

REDUCING BIASES IN CLINICAL JUDGMENT WITH SINGLE SUBJECT TREATMENT
DESIGN

Daniel J. Moran and Wendi Tai
Valparaiso University

Psychological literature exposes a number of biases that can influence one's judgment (e.g., pathology bias, confirmatory bias, hindsight bias, misestimation of covariance, decision heuristics, false consensus effect, and over-confidence in clinical judgment). Clinical judgment, the subjective method of arranging client data to establish a diagnosis and a treatment plan, can also be biased and may lead to inaccurate assessment and inefficient treatment. Taking repeated measures of symptoms, similar to the single subjects research design used in the behavioral sciences, may lead to better therapy because it reduces judgment bias.

When evaluating another person's behavior, there are numerous factors that may distort an accurate account of the response in context. Clinicians are not immune to these distortions in judgment, and several such biases will be examined in the clinical context. The use of single subject design methodology in treatment contexts may reduce these biases and help improve therapeutic endeavors.

Behavior analysts recognize the benefits of the single subject research design. This ideographic approach to research, which emphasizes repeated measures of individual behavior where subjects serve as their own control under different conditions, is well suited for applied settings (Hayes, Barlow, & Nelson-Gray, 1999). Clinicians using this time-series methodology can investigate not only the environmental influences on their client's therapeutic gains, but also their rate of behavioral change and its maintenance. Assessing each client's progress as an N=1 design supports the client's right to effective treatment (Van Houten et al., 1988), maintains scientific and practical standards of practice (Burns, 1990; Davison & Lazarus, 1995; Zaro, Barach, Nedelmann & Dreiblatt, 1977). Morgan & Morgan (2001), in an article in the *American Psychologist*, extolled the use of these designs and suggested that this technology may inform future business with managed care.

There is an additional, very good reason to utilize these techniques. Specifically, it is prudent for therapists to use the single subject treatment design because this mechanical

prediction technology reduces the deleterious biases involved in using clinical judgment to make a diagnosis (of category or severity) and treat a client's behavioral disorder. Many clinicians have little insight into how they make judgments in the clinical setting (Garb, 1998), and some critics argue that even when clinicians acknowledge that certain information is important, such information can have little influence on clinicians' judgments (Rock, 1994). Additionally, clinicians with many years of experience are usually not any more accurate than graduate students in clinical training (Dawes, 1989; Garb, 1998; Grove, Zald, Boyd, Snitz, & Nelson, 2000). This demonstrates that the amount of experience does not necessarily lead to better accuracy in the use of subjective methods of psychological assessment.

Clinical judgment is the informal and subjective method of arranging client data to establish a diagnosis and formulate treatment plans (Grove et al., 2000). Conversely, mechanical prediction involves formal and/or statistical techniques for the behavioral assessment of clients (Grove et al.). While therapists may contend that effective and accurate psychological assessment is the result of clinical experience, the single subject treatment design demands well-defined, specified methodological processes that are reproducible, and therefore less prone to subjective bias than clinical judgment.

The Oxford English Dictionary defines *bias* as "An inclination; prejudice" (OED, 1989). When a person's behavior is called "biased," it

implies that one response is more likely than other responses possible at that time. Bias itself is not problematic, as clinicians may be biased to use reliable data for their diagnoses, or defer diagnosis until more data is acquired. Such bias towards using data is ultimately to the benefit of the client and is a sound practice. When a clinician solely relies on clinical impression, however, their bias is not likely to benefit the client, as it is liable to initiate a distorted assessment of a client's current state and therapeutic progress, leading the applied scientist to practice ineffectively. For example, therapist's impressions of a client involve verbal processes shaped not only by the presenting problem, but also by a diverse reinforcement history that may taint the accuracy of a clinician's particular judgment. It is often speculated that clinicians can learn from years of experience how to make clinical judgments, but studies show that there are numerous biases that even experienced clinicians are vulnerable to faulty clinical judgment (Garb, 1998; Shemberg & Doherty, 1999).

