3 The Whys and Hows of the Scientific Path in Applied Psychology

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If the average applied psychology student is asked confidentially why they are pursuing a career in their field, the most likely answer is "to help people." Although this answer is such a cliché that it sometimes causes graduate admissions committee members to wrinkle their noses, in fact it is perfectly appropriate. The ultimate purpose of applied psychology is to alleviate human suffering and promote human health and happiness. Unfortunately, good will does not necessarily imply good outcomes. If mere intentionality were enough, there would never have been a reason for psychology in the first place, since human beings have always desired a happy life and shown compassion for others. It is not enough for psychology students to *want* to help: one must also know *how* to help.

In most areas of human skill and competence, "know how" comes in two forms, and psychology is no exception. Sometimes knowledge is acquired by actually doing a task, perhaps with guidance and shaping from others and with a great deal of trial and error. This approach is especially helpful when the outcomes of action are immediate, clear, and limited to a specific range of events. Motor skills such as walking or shooting a basketball are actions of that kind. The baby trying to learn to walk, stands and then falls—on average over 200 times before the skill of walking is acquired. The basketball goes through the hoop or it does not, providing just the feedback needed—even experienced players will shoot hundreds of times a day to keep this skills sharp. In areas such as these, "practice makes perfect," or at least adequate.

Sometimes, however, knowledge is best acquired in part through verbal rules. This approach is especially helpful when a task is complex and the outcomes are probabilistic, delayed, subtle, and multifaceted. You could never learn to send a rocket to the moon or to build a skyscraper through direct experience. For rule-based learning to be effective, however, the rules themselves have to be carefully tested and systematized. One of the greatest inventions of human beings the last 2,000 years has been the development of the scientific method as a means of generating and testing rules that work. Human "know how" has advanced most quickly in areas that are most directly touched by science, as a glance around almost any modern living room will confirm.

The problem faced by students of applied psychology is that the desire to be of help immediately pushes in the direction of "learning by doing" even though often the situations applied psychologists face do not produce outcomes that are immediate, clear, or occur within a known range of options. Consider parents who want to know how to raise their children. There are times that poor advice can seem to produce good

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immediate outcomes at the expense of long-term success. For example, telling children they are doing wonderfully, no matter what, may feel good initially but the children may grow up with a sense of entitlement and a poor understanding of how hard work is need to succeed. Similarly, a clinician in psychotherapy can do an infinite numbers of things. The immediate results are a weak guide to the acquisition of real clinical know how because effects can be delayed, probabilistic, subtle, and multifaceted.

All of this would be admitted by everyone were it not for two things. First, some aspects of the clinical situation *are* and *need to be* responsive to directed shaping and trial and error learning. Experience alone may teach clinicians how to behave in the role of a helper, for example. As the role is acquired, the confidence of clinicians will almost always increase, because the clinician "knows what to do." Some of this kind of learning is truly important, such as learning to relate to another person in a genuine way, but trial and error does not necessarily lead to an increase in the ability to actually produce desired clinical outcomes. That brings us to the second feature of the situation that can capture students in professional psychology. Clients change for many reasons and what practitioners cannot see, without specific attempts to do so, is what would have happened if the practitioner had done something different. Many medical practices (e.g., blood letting, mud packs) survived for centuries due to the judgmental bias produced by this process. Many problems wax and wane regardless of intervention and some features of professional interventions are reassuring and helpful almost regardless of the specifics. Thus, with experience most practitioners feel not only confident but also competent, because generally it appears that good outcomes are being achieved.

Despite that subjective sense, in virtually every area in which it has been tested over the last 50 years—at least since the famous clinical psychologist Paul Meehl formulated this issue clearly in 1955—when clinical judgment is pitted against statistical prediction, statistical prediction does a better job (Grove & Lloyd, 2006). Yet even when faced with clear clinical failures, practitioners are most likely to rely on clinical judgment to determine what to do next (Stewart & Chambless, 2008). This suggests that it can be psychologically difficult to integrate the rules that emerge from research, with the ongoing effort to be of help to others. Part of the problem is that science can suggest courses of action that are not personally preferred, which takes considerable psychological flexibility to overcome (Varra, Hayes, Roget, & Fisher, 2008). Part of the problem is that science can fail to provide clear paths ahead at times, when practical needs demand immediate action.

