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Decision Making in Evidence-Based Practice: Science and Art

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Decision Making in Evidence-Based Practice: Science and Art

It is true that the evidence-based practice movement has seen its share of rhetoric. Nonetheless, recent efforts to ground mental health practice on the best available evidence is a long overdue initiative, and one that promises to make important headway given both new research methodologies and the impact of the internet. Such methodologies include metaanalysis, case based reasoning, and the modeling of complex systems, triangulated with a variety of qualitative methods, and even with tacit knowledge. New database and internet technologies are dramatically streamlining the search and retrieval of existing research and other forms of evidence.

There remain, however, daunting barriers to fulfilling the vision of the evidence-based practice movement within the health and mental health fields. There are any number of practical problems, involving training of social work professionals, the design of their jobs, and the effective dissemination of research findings. There are, in addition, even more fundamental problems. These involve the difficulty of translating the results of group-based research studies into individualized practice, which is rooted in the helping relationship and social work ethics and values. This touches on a clash of world views and epistemologies of researchers and practitioners (Rosen, 2003).

This clash is partly rooted in the attempt to apply an archaic and naive conception of scientific research to evidence-based practice (EBP), one that runs counter to social work ethics and values, as well as with emerging findings on the nature of professional decision making. This approach to research represents a kind of naive inductivism, where you accumulate data and hope that somehow all the results magically add up to reveal what the problem is and the service technology that will work the best. The problem is that too often the research results are consistent with multiple and even contradictory theories and interventions. This inductivist approach contrasts with the prevailing approach that involves the need to begin with clear and meaningful theories and hypotheses, and only then to attempt to falsify them, as Carl Popper has urged (1959). Many researchers pay lip service to Popper's evolutionary epistemology (see *table 1*), but the hypotheses that guide much social work research are so constricted that they ignore the complexities of

client's lives that many practitioners intuitively understand. These involve multiple dimensions, and nonlinear, interactive, and idiosyncratic processes. The simplifications of many researchers, so often reflected in decontextualized group comparisons, only serve to support the belief by many practitioners in the irrelevance of much research. In addition, social workers in health and mental health are repeatedly taught the values of self-determination and the need to individualize services to unique client needs. Yet so many of the protocols and treatment manuals generated on the basis of the naive inductivist approach to EBP directly conflict with these values. Furthermore, many of the approaches to rational problem solving, which call for the sequential establishment of goals, and the comparison of multiple means for attainment of those goals, directly conflict with results from the field of naturalistic decision making. Research in this area has clarified how experts make decisions in the field, revealing that this often happens through a kind of immediate situational awareness (Klein, 1997), combined in complex cases, with modeling and active hypothesis testing and critical and metacognitive thought processes (Cohen, et al., 2000).

[INSERT FIGURE 1 ABOUT HERE]

This paper, thus, reviews of the application of decision-making research to evidence-based practice and argues that we need to broaden our conception of what constitutes evidence and the role of research in practice. Among other things, I would like to highlight the Nobelest Ilya Prigogine's suggestion that AScience is a dialogue between mankind and nature.@ (1996). Both research and practice are similar processes, both transactional, involving modeling and story telling, dialog and strategies of successive approximation.

This paper specifically argues that if EBP is recast and redefined, and based on this broadened view of research, many of the perceived barriers to its implementation will be minimized. The essence of EBP involves a decision making process tied with locating relevant evidence, not only from research databases but from the client systems themselves, synthesizing them, and translating the resulting understanding into practice decisions. For this reason, it only makes sense to examine and apply what has been found concerning the decision making process. This research reveals that there are dramatic disparities between the ways that experts naturally make decisions and those that are prescribed by proponents of naive forms of both

inductivism and rationalism.

To resolve this, I believe that we need to broaden our view not only of what constitutes evidence, to include client reports, reports of others, our direct observations and reactions, in addition to the results of formal and systematic research. We need to also broaden our view of what constitutes research, as involving a process that is more interactive and dialogical, multivariate, multimodal, and involving both quantitative and qualitative sources of data. In addition, it should be one that requires the posing of our best theories and hypotheses, and systematic attempts to falsify them. This presentation will review recent research in problem solving and decision making as a means of meeting these challenges.

But first, this paper will begin by reviewing a few of the essentials of EBP, and the ways that this vision has been adapted in recent years in response to some of its criticisms. Although there are many who would prefer a vision of evidence-based practice as an artistically-modified technology, I would argue that the traditional adage of social work practice as being a scientifically-informed art would be the most appropriate stance.

Evidence-Based Practice. The central idea behind evidence-based practice is that practitioners have a responsibility to account for the methods that they use based on the best evidence available, and that they have an ethical responsibility to convey to their clients any uncertainty, possible negative side effects, and the costs of their interventions and others concerned. I would go so far as to say that clients have a right to be treated with evidence-based methods, and without results from validated research the possibility of clients giving truly informed consent and engaging in self-determination is severely compromised (Thyer, 2003). It is our ethical responsibility to provide clients with an educated appraisal of the benefits and costs of our proposed service, along with the most promising alternatives.

Perhaps the simplest definition for evidence-based practice is that it consists of practice based on the best available evidence (O'Hare, 2005). Thomas O'Hare specifically defines evidence-based practice in mental health as, "the planned use of empirically supported assessment and intervention methods combined with the judicious use of monitoring and evaluation strategies for the purpose of improving the psycho-social

well-being of clients” (p. 6). Leonard Gibbs (2003) extends this idea and emphasizes that the approach derives from the posing of key questions:

Placing the client’s benefit’s first, evidence-based practitioners adopt a process of lifelong learning that involves continually posing specific questions of direct practical importance to clients, searching objectively and efficiently for the current best evidence relative to each question, and taking appropriate action guided by evidence (p. 6)

Evidence-based practice is perhaps the most recent incarnation of a variety of practice orientations and models, such as the promotion of accountability, outcomes assessment, data-based practice, empirically-based practice, or the practitioner-researcher model. It emphasizes the use of research throughout the problem-solving process, including assessment, setting goals, planning and implementing interventions, and in evaluating both the process and outcomes of these interventions, as exemplified in *table 1*. According to O’Hare (2006), evidence-based practice “emphasizes outcome research to help guide the initial choice of intervention, and monitoring and evaluation methods to facilitate optimal implementation.” (p. 5). Similarly, Gibbs (2003) emphasizes its process dimensions, noting that its major steps consist of the following:

1. Becoming motivated to apply evidence-based practice
2. Converting information needs into well-formulated answerable questions
3. Tracking down with maximum efficiency the best evidence with which to answer the question
4. Critically evaluating evidence for its validity and usefulness
5. Applying results of evidence appraisal to policy practice
6. Evaluating performance
7. Teaching others to do the same (pp. 8-9)

[INSERT TABLE 1 ABOUT HERE]

Despite extensive efforts to promote evidence-based practice in mental health, there remain considerable barriers to its full implementation. Many mental health professionals opt to either to indiscriminately comply with agency protocols, adopt a ‘whatever works’ stance, or to sign-on to one of the popular theoretical orientations, whether it be self psychology, dialectical behavior therapy, or trauma theory, rarely conducting or even consulting or any meaningful research on the associated practices. These practices are reflected in a study of Zeira and Rosen who found in their survey of 69 social workers and 141 of their clients that only 2% of practice decisions directly derived from a research base (2005). A variety of other

studies and reviews have sought to isolate the causes of the very minimal infusion of evidence-based practices within both the health and mental health fields, with some focusing on practical barriers and others on more fundamental problems (Dunn, et al., 1997; McLaughlan, et al., 2002).