SPECIFIC CLINICAL BIASES

Judgment can be influenced by a number of social/ verbal biases (e.g., pathology bias, confirmatory bias, hindsight bias, misestimation of covariance, decision heuristics, false consensus effect, and over-confidence in clinical judgment) and these biases will be considered in the context of clinical work.

Shemberg and Doherty (1999) posit that clinicians often develop a bias to look for psychopathology, and that clinical training and experience emphasizes "finding" psychopathology. Other research shows that individuals can be biased in searching for information only relevant to a socially reinforced hypothesis. They are more likely to ignore other information relevant to alternative hypotheses (Garb, 1998; Shemberg & Doherty). In clinical environments, bias toward psychopathology especially becomes a concern in settings where clients are influenced, explicitly and implicitly, to demonstrate pathology (i.e., residential psychiatric settings,

certain managed care arrangements, etc.). Such working conditions may lead to inauthentic diagnoses, which may then lead to a self-fulfilling prophecy.

Non-pathological diagnoses are largely underrepresented among professionals in clinical practice, and suggest a "pathology bias." In psychological settings, clinical judgments are generally less favorable (i.e., more negative) than judgments made by individuals in other fields, regardless of whether judgments are being made for psychologically impaired or normal populations (Garb, 1998). As a rationale, one could possibly reason that the pathology bias is advantageous if psychopathology is indeed present in a given client. However, a bias for perceiving psychopathology has not been shown to be positively related to the validity of clinical judgment (Garb, 1998).

Diagnoses are verbal behavior and therefore "reinforced through the mediation of other people [who] ...are behaving in ways that have been shaped and maintained by a verbal environment" (Skinner, 1986, p. 121). Participants in this verbal community may also shape the diagnostic behavior by establishing contingencies that do not primarily serve the client and the presenting problem. The pathology bias may be made more likely by financial contingencies, such as insurance companies only paying bills if there is a diagnosis. Similarly, parents or guardians who are convinced of their child's pathology may contribute to a pathology bias if the clinician is not vigilant of the greater set of social contingencies.

While the pathology bias influences making an inaccurate diagnosis, there are a number of other biases that maintain the erroneous diagnosis and skew the clinician's view of the therapeutic process. For instance, a clinician may demonstrate a "confirmatory bias," when seeking or recalling information that substantiates a diagnosis (Shemberg & Doherty, 1999). This poses a flaw to clinical judgment as

clinicians will tend to use information (true or ambiguous) to support their subjective judgment, but will not use data to refute their hypotheses or use other information to consider any alternative hypotheses (Garb, 1998). In terms of a pathology bias, clinicians can incorporate a confirmatory bias into their judgment when they are seeking to support their judgment that a client is exhibiting psychopathological behavior. In this case, clinicians have the tendency to highlight the information relevant in support of a psychopathological diagnosis and ignore any other information that is irrelevant in terms of psychopathology.

Confirmatory biases have been shown to exist with respect to clinician's recall of client information (Dawes, 1994; Garb, 1996, 1998). After making a clinical judgment, a clinician may have the tendency to selectively recall information supporting the particular judgment (Garb, 1996). If a client presents behavior inconsistent with the clinician's diagnosis, the clinician has a higher likelihood of forgetting that particular symptom in the future. Clinicians have been shown to have the tendency to recall more category-consistent information (consistent to their diagnosis) than category-inconsistent information (Garb, 1998). This implies that clinicians may forget information that is irrelevant to their diagnosis once a working diagnosis is achieved (Spengler & Strohmer, 1995), and this "irrelevant" information could have become important during therapy. In other words, if information does not fit the working hypothesis, it might be forgotten, yet sometimes the working hypothesis is flawed, and that "forgotten" information may have been useful in therapy. The "selective remembering" problems may be reduced with proper record keeping, such as the use of time-series methodology.