In one sense, scientist–practitioners are simply those who have deliberately stepped into the ambiguity that lies between the two kinds of "know how," and between the urgency of helping others and the sometimes slow pace of scientific knowledge. Fortunately, due to the past efforts of others, in most areas of applied psychology this is a road with some comforts. There is considerable evidence that the use of empirically supported procedures increases positive outcomes (Baker, McFall, & Shoham, 2009; Ollendick & Davis, 2004). When agencies convert to the use of such methods, client outcomes are better (Cukrowicz et al., 2005) and improvements are more long lasting (Cukrowicz et al., 2011). Even staff turnover appears to be reduced (Aarons, Sommerfeld, Hecht, Silovsky, & Chaffin, 2009).

But in other ways this is a road with difficulties. Mere adherence to treatment manuals, for example, does not necessarily guarantee good outcomes (Shadish, Matt, Navarro, & Phillips, 2000) and the important work of learning how to use scientifically supported methods in more flexible ways to fit individual needs is still in its infancy (Kendall & Beidas, 2007). It is important to know the specific processes of change that account for the effects of these methods, but that is often not clear (La Greca, Silverman, & Lochman, 2009). There is considerable evidence that relationship factors are key to many clinical outcomes (Norcross & Wampold, 2011), but there is still very limited evidence of the specific methods that alter these factors while maintaining their relationship to outcomes (Creed & Kendall, 2005).

For the applied researcher, what drives an interest in research is often the possibility of doing a greater amount of good for a larger number of people than could be reached directly, through the production of scientifically filtered know how that will be used by others. Unfortunately, this dream is surprisingly hard actually to realize. It is difficult to produce research that will be consumed by others and that will make a difference in applied work. For the practitioner, a reliance on scientifically based procedures will not fully remove the tension between clinical experience and scientific forms of knowing, because virtually no technologies exist that are fully curative, and only a fraction of clients will respond fully and adequately based on what is now known.

This chapter is for students who are considering taking "the scientific path" in their applied careers. We will discuss how to be effective within the scientist–practitioner model, whether in the clinic or in the research laboratory. We will briefly examine its history, and then will consider how to produce and consume research in a way that makes a difference.

History of the Scientist–Practitioner Model

From the early inceptions of applied psychology, science and practice were thought of by many as inseparable. This is exemplified by Lightmer Witmer's claim that:

> The pure and the applied sciences advance in a single front. What retards the progress of one, retards the progress of the other; what fosters one, fosters the other. But in the final analysis the progress of psychology, as of every other science, will be determined by the value and amount of its contributions to the advancement of the human race (Witmer, 1907/1996, p. 249).

This vision began to be formalized in 1947 (Shakow et al., 1947) when the American Psychological Association adopted as standard policy the idea that professional psychology graduate students would be trained as both scientists and practitioners. In August 1948, a collection of professionals representing the spectrum of behavioral health care providers met in Boulder, Colorado with the intent of defining the content of graduate training in clinical psychology. One important outcome of this 2 weeklong conference was the unanimous recommendation for the adoption of the scientist–practitioner model of training. At the onset of the conference not all attendees were in agreement on this issue. Some doubted that a true realization of this model was even possible. Nevertheless, there were at least five general reasons for the unanimous decision.

The first reason was the understanding that specialization in one area versus the other tended to produce a narrowness of thinking, thus necessitating the need for training programs that promoted flexibility in thinking and action. It was believed that such flexibility could be established when "…persons within the same general field specialize in different aspects, as inevitably happens, cross-fertilization and breadth of approach are likely to characterize such a profession" (Raimy, 1950, p. 81).