Several of the surveys of practical barriers to the implementation of EBP come from the field of nursing. Dunn, et al. (1997) found through a large-scale survey of British nurses that these barriers fell into four major categories, those involving the setting, the individual professional, the dissemination of the research, and the research itself. Barriers involving the setting consisted of insufficient time on job to implement new ideas, lack of cooperation from other professionals such as physicians, inadequate facilities, and the lack of time for review of research. The two most important individual factors were the nurses' unawareness of research and their feeling of being incapable of evaluating research and a lack of confidence in using it. Well known problems in dissemination include the lack of clarity and readability of many research reports, the diversity of places in which is reported, and very important, many of the statistical analyses were not understandable to these subjects. They also complained that the volume of available research was overwhelming. In a closely related study, McLaughan and her colleagues (2002) found that the primary reasons for non-utilization of research were the lack of organizational support, problems in understanding statistical reports that were perceived as too complex or statistical; the lack of credibility of researchers vis-a-vis clinical problems, and in general, the lack of both skills, and to a lesser degree, the motivation to use research.

Problems in the training of mental health professionals, including that of researchers, the structure of jobs, and methods of research dissemination, are all substantial barriers. There are, however, several other difficulties that are perhaps more pertinent to understanding barriers to implementation. Perhaps most pervasive is the gulf between the aims, values, and epistemologies of researchers and practitioners. On one hand, most researchers are interested in generalizable knowledge that is applicable to a wide variety of persons, problems, and situations, and in interventions that can be specified, replicated, and monitored with some fidelity. Experimental control for, rather than modeling of, non-treatment variables decontextualizes the

research, complicating the task of generalizing results. Some go so far as accusing researchers of being logical positivists, a long ago discarded approach to knowledge-building that ignores all that the most immediately observable phenomena, including most human experience (see Yu, 2001). Practitioners, on the other hand, are most interested in individualizing their interventions to the particular client or situation at hand, and engaging their clients in achieving personally meaningful goals, even when they will only agree to unorthodox means. For these reasons, there are many who argue that the scientific paradigm that informs research is inapplicable for social work practice (Heineman, 1981; Witkin, 1991). These arguments usually suggest that the epistemologies of researchers and practitioners are incompatible, that researchers fail to consider the multiple perspectives involved in client systems, short-shrift process understanding, over emphasize prediction and control, and use quantification to exclude alternative forms of understanding. Rosen has identified a related problem of practitioners short-shrifting the use of rational and scientific forms of knowledge building and instead indiscriminately transferring lay decision heuristics, or rules of thumb, perhaps those referred to as 'common sense', from non-professional contexts. One example would be the tendency of many to base decisions on the experience of a few anecdotes, recent instances that happen to come to mind, a common decision error referred to as the 'representativeness heuristic' (Tversky & Kahneman, 1974).

A narrow view of science that has informed some proponents of evidence-based practice has led to another problem, one that assumes that technique and method and their faithful execution is the primary curative agent in mental health treatment. Yet, there is a well-established body of research that suggests that less easily defined factors, including the quality of the relationship, empathy, or group cohesiveness are also extremely important (Norcross, 2002). While some go so far as to suggest that they are necessary and sufficient conditions for success, the body of evaluative research does indicate that type of method does add something, although only to a very modest degree. Some reviews of the psychotherapy research demonstrate that only 5% to 15% of the variance in outcomes are associated with particular techniques (Lambert, 1992; Wampold, 2001). Yet, manuals that attempt to specify the protocols for some evidence-based practices often

minimize the need for client engagement and relationship building, both of which require a degree of individualization and priority being given addressing what the client is most concerned about.

Probably the best known and most significant barrier to EBP is what has been characterized as that of the “idiographic application of empirical generalizations” (Rosen, 2003). Research is typically conducted on groups or samples so as to permit generalization of findings to larger populations. Yet, assessing the applicability of findings from a survey or a program evaluation to a particular client is no small problem. Most research reports do provide a table of sample demographics to help the reader informally assess the applicability of the results to diverse situations. Yet, most reported statistical tests only provide guidance in generalizing findings to some larger population, and assume that the sample is randomly drawn from it. Complicating this is the fact that samples in clinical trials are typically selected only after a variety of subject eligibility exclusions have been made. Researchers are interested in uncomplicated cases, without prior treatments, multiple diagnoses, or dangerous tendencies that would mitigate against their assignment to control groups. It has been reported that the average random controlled trial excludes about two-thirds of the possible patients, thus, severely undercutting the representativeness of the sample (Ruscio & Holohan, 2006).

Excluded cases are typically those that are seen in practice, and have been described in terms of their:

- ▶ Symptom presentation: Severe, diffuse, chronic, comorbid conditions
- ▶ Safety features: Suicidal, homicidal, ongoing danger
- ▶ Physical/medical features: Chronic pain, medical conditions, disability, cognitive impairment
- ▶ Personality features: Hostility, dependency, externalization, low-self esteem, low psychological mindedness
- ▶ Psychosocial features: Repeated trauma, multiple stressors, severe financial instability, social isolation, unsupportive social environment
- ▶ Motivation: Severe hopelessness and demoralization, etc.
- ▶ Treatment history: Repeated failures, unsuccessful treatments with EST (Ruscio, 2006).

Practitioners, therefore, are often left guessing how the results of one or a series of clinical trials might be applicable to a specific agency population or client. While it may be that such selection bias may not, in the final analysis, undermine the applicability of the findings, the important point is that their relevance as evidence is severely undermined.

The final problem that I would like to discuss is that the variety and number of decisions that

practitioners are required to make, often at a moment's notice, defeats the productivity of researchers. This is notwithstanding the proliferation of published research. Certainly major headway has been made on outcome studies of some of the most commonly used methods and modalities, whether individual psychotherapy, intensive case management, cognitive behavioral treatments, psychopharmacology, and the like. And there are some excellent websites, such as that of the Cochrane Collaboration (2006), with reviews and meta-analyses that greatly simplify access to these results. Yet the global selection of a singular service strategy is only one of many decisions that practitioners need to make. Much more limited is the research knowledge base that permits assessing the various permutations and combinations of treatments, or packaged interventions, for particular problems, sub-populations, and policy environments. But even more limited is the research that is needed to inform the multitude of day-to-day process decisions that practitioners are constantly required to make. These can range from decisions about particular interview methods or group composition, to emergency interventions or termination decisions, that need to be made in the context of a general service modality. Although research on micro-processes has now been conducted for many years, its results are still fairly limited, especially when it comes to isolating outcomes of specific micro-processes, for particular treatment techniques, for particular kinds of patients within the context of particular community support systems and cultures.