Clinical judgment can also be hindered by the hindsight bias (Garb, 1998). Hindsight bias arises when the clinician learns of an outcome and then acts as if they predicted the likelihood of the event. Related to the hindsight bias is the issue of deterministic reasoning

(Dawes, 1994; Garb, 1998). When clinicians attempt to understand the causes of their clients' behavior and symptomatology, their formulations can overestimate the influence of specific stimuli on the client's responses and ignore the fact that behavior is multiply determined. In fact, it seems the term *contextually determined* would be more appropriate. In addition to overestimating the effects of a limited number of stimuli on the dysfunctional behavior, the clinician can also overestimate the accuracy of that circumscribed formulation (Garb, 1998). The consideration of deterministic reasoning is important, because research in hindsight bias indicates that clinicians have a significantly higher likelihood of being overly deterministic when they have constructed a limited causal explanation (Dawes, 1986, 1994).

In addition to the hindsight bias, the misestimation of covariance is also an important bias influencing an overestimation of an accurate judgment. Misestimation of covariance occurs in instances where clinicians fail to correctly describe the relation between two events (Garb, 1998). This is often seen in instances where a clinician attempts to relate test scores with personality characteristics (Meehl, 1960). For instance, consider that a particular test result (event 1) and a particular diagnosis (event 2) can be considered true and/ or false by the clinician in the following array of possibilities: both the test result and diagnosis are considered "true" (events 1 and 2); a test result is "true" but not the diagnosis (event 1 but not 2); the diagnosis is true but not the test result (event 2 but not 1); neither a test result nor a diagnosis are true (neither event 1 nor 2). An experimental study described by Garb (1998) indicated that clinicians were more likely to recall cases where both the test result and diagnosis were endorsed as true. This suggested that clinicians had the tendency to remember instances where the two events appeared to correlate, thus increasing their likelihood of developing a covariation misestimation.

In addition to aforementioned clinician biases, decision heuristics (i.e., cognitive heuristics) can also play a role in influencing clinical judgment (Garb, 1998). Decision heuristics are composed of simple rules that are descriptive of how individuals make judgments. Empirical research has long shown that the representativeness heuristic is descriptive of how individuals make decisions in everyday life and can influence clinical judgment (Dawes, 1994; Garb, 1996). The representativeness heuristic defines instances where clinicians make diagnoses by comparing clients to “prototypical” or “typical” clients of a particular diagnosis. Both prototypical and typical impressions of psychological diagnoses are developed through clinical training and past experience. The prototypical client would exhibit all of the features and symptoms associated with a particular diagnosis. The typical or stereotypical client, on the other hand, would only display some of the associated features. Dawes (1986, 1994) has proposed the term representative thinking, which is analogous to that of the representativeness heuristic. Representative thinking functions as a bias in clinical practice as clinicians are making a judgment based on the degree to which a characteristic of a client matches a stereotype or prototype.

As an illustration, suppose a clinician is diagnosing a client with depression. By making a prototype comparison, the clinician would compare the client to an individual with depression as outlined in the diagnostic protocol (i.e., DSM-IV-TR). A prototype represents a theoretical ideal or standard by which clients are evaluated (Garb, 1998). Certainly, no client matches this theoretical standard perfectly, thus different clinicians approximate different degrees to which clients typify the prototype. As a result, this approximation allows for clinicians’ subjective opinions in determining the diagnosis of a client. Depending upon each clinician’s flexibility in working with the theoretical model of depression, the decision of whether or not a client fits the model can vary from one clinician to another.

On the other hand, by making a stereotypical comparison, the clinician would compare the client to the clinician’s own experience of what depressed clients are like. A stereotypical impression of any diagnosis would generally involve only a partial representation of the entire diagnostic picture of depression. Therefore, when making this kind of clinical judgment, the clinician tends to rely on the limited factors and signs that were helpful with diagnosing other clients with depression.