The second reason for the unanimous decision was the belief that training in both practice and research could begin to circumvent the lack of useful scientific information regarding effective practice that was then available. It was hoped that research conducted by those interested in practice would yield information useful in the guidance of applied decisions.

The third reason for the adoption of the scientist–practitioner model was the generally held belief that there would be no problem finding students capable of fulfilling the prescribed training. The final two reasons why the model was ultimately adopted is the cooperative potential for the merger of these two roles. It was believed that a scientist who held at hand many clinical questions would be able to set forth a research agenda adequate for answering these questions, and could expect economic support for research agendas that could be funded by clinical endeavors.

Despite the vision from the Boulder Conference, its earnest implementation was still very much in question. The sentiment was exemplified by Raimy (1950):

> Too often, however, clinical psychologists have been trained in rigorous thinking about nonclinical subject matter and clinical problems have been dismissed as lacking in "scientific respectability." As a result, many clinicians have been unable to bridge the gap between their formal training and scientific thinking on the one hand, and the demands of practice on the other. As time passes and their skills become more satisfying to themselves and to others, the task of thinking systematically and impartially becomes more difficult (p. 86).

The scientist–practitioner model was revisited in conference form quite frequently in the years that followed. While these conferences tended to reaffirm the belief in the strength of the model, they also revealed an undercurrent of dissatisfaction and disillusionment with the model as it was applied in practice. The scientist–practitioner split feared by the original participants in the Boulder Conference gradually became more and more of a reality. In 1961 a report was published by the Joint Commission on Mental Health voiced concerns regarding this split. In 1965 a conference was held in Chicago where the participants displayed open disgruntlement about the process of adopting and applying the model (Hoch, Ross, & Winder, 1966).

The late 1960s and 1970s brought a profound change in the degree of support for the scientist–practitioner model. Professional schools were created at first within the University setting and then in free-standing form (Peterson, 1968, 1976). The Vail Conference went far beyond previous conferences in explicitly endorsing the creation of doctor of psychology degrees and downplaying the scientist–practitioner model as the appropriate model for professional training in psychology (Korman, 1976). The federal government, however, began to fund well-controlled and large-scale psychosocial research studies, providing a growing impetus for the creation of a research base relevant to practice.

The 1980s and 1990s saw contradictory trends. The split of the American Psychological Society (now the Association for Psychological Science) from the American Psychological Association, a process largely led by scientist–practitioners, reflected the growing discontent of scientist–practitioners in professional psychology disconnected from science (Hayes, 1987). Professional schools, few of which adopted a scientist–practitioner model, proliferated but began to run into economic problems as the managed care revolution undermined the dominance of psychology as a form of independent practice (Hayes, Follette, Dawes, & Grady, 1995). The federal government began to actively promote evidence-based practice, though a wide variety of funded initiatives in dissemination, diffusion, and research/practice collaboration. Research-based clinical practice guidelines began to appear (Hayes & Gregg, 2001), and the field of psychology began to launch formal efforts to summarize a maturing clinical research literature, such as the Division 12 initiative in developing a list of empirically supported treatments (Chambless et al., 1996). An outgrowth of APS, the Academy of Psychological Clinical Science (APCS), began with a 1994 conference on "Psychological Science in the 21st Century." In 1995, the APCS was formally established and began recognizing doctoral and internship programs that advocate science-based clinical training.

In the 2000s, the movement toward "evidence-based practice" began to take hold in psychology (Goodheart, 2011) but the definition of "evidence" that was considerably broadened to give equal weight to the personal experiences of the clinician and to scientific evidence. The penetration of formal scientific evidence into psychological practice continued to be slow (Nathan, 2000; Stewart & Chambless, 2007), which began to receive national publicity. For example, *Newsweek* ran a story under the title "Ignoring the Evidence: Why do psychologists reject science?" (Begley, 2009). Practical concerns also began to be raised about the dominance of the individual psychotherapy model in comparison to web- and phone-based interventions, self-help approaches, and media-based methods (Kazdin & Blasé, 2011; see also the special issue of *Perspectives on Psychological Science* (Vol. 6, #5)). Treatment guidelines (e.g., Hayes, Follette, Dawes, & Grady, 1995) began to be embraced even by leaders of mainstream psychology (Goodheart, 2011). Finally, more science-based organizations took stronger steps to accredit training programs that emphasize a "clinical

scientist" model and to advocate for these values in the public arena. In 2007 the APCS formally launched the Psychological Clinical Science Accreditation System; as of 2011 about a dozen doctoral programs are accredited.