A variety of proposals have been frequently made for the resolution of the range of problems inherent in evidence-based practice. Many of these involve the recommendation that practice should continue to be based on a functional analysis of patient's behavior, that the therapist need not be too religious about adhering to formal EBT protocols. Abramowitz (2006) points out that "...one of the 'artistic' (as opposed to scientific) aspects of providing psychological treatment is being able to apply empirically supported procedures on the basis of a functional analysis of the antecedents, consequences of the problems in question." Both the selection of overall methods and the ways that they are individualized to particular clients should be based on as comprehensive a biopsychosocial assessment as is feasible for a given presenting problem. Although this recommendation will not be controversial among most practitioners, there

are considerable problems in translating the results of generalized dynamic formulations to selection of particular methods and techniques.

A frequent recommendation made is for the use of a tiered or a hierarchical approach to EBP (Ruscio, 2006). This can mean several things. It often means starting with the intervention that the strongest evidence exists for, and only when these don't exist, don't work, or can't be used for one reason or another, move to alternatives with less persuasive evidence, rather than adopting untested methods. When the first choice can be implemented, it may mean adapting it if it fails to achieve the goals of the treatment. Many evidence-based practices focus on particular symptoms, say, a hand washing compulsion or a phobia. Eliminating a symptom may be sufficient in some cases, but often it is a first step in identifying larger psychodynamic issues that underlie symptoms, and for this reason, some mental health professionals attempt to use evidence-based practices within the context of psychodynamic approaches. The use of decision trees in diagnosis and in psychopharmacology is common, and only occasionally have they been proposed for decisions regarding psychosocial interventions (Plionis, 2004).

Research relevant to mental health conditions and their treatments only provides general parameters for intervention decisions, for the selection of major service modalities and strategies, and this is likely to continue to be the case in the foreseeable future. Theories that permit us to extrapolate from this research do provide some further guidance. But even after both research and theory are considered in practice decision making, many ambiguities and conflicts will still persist. Many decisions can only be made through the critical applications of commonly held principles of practice, values, and ethics. For this reason, it is then that collaborative decision making with the client and with colleagues, including intuition and other trans-rational ways of knowing, assume particular importance in professional decision making. Just as the same theory may be consistent with several strategies, multiple and inconsistent interventions may be found to be equally effective, and neither are always sufficient to inform the countless everyday decisions of the practitioner. The recommendations to individualize, conduct biopsychosocial assessments, to use tiered practice approaches, and to consider empirical, theoretical, and ethical dimensions, are all important, but they

place practitioners under a kind of decisional overload. For this reason, I will now like to discuss how decision making theory might help with this problem.

Decision-Making Theory and Its Contributions. Many of the current approaches to decision making take as their point of departure the traditional ideal of optimization. I would not mention this, except that many the recommended approaches to social work problem solving and treatment planning still are infused by this ideal. This approach has sometimes been referred to as the *rational-comprehensive model* within political science and economics. It can only seriously be attempted when problems are particularly simple and there is agreement about preferred goals. This model looks much like the problem-solving strategies (see Perlman, 1957) in social work in respect to the (i) Definition of problem, (ii) setting of goals, (iii) determination and (iv) forecasting of alternative means for achieving goals, and (v) selection of the optimal alternative, except that it applies rational problem solving to large-scale social problems. Its pitfalls are well known. The way the problem is defined is influenced by values, and this affects the outcomes. Stakeholders often can not agree on goals and criteria. There are often many more alternatives than can be imagined, and rarely can their outcomes be forecast with confidence. The time and cost of search for and testing of alternatives is usually prohibitive. The Nobel prize winning behavioral economist Herbert Simon commented that people simply don't have "the wits to maximize" (1976, p. xxviii).

An early alternative for rational-comprehensive decision making was that proposed by Amitai Etzioni, (1967), one known as "Mixed Scanning". This combines incremental decision making processes for routine decisions, and rational-comprehensive methods for fundamental issues, thereby reducing the costs and time involved in evidence-based decision methods. A related method represents a kind of *rational-disjointed strategy*. Rational-disjointed decision making is characterized by the application of various types of deductive or inductive rational methods – technical, legal, philosophical, or empirical – in a systematic fashion to solving narrowly-defined problems, often on a case-by-case basis. The best known variant of this model is Herbert Simon's (1976) theory of bounded rationality, more popularly known as *satisficing*. Simon argues that most decision makers make a series of determinations about emerging alternatives, and then pick

the first one that emerges that is both satisfactory and sufficient. For example, a social worker looking to place a seriously mentally ill client in a group home visits various homes until one is found that meets the clients needs and minimum agency standards. The model takes into account the limited resources available for information search, as well as foregone opportunities that might result from overly prolonged search and deliberation.

Since the 1970s there has developed a broad field known as behavioral decision making which is concerned with understanding the processes of personal and professional decision making. Two of its early pioneers, Janis and Mann (1977), proposed a theory of vigilant decision making, another variant of rational decision making. They identified fairly restrictive conditions under which vigilant decision making can reasonably be expected to occur. These include the immediacy of a perceived threat, perception of risks associated with obvious solutions, hope for an optimal solution, and reasonable time to deliberate and search for a solution.

Since then, the field of behavioral decision making has split into those, on one hand, who study conditions associated with rational decision making in laboratory settings, and on the other hand, into a sub-field now known as naturalistic decision making (NDM) which is primarily concerned with decision making processes of professionals in real life situations. Studies concern groups as diverse as psychotherapists, pilots, and firefighters. Both quantitative and qualitative methods are used to study decision making with: (i) ill structured problems, (ii) uncertain, dynamic environments, (iii) shifting goals, (iv) action/feedback loops; (v) time pressure, (vi) high stakes, (vii) multiple players, (viii) constraints from organizational goals and norms (Orasanu & Connolly, 1993, p. 5). This research typically involves: expert decision makers, problems involving selecting responses to difficult situations, on the spot informal modeling of these situations, a focus on process, and pressure to ground responses on evidence (Lipshitz, et al., 2001). NDM researchers have in general departed from the traditional paradigm and ways that it evaluates the quality of decisions against abstract rational models, such as multi-attribute utility analysis (Zsombok, 1997).