To summarize the decision heuristic, consider that clinicians are operating in an environment that reinforces the rule-governed use of a flawed diagnostic nosology. The DSM diagnostic rules are not only “based on inadequately explicated theory” (Follette, 1996), but because rule-governed behavior leads to insensitivity to contingencies (Baron & Galizio, 1983; Barrett, Deitz, Gaydos, & Quinn, 1987; Galizio, 1979; Harzem, Lowe, & Bagshaw, 1978; Hayes, Brownstein, Haas, & Greenway, 1986; Shimoff, Matthews & Catania, 1986; Skinner, 1966, 1969; Vaughn, 1985), the clinician may make even poorer diagnoses because of an insensitivity to the contingencies provided by the nuances between client’s presentations. Such insensitivity may also lead clinicians to maintain expectations about how treatment for a particular client is likely to progress, and influence them to use a “cookie-cutter” treatment course for all those with the diagnosis, rather than to create an individualized treatment protocol. Objectively assessing the frequency, duration, intensity, and pervasiveness of dysfunctional behaviors described as “depressive” will help reduce the representativeness bias and facilitate treatment, because the client’s symptoms and improvements are being compared to their own behavior rather than external norms.

Related to the above, the false consensus effect suggests that individuals overestimate the degree to which people are alike (Dawes, 1991). Clinicians demonstrate the false consensus effect by overestimating the degree to which one client is like another, based on a particular characteristic. Similarly, a clinician can overestimate the degree to which a client can be like the clinician him/herself (Dawes, 1994; Einhorn & Hogarth, 1978).

Yet another area of concern when considering clinical judgment involves the idea that clinicians may demonstrate over-confidence in clinical judgment, by becoming too confident in their subjective psychological assessments. Einhorn and Hogarth (1978) have demonstrated that clinicians have the tendency to uphold strong confidence in their judgment. Oftentimes, clinicians can begin to develop an over-confident outlook to the accuracy of their judgment because they believe that more experience influences more effectiveness and accuracy in clinical judgment (Groth-Marnat, 2000). Many clinicians find it quite compelling when their clinical judgment turns out to be correct, even if only on a chance basis (Dawes, 1989, 1994). In other words, the behavior of diagnosing a client without the aid of reliable and objective data is intermittently reinforced when the diagnosis is later confirmed by trustworthy data. Therefore the clinician has an increased likelihood to make clinical judgments in the absence of dependable data. Further, when a clinician's judgment is proven to be correct, it is more easily remembered and socially reinforced when shared among others. Consequently, the clinician may begin to use unaided clinical judgment with greater frequency. However, the extent of professional training and experience, as well as the amount of information available to clinicians, *does not* necessarily increase the predictive accuracy of clinical judgment. In fact, validity of clinical judgment and the amount of clinical experience are unrelated (Dawes, 1989). When considered in the context of all the other potential biases of a therapist's judgment, this should alert clinicians that some sort of mechanical method

of analysis should receive serious consideration as a substitute for subjective clinical impressions.

IMPROVING "JUDGMENT"

As long as clinicians are unaware of or underestimate their various errors in making clinical judgments, they will continue to maintain their biases. Research findings indicate that there is a lack of adequate feedback regarding clinical judgment across all types of professional settings (Dawes, 1989; Groth-Marnat, 2000; Grove et al., 2000). In general, clinicians' errors in judgment are due to the aforementioned biases. Past experiments have identified that the effective learning of conceptual categories depends upon two general factors (Dawes, 1989). First, the learner (i.e., clinician) must have clear understandings about how (and which) instances belong to a given diagnosis. Second, the clinician must receive frequent and systematic feedback concerning understanding of the categorizations.

One area where the need for a better nosology and a better method of tracking progress is being addressed is in the field of clinical behavior analysis. The development of theoretically coherent alternatives to the DSM nosology is beyond the scope of this paper and has been addressed elsewhere (Carson, 1996; Follette, 1996; Follette & Houts, 1996; Follette, Naugle, & Linnerooth, 2000; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996).

