptualize clinical judgment and decision making in such a way that critical analysis of the local evidence, required to establish a fit between clinical theory, data, and action, is in the foreground of the clinician's concerns. We can accomplish this if we conceptualize research training explicitly as training in critical thinking and as a means to instill scientific attitudes. In the following section, we propose goals for research training that reflect this position.

Goals of Research Training

General Goals

Professional psychology programs should include research training that enables students to develop (a) a basic understanding and respect for the scientific bases of the discipline; (b) methodological knowledge designed to make them good consumers of scientific knowledge products; (c) enough basic skill in conducting research to be able to design and execute competent projects in professional and in some cases academic contexts with the support of properly trained consultants (e.g., statisticians).

Critical Thinking

Research training should be viewed as a major tool for developing and enhancing critical thinking skills in students. Because the logic and method of science transcend substantive areas and deal with the nature, generation, and verification of knowledge, research courses offer a unique opportunity to develop skills in observation, logic, and the generation of plausible inference.

In particular, students should be able to use empirical evidence to illuminate a problem or question while remaining cognizant of the limits of certainty inherent in different types of clinical and scientific data and scholarship. Furthermore, students should have the theoretical skills that are necessary to generate and to select among alternative possible views of a situation based on the best available empirical evidence. To these ends, a research curriculum should recognize explicitly that professional psychologists operate in open systems as opposed to the conditions of closure sought in controlled research settings. Open systems require inquiry skills commensurate with the realities of such systems.

Attitudes and Judgment Skills

Research training should provide a means for developing and manifesting various desirable attitudes and judgment skills related to professional inquiry and problem solving. These include (a) openness and receptivity to the multiple ways of looking at a problem (as opposed to dogmatism) and the various strengths and limitations of these approaches; (b) respect for empirical support (either local support or support offered in the scientific literature) for a particular viewpoint tempered by a healthy skepticism about the certainty such support affords and the appropriateness of its application to particular circumstances; (c) a sense of professional knowledge, responsibility, and authority (professional voice) with respect to the conduct of an inquiry that facilitates timely decision making and action while explicitly eschewing professional arrogance; (d) explicit recognition of one's own biases and predilections and how these might serve to limit an inquiry in deleterious ways; (e) explicit recognition of the interplay between ethics and scientific inquiry especially with respect to special issues that arise in local circumstances; and (f) explicit recognition of the need for collegial input and feedback in any inquiry however routine.

Knowledge Base in Scientific and Research Methodology and Practice

The discussion thus far provides a set of overarching goals for a research curriculum in professional psychology. There are, of course, more substantive objectives related to the demonstration of knowledge and skills in scientific methodology. Although many of these should be explicitly addressed in a science and research curriculum, it is obvious that they are also important to other aspects of the curriculum as well. These objectives are as follows:

1. The acquisition of basic knowledge of philosophy of science and the various ways it has impacted scientific psychology, especially in this century. This should in-

clude explicit recognition of scientific knowledge production as a social and political process.

2. The acquisition of basic knowledge of applied statistics and measurement theory as fundamental tools for the study of scientific constructs in populations. There should be explicit recognition of the issues and assumptions involved in applying aggregated findings to the individual case and in generalizing from individuals to populations.
3. The acquisition of basic knowledge of the logic of research design ranging from its most highly controlled level in laboratory experimentation to approximations of this control in quasiexperiments and field studies. The emphasis should be on how different research designs yield greater or lesser levels of certainty or plausibility with respect to a particular empirical result and how this may or may not afford equivalent certainty about conclusions that are drawn based on that result. In addition to encouraging the application of this logic to help solve local problems, efforts should be made to extend this logic to clinical contexts where prospects of experimental control are limited. For example, students should be taught to use knowledge of statistics and research design (the scientific imagination) as a means to enhance realistic judgment and decision making, although definitive research projects may be impossible to execute in local contexts.
4. The acquisition of basic knowledge of qualitative research methods with particular emphasis on the nature of reliability and validity in the collection and interpretation of qualitative data. Professional psychologists operate far more as anthropologists than as experimental researchers (open systems, specific cases, limited samples, and so on). Qualitative data have a special place in the generation of accurate and complete localized descriptions of phenomena, in grounded hypothesis generation, and ultimately in locally relevant explanation. Thus, skills in qualitative investigation—which include observation, research (as opposed to clinical) interviewing, summarizing and bounding qualitative data collection and analysis, and generating and reporting conclusions that follow from the data—are highly germane to daily practice. Formal training in the logic of qualitative approaches and their relationship to traditional quantitative approaches is central to a local clinical science.
5. The acquisition of basic knowledge of applications of various research approaches to social systems as well as to individuals. These include evaluation research approaches, survey approaches, sociological approaches, and the like. Many of the most widely used research methods logically are most compatible with the study of social systems (e.g., multiple regression). Professional psychologists need to understand how the study of social systems impacts the study of individuals and vice versa. In addition, it is important that the professional psychologist be able to design and execute applied research projects of this type in local settings for both program-evaluation and program-development purposes.
6. The acquisition of basic knowledge of one's personal epistemology, including personal biases, theoretical predilections, the nature of the "evidence" that leads one to develop particular beliefs about the nature of clinical phenomena and the place of scientific research in this matrix of professional beliefs. Scientific research is a major arena for public legitimation of professional psychology, but it is only a small portion of the personal fund of knowledge used in everyday practice, even among those who explicitly try to ground all action in scientific approaches (e.g., behaviorists). Professional psychologists need to be aware of the source and le-