Within the field of naturalistic decision making there are those who focus primarily on the use of

heuristics or decision rules – for example, practice principles – including the various errors that are made in their formulation or application. This orientation is closely allied with the study of problem solving, including the use of such diverse skills as critical thinking, metacognition, lateral thinking, mindful learning, creativity, and intuition. Several of these involve trans-rational forms of problem solving, ones that include logically and empirically grounded methods, but supplement them with additional forms of problem solving. But others within the naturalistic decision making field have sought to extend these approaches through the formulation of more abstract models of professional decision making, again, based on the study of how professionals actually make decisions in natural contexts. For example, the development of pattern languages (Alexander, 1977), case-based reasoning (Reisbeck, 1989; Visser, R., 1996), and the Recognition / Metacognition Model (RMM) (Cohen, et al. 1996) all are particularly needed developments that few social work professionals are familiar with.

Approaches concerned with heuristics have varied dramatically, ranging from the defining of simple decision rules, to complex systems for pattern matching, such as the use of pattern languages or case based reasoning. The field of clinical decision making, which initially developed within medicine, has attempted to combine the best of several of these approaches. Heuristics are usually framed as simple ‘if-then’ rules or principles that are easy to remember and use, but nonetheless, often allow considerable latitude in their interpretation. Examples are included in *table 2*, and these illustrate both the potentials as well as the many pitfalls of such rules. These rules may be derived purely from theory, from empirical research, or may simply reflect the ‘practice wisdom’ or common beliefs of a profession, true or false. Simon concludes that “research demonstrates that people solve problems by selective, heuristic search through large problem spaces and large data bases, using means-ends analysis as a principal technique for guiding the search.” (1986, p.3). Decision heuristics may prescribe the use of general strategies, or be embedded into the structure of a contingency model, or may stand alone. Their power is their ability to simplify decision making based on past experience, but their indiscriminate application can create major problems. Currently, the trend in many of the human services to formulate best and evidence based practices is an attempt to codify heuristics,

making them explicit for use in education, supervision, training, and research.

[INSERT TABLE 2 ABOUT HERE]

When heuristics are sufficiently defined and prioritized in a logical manner, then it is possible to define decision-making protocols or algorithms. These are often presented as decision trees in which one heuristic serves as the precondition for the next. An example is a diagnostic decision tree that is presented in *figure 2*. The health care field, including nursing, pharmacology, and psychiatric diagnosis, have done much to define such decision-making algorithms to guide their practice. These presuppose a fairly limited number of easily defined and logically interrelated alternatives, the benefits and drawbacks of which are well understood and agreed upon. When the number of alternatives is greater, and there is more uncertainty about their validity and their relationships, it may be possible to develop what is referred to as an expert system. These are supported by databases of rules, or ‘knowledge bases’, that are logically linked together and implemented in an interactive software program with its associated knowledge base. These can include weighting factors that indicate their level of certainty or importance for relevant decisions.

[INSERT FIGURE 2 ABOUT HERE]

In many situations, simple ‘if-then’ rules are inappropriate since there may be multiple and ambiguous conditions implicit in the ‘if’ part of the statement. ‘If-then’ rules assume simple situations that can be identified by one or a few criteria, e.g. “If the client is mentally ill and imminently dangerous to self or others, and if there is no less restrictive setting available, then hospitalize the client.” Even in this seemingly simple example scores of criteria, related in complex ways, are actually involved in the definitions of mental illness, setting restrictiveness, and dangerousness. Thus, much of professional decision making involves complex pattern recognition and matching, for instance, matching the pattern of a patient’s presentation of signs and symptoms, as well as strengths and other characteristics, with a known diagnostic pattern, e.g. schizophrenia.

In recent years there have been several promising approaches to pattern matching. One, involving the development of pattern languages, originated in the field of architecture and urban planning, developed by

Christopher Alexander (see *tables 3*). It has since been used in several other fields, ranging from computer programming to social work. A collection of patterns are formulated and written, with each minimally defining a typical problem, context, and solution. Thus, the matching is not only with individual characteristics, such as signs and symptoms, but also with the environmental context, and a solution that has previously developed for this particular combination of problem and context. The patterns also cite other relevant patterns.

[INSERT TABLE 3 HERE]

The field of clinical decision making has leaned heavily on the combined use of heuristics, algorithms (or decision trees), as well as informal pattern recognition. Increasingly, behavioral decision making theorists have investigated the application of more systematic approaches to the uses of algorithms, approaches to pattern recognition, as well as general cognitive skills and problem solving strategies, for improving decisions around assessment and treatment planning. One of the approaches being investigated is referred to as case-based reasoning (CBR) (see *table 4*). CBR is a strategy for pattern recognition that calls for the development of a database of cases, or a “case base”. As new cases are encountered, the case base is searched for similar cases using designated criteria, and perhaps even weights to indicate their relative importance. One or a few similar cases will be identified, examined as to what worked or did not work in those situations, and an extrapolation made to a plan for the current case. Then, the current case, along with the outcome of the intervention, is added to the case base. As such, case-based reasoning can be regarded as an extension of Alexander’s pattern languages. However, it does not necessarily involve the inclusion of as much contextual information as Alexander’s pattern languages.

[INSERT TABLE 4 ABOUT HERE]

But for the most part, clinical decision-making within the mental health field remains fairly informal and only minimally systematized, despite the increasing number of rapid assessment instruments. Debates continue about the relative importance of professional judgment versus definable heuristics, protocols, and pattern matching procedures, including formal testing. At the same time that those who favor greater

systematization question the reliability of professional judgment, intuition, listening with the “third ear”, and the like, many psychotherapeutically-oriented clinicians argue that these techniques undermine the quality of the relationship, objectify, stigmatize, disempower clients, and impose an oppressive medical model on them. In many instances, these are not mutually exclusive options. The professional’s use of his or her self as the primary instrument of practice means not only using feeling and intuition, but also the power of empirical evidence and rationality, the research knowledge base of the profession, and the full array of its decision making and practice methods.

One of the more significant contributions of naturalistic decision making has been the discovery that expert decision makers do not show the types of biases found under the restricted laboratory conditions, often due to a capacity that has come to be known as “situational awareness” (Klein, p. 51). Expert problem solvers spend considerably more time on recognizing, defining, and conceptualizing the nature of the presenting situation, rather than sequentially reviewing the pros and cons of alternative courses of action in a rationalistic manner. Klein goes so far as to argue that “People with experience can use their experience to generate a reasonable course of action as the first one considered.” In a study of chess players, — , — , Hubert Dreyfuss identifies five stages in the development of expertise, that range from the novice level involving the use of simple If-then rules, to the Expert level that involves a more subtle and refined discrimination ability, one that draws on their context-based, intuitive understanding, but checks and refines it to deal with critical analysis and reflection on the problematic situations (1997).