Assessing clinical progress can be enhanced with single subject design methodology (Ellis, 1999; Hayes et al., 1999), and such assessment may also improve therapy by allowing changes in the clinically relevant behavior to guide the therapeutic endeavor. Such flexibility is not available when a rigid protocol governs therapy, nor when the clinician's biased opinions of "improvement" guide therapy.

In single subject treatment design, frequent and consistent formal measurements are gathered to assess a client's clinically relevant behaviors *and* their contexts. It may appear that in repeated measures designs, the behavior and its variation is the main focus, and the context of the behavior is the backdrop. However, it must be stressed that single subject treatment assessment *must* include evaluation of the prevailing contingencies interacting with the behavior. By taking valid measures of clinically relevant behaviors on a regular basis and objectively appraising the environment, the clinician gains valuable and less subjective data about the impact of the intervention, which can more effectively guide the therapy. This is not to suggest that clinicians solely using clinical judgment do not use their impressions to guide decisions in therapy, but that "the formality of repeated measurement insulates the practitioner from certain key errors of judgment that are common to human decisions" (Hayes et al., 1999, p. 102).

Specifically, the clinician is in a better position to evaluate whether treatment goals are being approached if there is graphic representation of objective behavior change. The graphs used in single subjects treatment design compares the client's progress to the client's baseline rather than to a "prototypical" or "typical" client. This individualized approach allows for greater accuracy in assessing treatment effects for that person and eliminates the representative heuristic and the false consensus effects as biases. The graphic data from single case methodology also helps objectively demonstrate whether a client's behavior is improving, staying the same, or getting worse and thereby reduces the bias of overconfidence in clinical judgment.

The chance of a pathology bias is reduced because the therapist can see that a behavior considered "clinically relevant" may not occur at a dysfunctional rate or intensity.

However, incisive clinicians understand that there may be reason to investigate the behavior of reporting subclinical behaviors as clinically relevant. In other words, there may be clinical relevance in reports of symptoms that are not clinically relevant.

Mischel (1968) states that psychologists "frequently measure and describe a purportedly general dimension of behavior only to discover later that it has dubious consistency" (p.29). Learning the dubious consistency of personality factors will arise from repeated measures design because therapists will observe that behavior is a function of the environment, and not a function of a test profile derived from norms. This can enhance therapy as the clinician will be able to exert greater influence on the client's behavior through environmental interventions, and will no longer be restricted to rigid suppositions and expectations of the client's behavior. With the continual presentations of behavioral and environmental data, the bias of misestimation of covariance between personality test scores and current data can be eliminated.

Using N=1 data for each client can also reduce the effects of the hindsight bias and deterministic reasoning because the clinician is constantly assessing the environmental variables rather than using conjecture. However, when a clinician uses this methodology, there is still the danger of judging a particular environmental stimulus as the casual factor, when indeed it is merely a consistent *contributing* factor.

The problem of clinicians selectively recalling information that supports a particular judgment (the confirmatory bias) can be diminished by the recurrent collection of data because the increased data collection will more strongly refute the working hypothesis than no data at all. Nevertheless, there is still the danger of inadvertent disregarding new disconfirming

data being selected by social and financial contingencies. However, this threat is diminished because there is a greater amount and familiarity with the behavioral and environmental data. The commitment to data collection will reduce opportunities for “selective remembering.”

The use of time-series data collection will improve the clinician’s therapeutic effectiveness by eliminating the common mistakes made when clinical judgment is the only tool used to guide therapy. In addition to reducing the biases found in clinical judgment, the graphic representation of the changes in each client’s behavior will also uphold the client’s right to receive effective treatment (Van Houten et al., 1988). Further, it will preserve practical standards of the applied science and, because of its elegance and simplicity, may even help communicate the contingencies and results of therapy with managed care representatives.

