University of Rhode Island

DigitalCommons@URI

Open Access Dissertations

2000

Can the Influence of Base Rate Information be Distinguished from the Influence of Gender Stereotypes in the Psychiatric Diagnostic Decision Making Process?

Maureen McCormick
University of Rhode Island

Follow this and additional works at: https://digitalcommons.uri.edu/oa_diss

Recommended Citation

McCormick, Maureen, "Can the Influence of Base Rate Information be Distinguished from the Influence of Gender Stereotypes in the Psychiatric Diagnostic Decision Making Process?" (2000). *Open Access Dissertations*. Paper 904.
https://digitalcommons.uri.edu/oa_diss/904

This Dissertation is brought to you for free and open access by DigitalCommons@URI. It has been accepted for inclusion in Open Access Dissertations by an authorized administrator of DigitalCommons@URI. For more information, please contact digitalcommons-group@uri.edu.

BF1045
1 .42
N 336
2000

CAN THE INFLUENCE OF BASE RATE INFORMATION BE
DISTINGUISHED FROM THE INFLUENCE OF GENDER STEREOTYPES
IN THE PSYCHIATRIC DIAGNOSTIC DECISION MAKING PROCESS?

BY

MAUREEN MCCORMICK

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN
PSYCHOLOGY

UNIVERSITY OF RHODE ISLAND

2000

Abstract

A correct diagnosis may be critical to the implementation of an appropriate treatment plan for a patient. Many factors contribute to the difficulty of assigning a correct psychiatric diagnosis, including misuse, or less than optimal use, of information. Many studies have documented underutilization of base rate data in prediction. Research into the use of stereotypes has demonstrated that too much reliance on an individual's membership in a group may also affect decision making. What is the appropriate use of base rate data and group membership in psychiatric diagnosis? It was hypothesized that participants would underutilize base rates in a low base rate condition and overutilize base rates in a high base rate condition when gender stereotypes were not a factor. This hypothesis was supported by the results of the study, that is, there was a marked tendency for participants' answers to deviate from the base rate, in the high (80%) and low (20%) base rate cases, toward the midpoint (50%). It was further hypothesized that gender stereotypes would unduly influence psychologists' estimates that a patient has a particular personality disorder, that is, that clinicians would underutilize base rate information and rely on their prototypes of two personality disorders to make diagnostic decisions. This hypothesis was partially supported by the results of this study. Although clinicians underutilized base rate information, it was not apparent that their decision making was adversely affected by gender stereotypes. Rather, participants tended to rely on a piece of extraneous information that was provided, that is, the diagnosticity of a test that was given as 50%. It was also hypothesized that clinicians would assign higher probabilities for psychopathology to females than to males overall. This hypothesis was not supported by the results of this study. This may be because psychologists are not inappropriately influenced by gender stereotypes, at least within certain contexts. Certain limitations in the study may also contribute to the findings.

Acknowledgements

Many thanks to my major professor David Faust and committee members W. Grant Willis, John Boulmetis, and Jonathan Schroeder for their support and contributions to this study. Thanks also to Joseph Rossi for conducting the statistical power analysis, and to Charles Boisvert for sharing the fruits of an extensive literature search. I extend my gratitude to Nicholas Covino and Ellen Golding at Beth Israel Deaconess Medical Center for their unwavering support and common sense. Thank you to friends who have encouraged my efforts in many ways, including Sara Johnson, Meg Ackley, Pamela Waite, Janis Fleishman, Deirdre Barrett, Ernest Hartmann, Patricia Erhart, Jason Dahn, and Fabiana Wallis. My mother Eleonora McCormick has been more than generous with her support, especially the financial sort. Jane McHale excelled in career counseling and helped me to discover new goals and to plot a course for becoming a psychologist. I am grateful to Mark Braverman who showed me what a privilege it is to work as a psychotherapist and inspired my career change. And, finally, everlasting love and gratitude to Stuart Andrews, without whose unconditional love and support this dissertation would truly have remained an unfulfilled goal.