Other researchers have developed and tested models that combine situational awareness with critical thinking and modeling skills. The most promising such example of a combination model is the Recognition / Metacognition (R / M) Model proposed by Cohen et al. (1996). Their model is premised on the notion that humans typically combine the strengths of both recognitional and metacognitive or reflective processes. They explain that, “The R / M model implies that the two paths along which expertise develops are intertwined. Reflection increases the power of recognition, but itself gains power as a base of recognitional knowledge is built” (Cohen et al., 2000, p.14). Recognitional processing is one of pattern matching, one that consists of

building a mental model of a situation, matching it against models of similar situations encountered, and selecting an action based on this matching and what has been found to have worked previously. A doctor or therapist cognitively attempts to match a pattern of symptoms with formal diagnostic categories, and to deduce the most effective treatment based on the profession's past experience with the diagnosis (see *figure 3*). However, there are usually too many permutations of possible real world situations, and insufficient historical cases or patterns to match them with. Conversely, previous cases may lead to contradictory recommendations. Thus, recognition must be supplemented with critical thought and the application of heuristics, or rules of thumb for decision making. This process is reflected in the rightmost column of *figure 3*. This model includes a "quick decision test" to determine whether there is sufficient time and enough at stake to merit further deliberation. If so, the decision maker critiques the preliminary model, asking whether there are gaps in the information available, conflicts between what this information suggests, or questionable assumptions, all in an iterative manner. Depending on the results of this process, the recognitional process may be accepted or rejected, or modified with new models of the problem and the possible interventions. The recognitional process constrains reflection. Reflection, in turn, may control, adapt, or enhance the recognitional process. Thus, this model of higher level naturalistic decision making integrates the use of general decision making strategies with heuristics and pattern matching, including critical thinking, illustrating the power of professional decision making.

[INSERT FIGURE 3 ABOUT HERE]

Decision making theory and research has generated a rich array of models, most of which take as their point of departure the classical ideal of rational optimization, of ends-means analysis. Each contribution to the field has attempted to find a balance between providing a realistic portrayal of how decisions are actually made and proposing means of improving the quality of decision making, but in the process, this distinction has often been ambiguous. The major thrust of these efforts has been to identify the conditions under which alternative approaches are used or might be used, and these are most commonly referred to as contingency models. Others focus less on global strategies and more on particular techniques, such as

heuristics, algorithms, or expert systems, often adapted to specialized domains of practice. Similarly, efforts are increasingly concerned with combining the best of these models into unified approaches. One of the few efforts to date that has attempted to define a contingency model that draws on the need for situational awareness, including tacit forms of internalized knowledge, as well as both global strategies and heuristics is the Recognitional / Metacognitive model of Cohen, Adelman, and Thompson (2000). Similarly, others such as Melvin Shakun (2001), argue that a truly comprehensive model will need to incorporate cognition, affection, and conation as three integral dimensions of consciousness and of decision making, placing these within a complex systems framework.

There remains much to be learned about how rational, deliberative, and evidence-based approaches to professional decisions are made or might be made in the context of ambiguous time-stressed situations involving massive decisional overload. One criticism of naturalistic decision making is that there are limits, as to how much can be learned simply by studying the decision processes of experts, especially when there is a lack of consensus about criteria for evaluating their outcomes. Lipshitz, however, responds to this criticism through his comment that: “NDM researchers believe that ‘ought’ cannot be divorced from ‘is’: Prescriptions which are optimal in some formal sense but which cannot be implemented are worthless.” (2001, p. 335). It is clear from both current theory and research that traditional efforts to abstractly approximate a rational-comprehensive strategy fail. However, this does not invalidate the possibilities of evidence-based practice, especially when it is viewed as working in concert with tacit and other trans-rational approaches to knowledge building, rather than in competition with it.

Concluding Comments. One of the arguments of this paper is that the field of evidence-based practice, as promising as it is, has sometimes attempted to implement a narrow, rationalistic, and inductivist approach to knowledge building and application, and in so doing, has greatly complicated the achievement of the movement’s underlying ideals. The broader fields of social work and mental health have been driven by core values involving the relief of suffering, mutual support, social justice, respect for diversity, self-determination, and the need for individualizing services. These values, combined with the complex situations

routinely encountered in practice, place practitioners under severe forms of decisional overload. One of the discoveries in the field of complex systems research is that as key parameters pass beyond certain thresholds, bifurcations (or splits) of processes develop, and when more than three to four such splits occur, systems completely decohere (see Hilborn, 1995, pp. 140-160 & 599-627). The split between mental health researchers and practitioners may be approaching such a threshold. Healing this split should not mean either rejecting the ethical responsibility to base practice on solid evidence, nor should it mean rejecting the role of professional judgment, clinical intuition, or others forms of transrational knowledge development. It should instead mean developing a broadened epistemology that integrates empirical, rational, and transrational ways of knowing, and draws from the body of research on decision-making, especially that of professionals.

The application of manualized evidence-based practice protocols runs the risk of undercutting the role of professional judgment and the need for the individualization of services. Well known problems involved in generalizing the EBP results of randomized clinical trials simply do not support their implementation except as general treatment strategies, the execution of which needs to be accompanied by considerable professional judgment in progressively adapting them to the needs of particular clients. The 'If-then' heuristics and decision trees, derived from this research are useful training novices, but we now know from the field of naturalistic decision making that successful practice involves the internalization of a wide base of such knowledge into what Polanyi referred to as tacit knowledge, closely related with what more recent NDM researchers have referred to as situational awareness. Such awareness permits the very swift, virtually simultaneous review of multiple possibilities, that the traditional problem-solving means-ends analyses can not compete with. While there will continue to be relatively simple clinical situations that tacit knowledge alone will be sufficient for guiding responses, there will always be no shortage of complex cases that require active reflection, critical thought, and special research efforts to illuminate. We need to understand better how the transition is made from the use of concrete heuristics to their internalization and to the capacity for situational awareness and the use of accurate and verifiable intuition, especially in the development of hypothesized models. Part of expertise involves effective mental modeling of novel and

complex problems, sometimes through the construction of stories, metaphors, and visual images, and other times, through more formal modeling. The former may even be a precondition to success at the latter. Only by constructing sufficiently rich models of clients, of their pain, their functioning, and their various circumstances, can they be tested, refined, and used to guide our responses.

Another key contribution of decision making research to evidence-based practice are some of the methodologies for overcoming the problem in the idiographic application of empirical generalizations. Determining the applicability of group-based studies to a specific client or population can be greatly aided through case-based reasoning, through reference to an appropriate case-base and identification of similar cases and the interventions that were successful in these particular cases. There are also a variety of other methods that have been around for a number of years that EBP practitioners should not overlook, that range from qualitative case studies and single system studies, structural equation and multilevel modeling with very large samples, to meta- and mega-analyses. But not to be minimized is the evidence that emerges out of the case at hand, the client's particular history and preferences. For example, some psychiatric emergency services are establishing databases of their frequent users, including information about treatments that were particularly successful or unsuccessful in prior years, as well as side-effects of medications, available community supports, and the like. This is not the kind of evidence that is usually included in the professional journals or manualized protocols.