REFERENCES

- Baron, A., & Galizio, M. (1983). Instructional control of human operant behavior. *Psychological Record*, 33, 495-520.
- Barrett, D. H., Deitz, S. M., Gaydos, G. R., & Quinn, P. C. (1987). The effects of programmed contingencies and social conditions on response stereotypy with human subjects. *Psychological Record*, 37, 489-505.
- Burns, D. D. (1990). *The feeling good handbook*. NY: Penguin Books.
- Carson, R. C. (1996). Aristotle, Galileo, and the DSM taxonomy: The case of schizophrenia. *Journal of Consulting and Clinical Psychology*, 64, 1133-1139.
- Davison, G. C., & Lazarus, A. A. (1995). The dialectics of science and practice. In S. C. Hayes, V. M. Follette, T. Risley, R. D. Dawes, & K. Grady (Eds.), *Scientific standards of psychological practice: Issues and recommendations* (pp. 95-120). Reno, NV: Context Press.
- Dawes, R. M. (1986). Representative thinking in clinical judgment. *Clinical Psychology Review*, 6, 425-441.
- Dawes, R. M. (1989). Experience and validity of clinical judgment: The illusory correlation. *Behavioral Sciences & the Law*, 7, 457-467.
- Dawes, R. M. (1991). Probabilistic versus causal thinking. In D. Cicchetti & W. M. Grove (Eds.), *Thinking clearly about psychology: Volume 1: Matters of public interest* (pp. 235-264). Minneapolis, MN: University of Minnesota Press.
- Dawes, R. M. (1994). *House of cards: Psychology and psychotherapy built on myth*. New York: The Free Press.
- Dawes, R. M., Faust, D., & Meehl, P. E. (1989). Clinical versus actuarial judgment. *Science*, 243, 1668-1674.
- Einhom, H. J., & Hogarth, R. M. (1978). Confidence in judgment: Persistence of the illusion of validity. *Psychological Review*, 85, 395-416.
- Einhom, H. J., & Schacht, S. (1977). Decisions based in fallible clinical judgment. In M. F. Kaplan & S. Schwartz (Eds.), *Human judgment and decision processes in applied settings* (pp. 125-144). New York: Academic Press, Inc.
- Ellis, M. V. (1999). Repeated measures designs. *Counseling Psychologist*, 27, 552-579.
- Follette, W. C. (1996). Introduction to the special section on the development of theoretically coherent alternatives to the DSM system. *Journal of Consulting and Clinical Psychology*, 64, 1117-1119.
- Follette, W. C. & Houts, A. C. (1996). Models of scientific progress and the role of theory in taxonomy development: A case study of the DSM. *Journal of Consulting and Clinical Psychology*, 64, 1120-1132.
- Follette, W. C., Naugle, A. E. & Linnerooth, P. J. (2000). Functional alternatives to traditional assessment and diagnosis. In M. J. Dougher (Ed.), *Clinical Behavior Analysis* (pp. 99-126). Reno, NV: Context Press.
- Galizio, M. (1979). Contingency-shaped and rule-governed behavior: Instructional control of human loss avoidance. *Journal of the Experimental Analysis of Behavior*, 31, 53-70.
- Garb, H. N. (1996). The representativeness and past-behavior heuristics in clinical judgment. *Professional Psychology: Research and Practice*, 27, 272-277.
- Garb, H. N. (1998). *Studying the clinician: Judgment research and psychological assessment*. Washington, DC: American Psychological Association.
- Goldberg, L. R. (1991). Human mind versus regression equation: Five contrasts. In D. Cicchetti & W. M. Grove (Eds.), *Thinking clearly about psychology: Volume 1: Matters of public interest* (pp. 173-184). Minneapolis, MN: University of Minnesota Press.
- Groth-Mamat, G. (2000). Visions of clinical assessment: Then, now, and a brief history of the future. *Journal of Clinical Psychology*, 56, 349-365.
- Grove, W. M., Zald, D. H., Boyd, L. S., Snitz, B. E., & Nelson, C. (2000). Clinical versus mechanical prediction: A meta-analysis. *Psychological Assessment*, 12, 19-30.
- Harzem, P., Lowe, C. F., & Bagshaw, M. (1978). Verbal control in human operant behavior. *Psychological Record*, 28, 405-423.
- Hayes, S. C., Barlow, D. H., & Nelson-Gray, R. O. (1999). *The scientist-practitioner: Research and accountability in the age of managed care*. Boston: Allyn & Bacon.
- Hayes, S. C., Brownstein, A. J., Haas, J. R., & Greenway, D. (1986). Instructions, multiple schedules, and extinction: Distinguishing rule-governed from schedule-controlled