At present, professional psychology is more diverse than ever. A substantial body of evidence about what practices work best is now available, and governmental bodies are turning to that evidence for guidance in policy with growing frequency (see, e.g., the *National Registry of Evidence-Based Programs and Practices* maintained by the Substance Abuse and Mental Health Services Administration in the US Department of Health and Human Services (http://www.nrepp.samhsa.gov/)). At the same time, professional training programs that eschew the importance of science to day-to-day professional practice continue to grow as well.

The student of applied psychology needs to think through these issues and consider their implications for professional values. Professionals of tomorrow will face considerable pressures to adopt evidence-based practices. We would argue that this can be a good thing, if psychological professionals embrace their role in the future world of scientifically based professional psychology. Doing so requires learning how to do research that will inform practice, how to assimilate the research evidence as it emerges, and how to empiricize practice itself. It is to those topics that we now turn.

Doing Research That Makes a Difference

The vast majority of psychological research makes little impact. The medium number of citations for published psychological research approaches zero (Schaffer, 2004) and most psychology faculty and researchers are little known outside of their immediate circle of students and colleagues. From this situation we can conclude the following: If a psychology student does what usually comes to mind in psychological research based on the typical research models, he or she will make only a limited impact, since that is precisely what others have done who have come to that end. A more unusual approach is needed to do research that makes a difference.

Making a difference in psychological research can be facilitated by clarity about (a) the nature of science and (b) the information needs of practitioners.

The Nature of Science

Science is a rule-generating enterprise that has as its goal the development of increasingly organized statements of relations among events that allow analytic goals to be met with precision, scope, and depth and based on verifiable experience. There are two key aspects to this definition. First, the product of science is verbal rules based on experiences that can be shared with others. Agreements about scientific method within particular research paradigms tell us how and when certain things can be said: for example, conclusions can be reached when adequate controls are in place, or when adequate statistical analyses have been done. A great deal of emphasis is placed on these issues in psychology education (e.g., issues of "internal validity" and "scientific method") and we have little additional to offer in this chapter on those topics.

Second, these rules have five specific properties of importance: organization, analytic utility, precision, scope, and depth. Scientific products can be useful even when they are not organized (e.g., when a specific fact is discovered that is of considerable importance), but the ultimate goal is to organize these verbal products over time. That is why theories and models are so central to mature sciences.

The verbal products of science are meant to be useful in accomplishing analytic ends. These ends vary from domain to domain and from paradigm to paradigm. In applied psychology, however, the most important analytic ends are implied by the practical goal of the field itself, namely, the prediction and influence of psychological events of practical importance. Not all research practices are equal in producing particular analytic ends. For example, understanding or

prediction are of little utility in actually *influencing* target phenomena if the important components of the theory cannot be manipulated directly. For that reason, it helps to start with the end goal and work backward to the scientific practices that could reach that goal. We will do so shortly by considering the research needs of practitioners.

Finally, we want theories that apply in highly specified ways to given phenomena (i.e., they are precise), apply to a broad range of phenomena (i.e., they have scope), and are coherent across different levels of analysis in science, such as across biology and psychology (i.e., they have depth). Of these, the easiest to achieve is precision, and perhaps for this reason the most emphasis in the early days of clinical science was the development of manuals and technical descriptions that are precise and replicable. Perhaps the hardest dimension to achieve, however, is scope and, as we will argue in a moment, that is the property most missing in our current approaches to applied psychology.