gitimacy of the knowledge they use be it from science and scholarly sources, from a respected colleague or mentor, from institutional culture, or from compelling personal experience. Awareness of how one ascribes credibility to an idea lays the foundation for critical self-examination informed by evidence.

7. The acquisition of solid skills in professional writing, with particular emphasis on the research report where empirical or scholarly data (broadly defined) are used both to answer a specific question and to inform reasonable extrapolations to other contexts. Good written communication captures the essence of critical thinking skills; therefore, it is an essential tool for educating the local clinical scientist.

Pedagogy: Toward a Realistic View of Local Clinical Science

Traditional Concept of Scientific Inquiry

The major challenge in meeting these goals is the development of a pedagogy that links all aspects of scientific research training to the concept of local clinical scientific inquiry. This requires some changes in ideas about what scientific inquiry is and what it can become.

There are powerful identity issues involved in the relation between science and practice (Stricker & Keisner, 1985a). Although professional psychologists benefit from research instruction, traditional research training has been at the center of professional psychology's disaffection with scientist–practitioner training, attempts to deny this notwithstanding (e.g., Barlow, Hayes, & Nelson, 1984). A major reason for this dissatisfaction is the failure of professional psychology to develop a research pedagogy that is uniquely geared to the needs of professional inquiry.

Without discounting the power of clinical applications of scientifically derived concepts (e.g., behaviorist, cognitive, interpersonal), it is clear that scientific training in professional psychology has been as much training in a critical-empirical attitude as in scientific techniques, although this is seldom openly discussed in the literature. Unfortunately, this attitude, subordinate to the publication traditions of university science, often has failed to grasp the significance of the many different approaches to local clinical phenomena.

One outcome of a narrow view of science is that some psychologists—through personal backgrounds, interests, training programs, and so forth—have tended to identify with the scientist role by conceptualizing their work in terms of phenomena that are tractable in traditional scientific research contexts. Other psychologists, in contrast, have remained ambivalent about science, bemoaned its narrowness and apparent irrelevance, and pursued specialties and theoretical orientations that often suit personal taste as much as the realities of clinical phenomena. (How often have you heard psychologists note how competent or incompetent they are at statistics and research design, as if this, in itself, determines their adequacy or inadequacy as clinician–scientists? How often has a shrugging off of scientific work been the basis for following other theoretical traditions, usually those espoused by wealthy urban clinicians?)

Goal of Local Clinical Science

We believe that a professional environment in which some psychologists view themselves as more scientific than others is indefensible. Therefore, we propose that training programs develop methods to invest psychologists with a clear, shared sense of how science, in all its variety of manifestations, operates in day-to-day professional activities, a shared sense that defines science as a tool for all rather than as a source of prestige for a few. This objective should have higher priority than the success one has as a practitioner of university science. The curricular goals, previously described, are a step in this direction.

The key question is whether the professional psychologist enters the clinical situation thinking as a scientist, informed by general knowledge while receptive to important specifics, interested in discovering how theory fits observation, and vice versa. To discuss whether one published one's dissertation, performed a multivariate analysis, or found research alienating or irrelevant to clinical practice simply misses the point. Rather than asserting one's theoretical preferences, the local scientist must be responsible and creative in identifying empirical linkages between local realities and theory that could stand the test of critical scrutiny by colleagues. In addition, he or she must be aware of and responsive to the fallibility of any particular approach to the situation.