behavior. *Journal of the Experimental Analysis of Behavior*, 46, 137-147.

Hayes, S. C., Wilson, K. W., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Emotional avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64, 1152-1168.

Kleinmuntz, B. (1991). Recent developments in computerized clinical judgment. In D. Cicchetti & W. M. Grove (Eds.), *Thinking clearly about psychology: Volume 1: Matters of public interest* (pp. 217-234). Minneapolis, MN: University of Minnesota Press.

Meehl, P. E. (1960). *Clinical versus statistical prediction: A theoretical analysis and a review of the evidence* (4th ed.). Minneapolis, MN: Jones Press Inc.

Meyer, G. J., Finn, S. E., Eyde, L. D., Kay, G. G., Moreland, K. L., Dies, R. R., Eisman, E. J., Kubiszyn, T. W., & Reed, G. M. (2001). Psychological testing and psychological assessment. *American Psychologist*, 56, 128-165.

Mischel, W. (1968). *Personality and assessment*. NY: Wiley.

Morgan, D. L. & Morgan, R. K. (2001). Single-participant research design: Bringing science to managed care. *American Psychologist*, 56, 119-127

Oxford English Dictionary (2nd ed.). (1989). Oxford, England: Oxford University Press.

Rock, D. L. (1994). Clinical judgment survey of mental-health professionals: I. An assessment of opinions, ratings, and knowledge. *Journal of Clinical Psychology*, 50, 941-950.

Shemberg, K. M., & Doherty, M. E. (1999). Is diagnostic judgment influenced by a bias to see pathology? *Journal of Clinical Psychology*, 55, 513-518.

Shimoff, E., Matthews, B. A., & Catania, A. C. (1986). Human operant performance: Sensitivity and pseudosensitivity to contingencies. *Journal of the Experimental Analysis of Behavior*, 46, 149-157.

Skinner, B. F. (1966). Operant behavior. In W. K. Honig (Ed.), *Operant behavior: Area of research and application*. Englewood Cliffs, NJ: Prentice-Hall.

Skinner, B. F. (1969). *Contingencies of reinforcement: A theoretical analysis*. New York: Appleton-Century-Crofts.

Skinner, B. F. (1986). The evolution of verbal behavior. *Journal of the Experimental analysis of Behavior*, 45, 115-122

Spengler, P. M., & Strohmer, D. C. (1995). A scientist-practitioner model of psychological assessment: Implications for training, practice and research. *Counseling Psychologist*, 23, 506-535.

Van Houten, R., Axelrod, S., Bailey, J. S., Favell, J. E., Foxx, R. M., Iwata, B. A., & Lovaas, O. I. (1988). The right to effective behavioral treatment. *Journal of Applied Behavior Analysis*, 21, 381-384.

Vaughan, M. E. (1985). Repeated acquisition in the analysis of rule-governed behavior. *Journal of the Experimental Analysis of Behavior*, 44, 175-184.

Zaro, J. S., Barach, R., Nedelmann, D. J. & Dreiblatt, I. S. (1977). *A guide for beginning psychotherapists*. Cambridge, England: Cambridge University Press.