The Knowledge Needed by Practitioners

Over 30 years ago, Gordon Paul eloquently summarized the empirical question that arises for the practitioner: "what treatment, by whom, is most effective for this individual with that specific problem, and under which set of circumstances does that come about" (Paul, 1969). Clients have unique needs and unique problems. For that reason, practitioners need scientific knowledge that tells them what to do to be effective with the specific people with who they work. It must explain how to change things that are accessible to the practitioner so that better outcomes are obtained. Practitioners also need scientifically established know how that is broadly applicable to the practical situation, and can be learned and flexibly applied with a reasonable amount of effort and in a fashion that is respectful of their professional role.

Clinical manuals have been a major step forward in developing scientific knowledge that can focus on things the clinician can manipulate directly in the practical situation, but not enough work has gone into how to the development manuals that are easy to master and capable of being flexibly applied to clients with unique combinations of needs (Kendall & Beidas, 2007). With the proliferation of empirically supported manuals, more needs to be done to come up with processes that can allow the field to synthesize and distill down the essence of disparate technologies, and combined essential features of various technologies into coherent treatment plans for individuals with mixed needs.

One way that can be done is through models and theories. It is often said that practitioners avoid theory and philosophy in favor of actual clinical techniques, but an examination of popular psychology books read by practitioners shows that this is false. Practitioners need knowledge with scope, because they often face novel situations with unusual combinations of features. Popular books take advantage of this need by presenting fairly simplified models, often ones that can be expressed in a few acronyms, that claim to have broad applicability.

Broad models and theories are needed in the practice environment because they provide a basis for the use of knowledge when confronted with a new problem or situation and suggest how to develop new kind of practical techniques. In addition, because teaching based purely on techniques can become disorganized and incoherent as techniques proliferate, theory and models make scientific knowledge more teachable.

Book publishers, workshop organizers, and others in a position to know how practitioners usually react often cringe if researchers try to get too theoretical, but this makes sense given the kind of theories often promulgated by researchers, which are typically complicated, narrow, limited, and arcane. Worse, many theories do not tell clinicians what to do because they do not focus primarily on how to change external variables. Clinical theory is not an end in itself, and thus should not be concerned primarily about "understanding" separated from prediction and influence, nor primarily with the unobservable or unmanipulable.

To be practically useful, psychological theories and models must also be progressive, meaning

that they evolve over time to raise new, interesting, and empirically productive questions that generate coherent data. It is especially useful if the model can be developed and modified to fit a variety of applied and basic issues. They also need to be as simple as possible in the sense that both they are easy to learn and they simplify complexity where that can be done.

Finally, to be truly useful applied research must fit the practical and personal realities of the practice environment. It does no good to create technologies that no one will pay for, that are too complicated for systems of care to adopt, that do not connect with the personal experiences of practitioners, that are focused on methods of delivery that cannot be mounted, or that focus on targets of change that are not of importance. For that reason, applied psychology researchers must be intimately aware of what is happening in the world of practice (e.g., what is managed care, how are practitioners paid, what problems are most costly to systems of care, and so on).

Research of Importance

Putting all of these factors together, applied research programs that make a difference tend to *reach the practitioner with a combination of both a technology and an underlying theory or model that is progressive, simplifying, fits with the practical realities of applied work, and is learnable, flexible, appealing, effective, broadly applicable, and important.* This is a challenging formula, because it demands a wide range of skills from psychological researchers who hope to make an applied impact. Anyone can create a treatment and try to test it. Anyone can develop a narrow "model" and examine a few empirical implications. What is more difficult is figuring out how to develop broadly applicable models that are conceptually simple and interesting and that have clear and unexpected technological implications. Doing so requires living in both worlds: science and practice. The need for this breadth of focus also helps makes sense of the need for broad knowledge of psychological science that is often pursued in more scientifically based clinical programs.

The Practical Role of the Scientist–Practitioner

In the practical environment, the scientist–practitioner is an individual who performs three primary roles. First, the scientist–practitioner is a consumer of research, able to identify, acquire, and apply empirically supported treatments and assessments to those in need. This requires well-developed practical skills, but it also requires substantial empirical skills. The purpose of this consumption is too put empirically based procedures into actual practice.