A pedagogy that addresses these concerns necessitates changing our commonly held ideas of what scientific training is designed to accomplish. Instead of concentrating on knowledge generation, we should emphasize how knowledge is produced in a variety of contexts. In so doing, we must accept the possibility that much of the scientific training we have received is inadequate. We need to design new ways of translating scientific thinking into approaches to professional inquiry. We must develop rules of evidence to be applied in local clinical contexts. We should return to an emphasis on how and why scientific methodologies work and eliminate the cookbook mentality that makes science seem irrelevant to clinical concerns. Finally, we must recognize that science cannot account completely for the array of unique situations we confront clinically however good we become at identifying the underlying order of things. We are not repeating the cliché that clinical work is art, but clinical work does require an approach to science that is ecologically compatible with the reality of clinical practice. Professional psychologists with this approach to science can assume their proper place within psychology as scientific investigators of the local conditions of human psychological dysfunction. If professional psychologists do not have to rely solely on academic scientists as scientific models, they will no longer have to struggle to ensure their professional legitimacy.

Pedagogy for Local Clinical Science

The design of a research pedagogy must move beyond the mere teaching of methodological tenets to the explicit unpacking of their implications for critical thinking and practice. Issues in research and in clinical practice often are akin to each other. Table 1 presents some specific examples of the types of critical questions raised by various research concerns. Material from experimental, qualitative, and evaluation research and from applied logic are presented to emphasize that local clinical science requires a broad concept of inquiry. Our objective is to show how the critical logic of research

Table 1
Some Examples of How Methodological Concerns Raise Important Critical Questions for the Local Clinical Scientist

Research concept	Methodological concern	Critical questions for the local clinical scientist
	From experimental research: Some threats to validity[a]	
History	A confounding event occurring during an experiment	Are results of intervention due to some intervening effect unrelated to treatment, such as a job change or a change in marital status?
Statistical regression	Subjects in an extreme group will often change toward the mean simply as a result of a statistical artifact related to unreliability of measurement	Interventions virtually always deal with extreme groups. Is the initial presenting pattern statistically extreme for this client or for the populations the client "represents?" If so, what changes can be expected in the next "measurement/observation"?
Selection	Experimental subjects from a select group (e.g., volunteers) may limit the extent to which we can generalize the observed results to an unselected group	Clients who seek treatment are a select group; those seeking a specific type of intervention are even more select. Are observed effects due to special characteristics of these clients? Which characteristics and to what extent? How would the effectiveness of an intervention look in an unselected sample?
Experimenter expectancy	Experimenters can communicate a confounding expectation to subjects to behave in a manner confirming the hypothesis of the experiment	Has the psychologist communicated an expectation to the client that may yield results consistent with that expectation? For example, it is not unusual to note differences in symbolism that appear in the dreams of clients in psychotherapy with therapists of different orientations
	From qualitative research[b]	
Bounding data collection and analysis	Because qualitative data often require extensive summarization and coding, researchers must set boundaries around the analysis that are logically related to the research questions	Professional psychologists commerce with an unbounded field of information potentially relevant to an intervention. What are the most pertinent sources of data and how can they be systematically summarized? What and how do particular sources of data support inferences drawn about a case?
Research interviewing	A focus on the subjective realities of research participants requires skills in thorough interviewing about particular issues: furthermore, it requires an understanding of language usage in local contexts	Are the particulars of clients' subjective experience being investigated as framed within local language communities without distortion from premature translation of information into theoretical formulations? Are applications of theory adequately translated at the local level and supported by local evidence?
	From evaluation research[c]	
Leverage of an evaluation question	Evaluation researchers attend to the extent to which projects yield results that will be useful to the system studied	Are the major issues being investigated in a way that can make a difference to the clients? Are values, theories, or methods being applied that are not consistent with the realities of local circumstances?
	From applied logic[d]	
Conditions under which a statement can be accepted at face vales	Logicians ask under what conditions a statement can be accepted as true. (e.g., statements that refer to material directly observed by an informant carry greater credibility than those that suggest an interpretation)	"The newspaper reports that candidate X views the national debt as a disgrace" is a credible statement about the report and less credible about candidate X's views. Psychologists largely deal with abstract reports of this sort. Are the credibility and meaning of various reports being assessed realistically? Is application of theory consistent with the most logically sound information available?

[a]Based on Cook & Campbell (1979). [b]Based on Miles & Huberman (1984) and Mishler (1986). [c]Based on Cronbach (1982). [d]Based on Dauer (1989).

methodology extends, in interesting ways, to a greater appreciation of the process of psychological intervention.

Research methodology. The complicating confounds that trouble the experimental researcher are parallel to the complicating conditions of treatment that trouble the clinician. Both researcher and clinician are concerned with observation and control, but the demands and expectations for precision in these efforts differ depending on the circumstances. Our approach encourages an integration of the scientist identity with that of the practitioner. The clinician, faced with a difficult set of heterogeneous problems, cannot use the researcher's solutions (e.g., randomization and averaging). Instead the clinician is encouraged to develop explicit means of responding to that which, under traditional circumstances, is considered to be beyond control. We only have begun to tap this potential in our pedagogy and in our conceptualization of the professional enterprise.