Many proponents of EBP will readily acknowledge the need to apply the results of group-based research studies in an individualized manner. However, much work needs to be done in identifying the analytical and other methods required for doing this. Persons (2006) recommends that, "To strengthen the evidence base of case formulation-driven cognitive-behavior therapy, the therapist also relies on an empirical hypothesis-testing approach to each case, uses evidence-based nomothetic formulations and treatment plans as templates for the ideographic formulation and treatment plan..." (pp. 168-9). This requires, I would suggest, an advanced generalist model of practice that permits the integration of multiple methods of direct and indirect practice, based on a complex systems assessment of the clients involved, their salient needs,

strengths, and relevant environments (see *figure 4*). It requires grounding the application of both case-based and group-based sources of evidence in a critical application of core social work values and ethics, and an interactive and self-organizing dialogue for the facilitation of a mutual practical understanding of the problems, needs, and possibilities at hand. Conceived in this manner, evidence-based practice avoids becoming a technology, and instead becomes a kind of dynamic art that is informed by and grounded in research.

[INSERT FIGURE 4 ABOUT HERE]

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Tables and Figures

**Figure 1 Inductivism and The Alternative of
Scientific Problem Solving**

The Inductivist Scheme

Observations → Generalization → More → Theory Justified?
to Create a Theory Observations

Scientific Problem Solving

Problem → Conjectured → Criticism, → Replacement → New
Solutions Experiments, etc. of Erroneous Terms Problems

SOURCE: Based on pages 59 and 65, David Deutsch. (1997). *The fabric of reality*. New York: Penguin Book.

**Table 1 Examples of Integration of Empirical Evidence in
The Stages of the Problem-Solving Process**

Engagement	<ul style="list-style-type: none"> ▶ Use of census data in identifying groups requiring outreach efforts ▶ Easy availability of accurate and useful resource information for clients in crisis
Assessment	<ul style="list-style-type: none"> ▶ Use of rapid assessment instruments in determining type and extent of needs and problems, including psychopathology ▶ Standardized interview protocols ▶ Review of research on selected populations-at-risk to understand possible concerns, problems, dynamics ▶ Community needs assessments and resource inventories
Goal Setting	<ul style="list-style-type: none"> ▶ Use of evaluation or other intervention research, i.e. literature reviews and metaanalyses, to ascertain possible outcomes that can be realistically expected ▶ Qualitative research on the values, cultures, and aspirations of selected client groups, i.e. use of focus groups
Intervention Planning	<ul style="list-style-type: none"> ▶ Evaluation research, and its various reviews, in assessing promising intervention methods, their effectiveness and drawbacks ▶ Use of descriptive surveys in assessing the availability of various service alternatives within a given area
Contracting	<ul style="list-style-type: none"> ▶ Review of results of psychotherapy process studies to determine optimal approaches to contracting ▶ Policy Delphi studies as a means of developing consensus among stakeholders
Intervention	<ul style="list-style-type: none"> ▶ Use of Rapid Assessment and monitoring instruments in tracking changes in problem status over course of treatment ▶ Process studies of impact of particular techniques ▶ Client satisfaction surveys and focus groups
Evaluation & Termination	<ul style="list-style-type: none"> ▶ Use of single-subject studies in assessing effectiveness of interventions implemented

SOURCE: Hudson, Christopher. (In press). Human behavior in complex systems. Emerging paradigms in advanced practice. Lyceum.

Table 2 Examples of Heuristics

Heuristics are simple ‘rules of thumb’ or practice principles that are often used to guide decision making in complex problems. While some may be based on formal research or theory, many reflect the accepted practice wisdom of a profession, the validity of which is untested.

Some general examples from the field of behavioral decision making:

1. **REPRESENTATIVENESS HEURISTIC:** If a set of signs and symptoms are common to two phenomena, conclude that the causes and/or effects of each will also be the same. The danger is that prior probabilities are often ignored, or that equifinality may be involved, that the same end may result from different causes (Tversky & Kahneman).
2. **AVAILABILITY HEURISTIC:** The probability of an event occurring is estimated based on how readily it comes to mind. This is a particularly dangerous heuristic, as many factors influence recall, other than salience (Tversky & Kahneman).
3. **ANCHORING HEURISTIC:** The first values in a series are relied on to estimate the progression of a series of values (Tversky & Kahneman).
4. **ELIMINATION BY ASPECT:** When a choice must be made between many alternatives, groups of alternatives are progressively rejected if they fail to meet various minimum criteria. This may result in either eliminating too few alternatives, all of them, or focusing inappropriate criteria for a final decision (Tversky, 1972).
5. “Do what we did last time if it worked, and the opposite if it didn’t”. (Janis & Mann, 1977).

A few examples specific to the human services:

6. ‘Implement those alternatives for which consensus can be achieved.’
7. ‘If two diagnoses for the same problem are equally plausible, focus on treating the less severe one, and monitor the outcome.’
8. ‘Start with where the client is at.’
9. Start working in a collaborative manner, and only if there is not consensus, then consider a campaign strategy, or as a last resort, a conflict strategy (Roland and Warren).

Table 4 Case Based Reasoning: A Strategy for Clinical Decision Making

OVERVIEW. Case-based reasoning (CBR) refers to a recently developed set of methods for drawing on the results of past clinical decisions for making current case decisions. It was developed during the 1990s, out of work in the cognitive sciences, specifically, artificial intelligence. It relies on identifying one or more previous cases, recorded in a “case base”, based on their similarity to the case at hand, and then using the previous experience to either select or reject potential interventions for the current case.

BACKGROUND. CBR has its roots in the work of Roger Schank on dynamic memory even as far back as Ludwig Wittgenstein and his critique of problem of generating classical definitions with necessary and sufficient conditions for most phenomenon. The first actual CBR system was developed by Janet Kolodner at Yale University in the 1980s and involved the meetings and travels of the then Secretary of State Cyrus Vance.

MAJOR METHODS. Most approaches to CBR, at a minimum, utilize the following:

- ▶ Data collection and documentation of current case.
- ▶ Retrieve from the case base the most similar case(s) relevant to the current problem. Weights might be assigned for each feature based on their importance; the case(s) with the highest weighted average would serve as the reference case(s).
- ▶ Extrapolate solutions from retrieved cases to current case.
- ▶ Adapt the solution based on unique features of the current case.
- ▶ Include data on the current case and outcome in the case base.

APPLICATIONS. CBR has been used in a wide variety of fields, both within health and the human services, and beyond. The following are a few examples:

- ▶ Medical diagnosis
- ▶ Help desk and consultation in helping customers problem shoot with a product or service
- ▶ Legal reasoning
- ▶ Social work education (“Cascade”, Viser 1996).
- ▶ Designing supports for homebound disabled and elderly

TOOLS. The following are a few resources available to support case-based reasoning:

- ▶ Software. A variety of commercial and free programs are available; see: <http://www.ai-cbr.org/tools.html> .
- ▶ Increasingly CBR systems are being used on the internet to facilitate large-scale collaborative efforts.