Second, the scientist–practitioner evaluates his or her own program and practices. The modern day scientist–practitioner "…must not only be a superb clinician capable of supervising interventions, and intervening directly on difficult cases, but must also be intimately familiar with the process of evaluating the effectiveness of interventions… and must adapt the scientific method to practical settings…" (Hayes, Barlow, & Nelson-Gray, 1999, p. 1). This requires knowledge of time series or "single case" research designs, clinical replications series, and effectiveness research approaches, among others. Additive model group research methods, which use existing programs as a kind of baseline and thus raise far fewer ethical issues than group research protocols with no treatment control groups, are also gaining in popularity in applied settings.

Third, the scientist–practitioner reports advances to applied and scientific communities, contributing both to greater understanding of applied problems and to the evolution of effective systems of care. In today's landscape, a wide variety of contributions are possible from practical sites.

For example, clinical replications series and open effectiveness trials in applied settings are highly valued in the empirical clinical literature (e.g., Persons, Bostrom, & Bertagbolli, 1999; Watkins et al., 2011). Clinical replication series are large collections of single case experimental designs and empirical case studies using well-defined treatment approaches and intensive measurement. Their purpose is to determine rates of successes and failures, and factors that contribute to these outcomes, in a defined patient group.

These kinds of contributions are essential to the overall goal of developing scientific known how that will help alleviate human suffering. Clinical replication series provide an excellent example. For clinical research to be useful to practitioners, it must be known what kinds of client are most likely to respond to what kinds of treatments in the real world setting. Indeed, sometimes methods that succeed in highly controlled efficacy trials, fail in effectiveness trials when real world issues are factored in (e.g., Hallfors et al., 2006). This question cannot be adequately answered purely based on data from major research centers because the number and variety of clients needed to address such questions is much too large. Only practitioners have the client flow and practical interest that formal clinical replication series demand.

The Scientist–Practitioner in Organized Healthcare Delivery Systems

The combination of roles embraced by scientist–practitioners given them a special place in the healthcare marketplace as organized systems of care become more dominant. No one else is better prepared to help triage clients into efficient methods of intervention, to train and supervise others in the delivery of cost effective and empirically based approaches, to deliver these approaches themselves, to work with complicated or unresponsive cases to learn how to innovate new approaches, and to evaluate these delivery systems. Unfortunately, with some exceptions psychologists have largely resisted cooperation with organized systems of care, so the contributions to be made by scientist–practitioners have been more limited (Cummings, 2006; McFall, 2006).

Looking Ahead

The history of science suggests that, in the long run, society will ultimately embrace scientific knowing over know how that emerges from trial and error whenever substantial scientific evidence exists. That has happened in architectural and structural design, public health, physical medicine, food safety, and myriad other areas, presumably because scientific know how is a better guide to effective practices. The same shift is beginning to occur in mental health and substance abuse areas. But while progress has been made in the identification of techniques that are effective with specific problems it is clear that we still have a long way to go. Today's students will help decide how fast the transition to a empirically based professional will be.

If the trends seen in other fields are a good guide, ultimately applied psychology will be required to adopt an evidence-based model. In the present day, however, professional trends continue to pull the field in both directions. Some in the practice leadership (e.g., Fox, 2000) have argued against embracing the movement toward empirically supported treatments, preferring instead the adoption of new forms of professional training (e.g., pharmacotherapy training).

Meanwhile, changes in the field itself make the scientist–practitioner model more viable. For example, the skills needed to add value to organized behavioral healthcare delivery systems are precisely those emphasized by the scientist–practitioner model. The scientist–practitioner model may yet provide the common ground upon which psychology as discipline relevant to human suffering will flourish. Students of professional psychology will have a large role in determining how these struggles for identity will ultimately work themselves out. The scientific path is not an easy one for applied psychology students to take, but for the sake of suffering humanity, it seems to be the one worth taking.

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