Applied statistics. More than 30 years ago, Meehl (1954) concluded his influential book comparing clinical and statistical prediction with a chapter entitled "The Unavoidability of Statistics." He did not mean that a clinician could not exist without performing analyses of variance. Rather he was alluding to the need for the clinician to validate clinical hypotheses and the role of statistics in providing confirmation or disconfirmation of hunches. Furthermore, however much we attempt to individualize our approach, population effects will be manifest in treatment as we move from individual to individual; choosing to remain ignorant of them can be equivalent to dishonesty.

Meehl and Rosen (1955) pointed to a fundamental manifestation of population effects in their discussion of base rates, defined in the most simple way as the frequency with which an event occurs naturally. The population realities summarized in a base rate ensure, for example, that a diagnostician who can predict the occurrence of suicide with 75% accuracy in a select group in which suicide occurs 60% of the time, will gain a reputation as a genius, whereas the same diagnostician, working with the same rate of accuracy in an unselected group in which suicide occurs 1% of the time, will contribute little and stop receiving referrals very quickly. Such considerations are seldom part of our conversations about colleagues we admire or of our assessments of our own efforts. Yet base rates are crucial in much professional decision making, and they are most important within a local frame of reference.

For years, the practical implications of these statistical facts have been lost in the fog that has existed on the boundary between the science and the practice of psychology. We are suggesting that professional psychology mount an effort to develop formally and to transmit to clinicians practical skills in collecting or at least intuiting local base-rate information, in assessing the ways population characteristics are and are not manifested in individuals, and in facing directly the gambler's problem (assessing this individual in this situation at this time) endemic to a local clinical science.

Psychological measurement. In a more recent methodological development, Lamiell (1987) and Lamiell and Trierweiler (1986) discussed the problem of measurement of the individual without reference to populations. Although the technical argument is beyond the scope of this chapter, suffice it to say that such measurement is seen to derive meaning from a dialectical reference to what might have been but was not (interactive measurement) rather than from reference to a population norm (normative measurement). This is a major step beyond the interminable idiographic-nomothetic

debate because this "idiothetic" approach provides a logic whereby data and generalizations from that data are derived within the meaning frame of the subjects, a position clearly compatible with the needs of the local clinical scientist. Students find this work compatible with their clinical work and inspiring because it encourages looking beyond the information given to the limits of an individual's or social unit's frame of meaning. We need to develop ways to help students bring such conceptual and research tools to bear on the assessment and decision-making problems of professional practice.

Future development of the research and evaluation curriculum. Obviously much needs to be done to move us beyond these preliminary suggestions to the generation of explicit investigatory strategies for the local clinical scientist. Several areas for future development of the research curriculum are as follows:

1. More work bridging the gap between basic research and clinical efforts is needed (e.g., Stricker & Keisner, 1985b) and full-time professionals need to be involved in developing these translations using the groundwork laid by research clinicians. In so doing, researchers and clinicians need to collaborate in generating models for the proper diffusion of research into practice; a local clinical science involves knowledgeable application in local contexts as well as skills in inquiry.
2. Views of science that explicitly recognize the problems of clinical inquiry need to be incorporated into training. Particularly promising heuristically is the realist view in philosophy of science (e.g., Harré, 1986; Manicas & Secord, 1983) that directly addresses the relation between experimental and interpretive approaches to scientific inquiry.
3. More explicit adaptations of the kind of thinking found in anthropology, history, and so forth (e.g., Lincoln & Guba, 1985) are needed. Feminist scholars have taken the lead in the productive adaptation of such approaches in ways compatible with a local clinical science (e.g., Belenky, Clinchy, Goldberger, & Tarule, 1986).
4. As suggested in Table 1, the principles of logic, properly translated, could provide tools for critically analyzing the type of direct and indirect data that are common in professional practice (e.g., Bakan, 1956; Dauer, 1989).
5. As has been long recognized (e.g., Raimy, 1950; Shakow, 1976), participant observation and other self-as-tool skills (see Singer, Peterson, & Magidson, chap. 18) need to be conceptualized in the research–scientific context.

We believe that if professionals come to see themselves overtly and practically as local clinical scientists, many of the identity issues still being acted out in professional circles between academic and professional psychologists (see Stricker & Keisner, 1985a) will lose their force, and the mutually respectful dialogue envisioned for the profession from its onset may be realized.

Conclusion

We recognize that some aspects of our proposal are controversial, and our formulation requires further development and refinement. It is a mistake to interpret our approach as encouraging a loosening of standards of rigor in the profession. We do not suggest that, for example, clinicians accept increasing dependence on impressionistic data and call it science. Rather, we propose the opposite: Clinicians should be respon-