ADVANTAGES AND DISADVANTAGES. CBR is especially useful where the complexity and variety of cases encountered, as well as the demand for individualized response, preclude the use of simpler decision rules or more highly structured decision trees. An important problem involves determining relevant features of cases, and some criteria for assessing case similarity. Sometimes multiple precursor cases can be identified, each suggestive of different interventions, or conversely, there may be no relevant cases available.

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- SOURCE:** Hudson, Christopher. (In press). Human behavior in complex systems. Emerging paradigms in advanced practice. Lyceum.

Table 3 Pattern Languages

Overview. An increasing number of fields are developing pattern languages to support decision making. These are collections of statements about best practices or recommended solutions for typical problems encountered in practice. They go beyond mere listings of interventions, as they routinely identify a problem or issue, and a context for its application. They are often developed collaboratively, using a common template, and agreed upon procedures for their development, review, and updating.

- ▶ Patterns typically identify a **PROBLEM**, a **CONTEXT**, and a **SOLUTION**, and sometimes include background information and a rationale.
- ▶ Patterns may also specify other patterns that they are part of or can be used in conjunction with.
- ▶ Patterns statements can include observable actions, empirical research, hypotheses to be tested theories, or "best practices".
- ▶ Patterns can be framed in many ways; they can be very general or specific in their focus. They may draw on theoretical knowledge or 'practice wisdom'.
- ▶ Patterns can also serve a heuristic function in stimulating discussion, research, or advocacy.

Pattern languages have been developed in the following fields: architecture and city planning, software design, cyber-cultural studies, ecology, health care education, communications, and community development. **Table 3** presents an example of pattern statement developed as part of a collaborative internet-based effort to develop a pattern language for living communications.

Background. The notion of a pattern language was first introduced by the architect, Christopher Alexander, in his book, *Pattern Languages*. He explains:

A pattern language consists of a cascade or hierarchy of parts, linked together by patterns which solve generic recurring problems associated with the parts. Each pattern has a title and collectively the titles form a language for design. ... A pattern is essentially a morphological law, a relationship among parts within a particular context. Specifically, a pattern expresses a relationship among parts that resolves problems that would exist if the relationship were missing. As patterns express these relationships, they are not formulae or algorithms, but rather loose rules of thumb or heuristics.

Recent Applications. Alexander and his colleagues have researched the many Pattern Languages that they stimulated, and identified 15 deeper principles governing living systems. These Fifteen Properties are the focus of Alexander's newest book, a four volume series called *The Nature of Order*. In this research, they asked people questions like:

- ▶ Is your wholeness increasing in the presence of this object? ...or this one?
- ▶ Do you feel more whole?
- ▶ Do you feel more alive in the presence of this thing?
- ▶ Do you feel that one is more of a picture of your own true self?

In analyzing their results, they found evidence of universal agreement among humans about the design patterns that support wholeness, coherence, and aliveness. They concluded that, "The life that is actually in the thing is correlated in some peculiar fashion with the condition of wholeness in ourselves when we are in the presence of the thing... not merely a hunch, but a testable empirical result." (1999). Alexander explains,

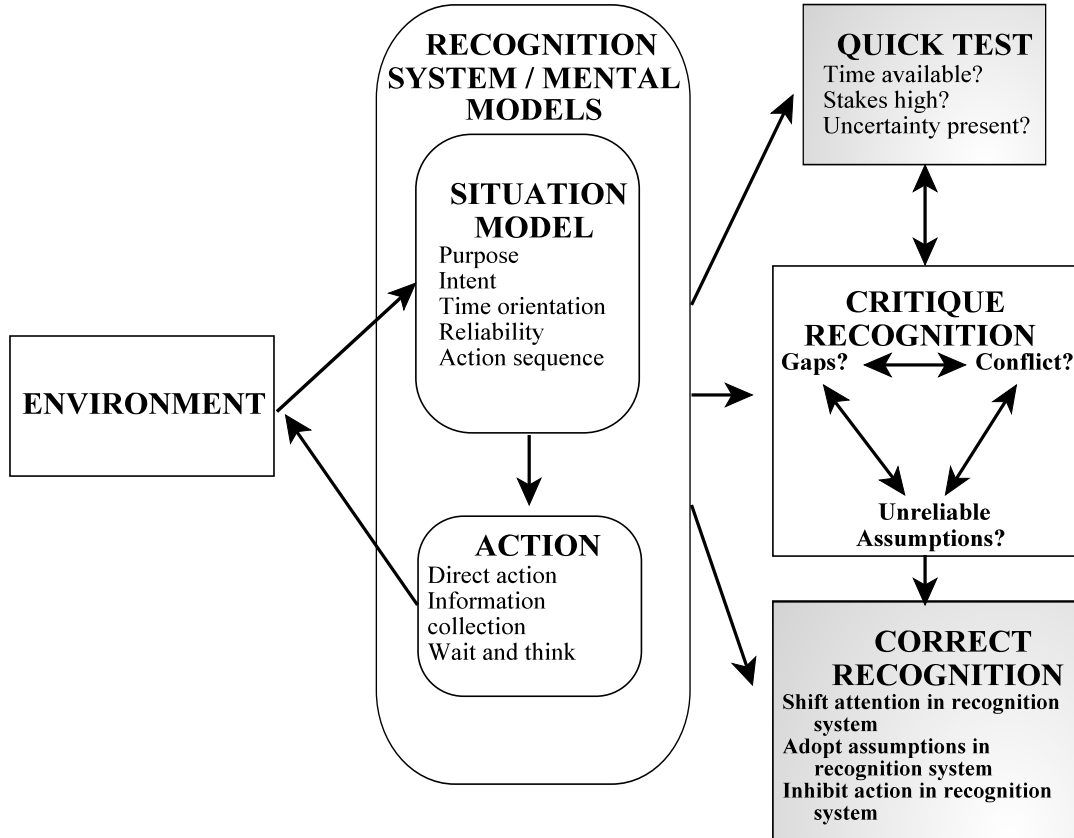
At the root of these Fifteen Properties, there appears to be a recursive structure based on repeated appearances of a single type of entity -- the primitive element of all wholeness. These entities are what I call 'centers'. All wholeness is built from these centers, and centers are recursively defined in terms of other centers.

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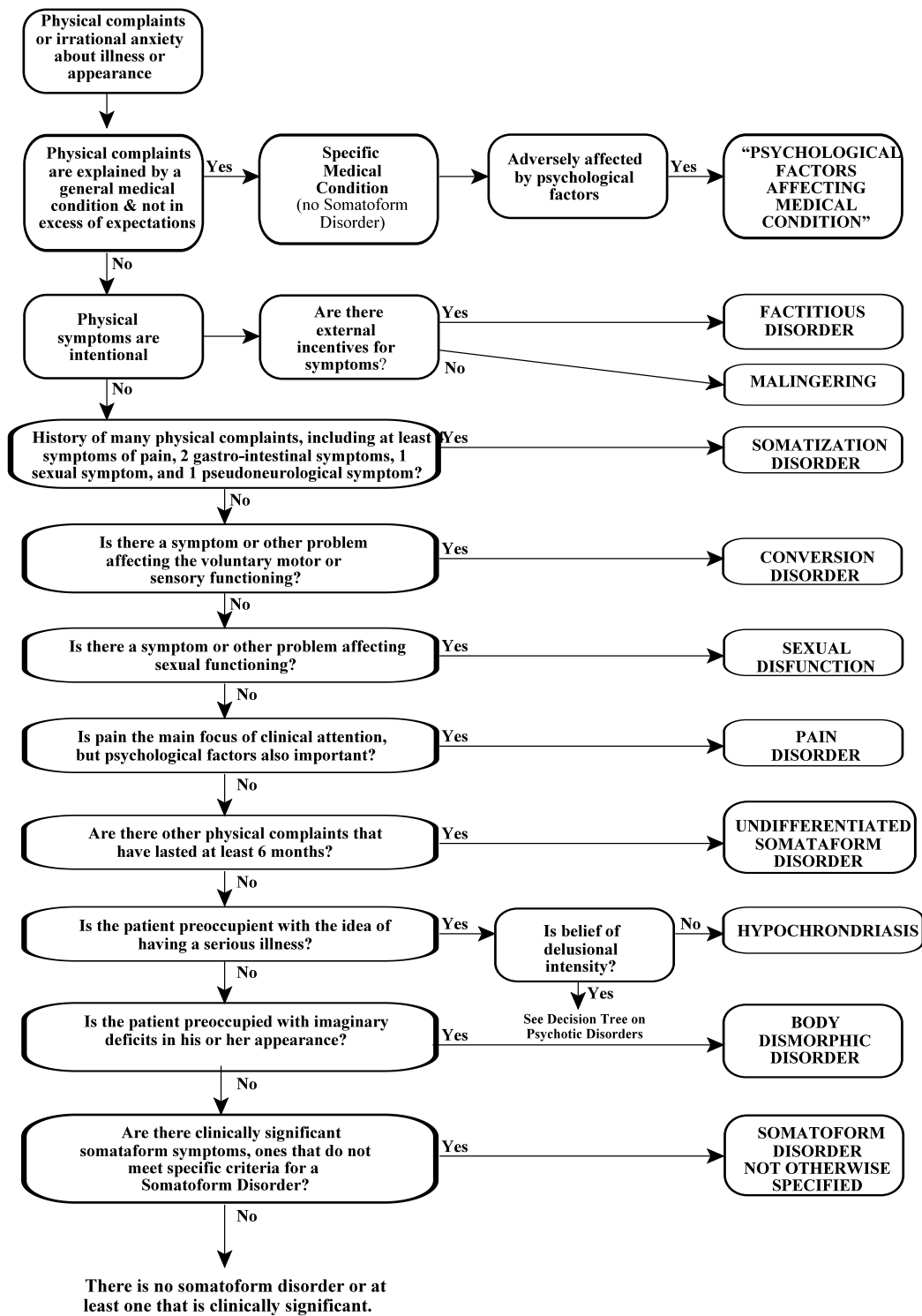
SOURCE: Hudson, Christopher. (In press). Human behavior in complex systems. Emerging paradigms in advanced practice. Lyceum.

Figure 3 Components of the Recognition / Meta-Cognition Model of Decision Making



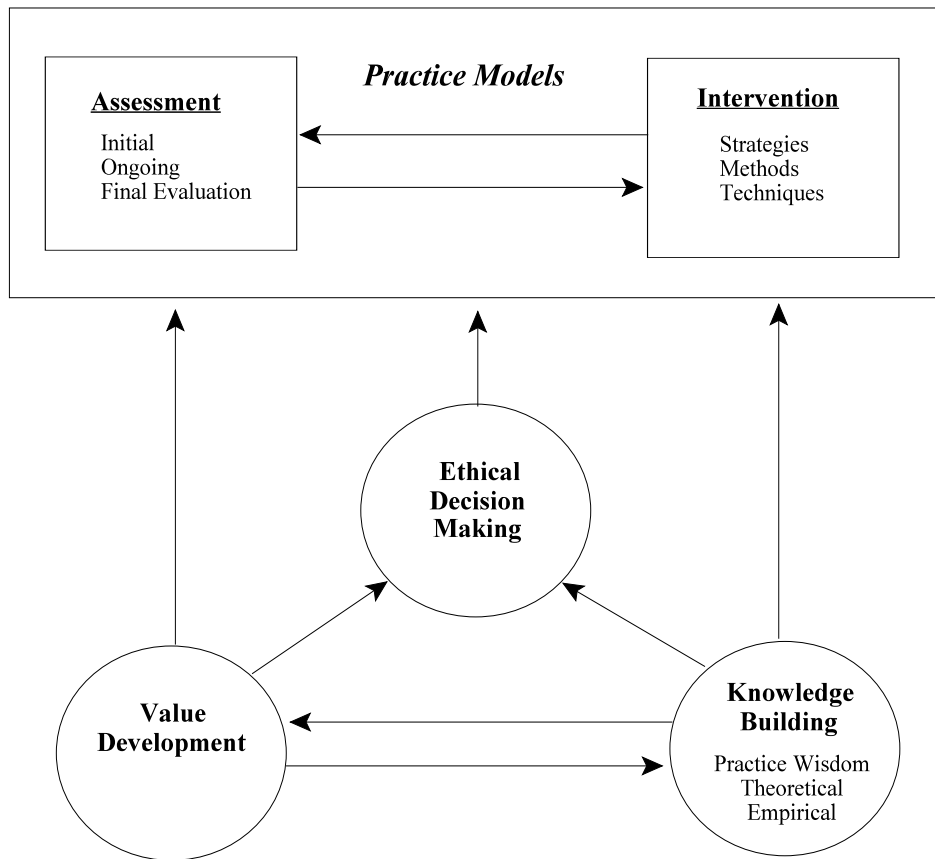
SOURCE: Redrawn from Cohen, Marvin S., Adelman, Leonard, and Thompson, Bryan B. (March 2000). Experimental investigation of uncertainty, stakes, and time in pilot decision making". Cognitive Technologies, Arlington, VA.

Figure 4 Example of a Diagnostic Decision Tree: Somatoform Disorders



SOURCE: Redrawn from American Psychiatric Association [APA]. (2000). *Diagnostic and statistical manual of mental disorders*, Fourth Edition (Text Revision). Washington DC.

Figure 4 An Overview of Advanced Generalist Practice



SOURCE: Hudson, Christopher. (In press). Human behavior in complex systems. Emerging paradigms in advanced practice. Lyceum.