Table of Contents

	Page
Introduction	1
Research Questions and Hypotheses	17
Method	19
Results	21
Discussion	26
References	33
Tables	36
Figures	45
Appendix	47
Bibliography	78

List of Tables

	Page
Table 1: Deleted Outliers	36
Table 2: Means and Standard Deviations of Respondent Demographics	37
Table 3: Means and Standard Deviations of Probability Estimate by Sex, Disorder, and Base Rate	38
Table 4: Means and Standard Deviations of Confidence by Sex, Disorder, and Base Rate	39
Table 5: Means and Standard Deviations of Probability Estimate by Prototypicality and Base Rate	40
Table 6: Means and Standard Deviations of Confidence by Prototypicality and Base Rate	41
Table 7: Means and Standard Deviations of Probability Estimate by Amount of Individuating Information and Base Rate	42
Table 8: Means and Standard Deviations of Confidence by Amount of Individuating Information and Base Rate	43
Table 9: Number and Percentage of Responses by Response Strategy and Base Rate	44

List of Figures

	Page
Figure 1: Normative Standard and Predicted Responses	45
Figure 2: Normative Standard and Actual Responses	46

Introduction

A correct diagnosis may be critical to the implementation of an appropriate treatment plan for a patient. Many factors contribute to the difficulty of assigning a correct psychiatric diagnosis, including misuse, or less than optimal use, of information. Researchers in the area of clinical judgment are particularly interested in this latter manner, and, through investigating the diagnostic process, in uncovering and designating ways to improve diagnostic accuracy (Dawes, 1982).

Statistical methods can be used to examine relations between variables in a given population so that true associations can be used to make predictions about members of the population. In this context, knowing and using the individual's group membership are often essential for making the prediction. In contrast, social stereotypes (i.e., invalid or overperceived relations) may lead to an inappropriate use of group membership for predicting individual behavior. This study examined if and how clinical psychologists use a patient's group membership in these two ways when forming a diagnosis, and attempted to disentangle appropriate use of base rates from inappropriate activation of stereotypes.

Many researchers have argued for the use of frequency data as a way to improve the overall accuracy of diagnoses (Faust, 1986; Meehl & Rosen, 1955). Base rates, which represent the prevalence of disorders in a population, are one type of especially useful frequency data. Research has shown that human judges will use frequency data when it is the only information available; however, individuals consistently favor case-specific, or individuating, information over frequency data when estimating probabilities, and often underutilize or disregard base rate information (Kahneman & Tversky, 1973; Kennedy, 1994; Lyon & Slovic, 1976).

On the other hand, social psychologists have demonstrated that beliefs in stereotypes influence judgments in a way that diminishes accuracy. This research has shown that an individual's membership in a group often contributes more weight than is

warranted to another person's judgment of the individual (Hamilton & Gifford, 1976; Hamilton & Rose, 1980). A stereotype can be conceived of as an over- or underperception of the frequency with which positive or negative attributes are associated with individuals in a group.

Studies on judgment have typically (or purportedly) focused on one or the other, but not both, of these two subject matters: extent of base rate usage and influence of stereotypes. Studies on base rates often call on clinicians to place greater reliance on frequency data, or to adjust diagnostic probabilities upward or downward based on background frequency, whereas studies on stereotypes often prescribe diminished reliance on perceived background frequency data. How can these lines of research and prescriptive advice be reconciled, and is there a way to distinguish between adjustments in judgments justified by differences in base rates versus those distorted by reliance on stereotypes or frequency data that are presumably inaccurate?

This study examined clinicians' use of base rates and stereotypes, with the intent of quantifying these influences in a diagnostic task. The specific context for this study is the use of base rates and gender stereotypes in the diagnosis of antisocial personality disorder (APD) and histrionic personality disorder (HPD) in men and women.

Several areas of literature are reviewed in the following section to provide the theoretical underpinnings for this study. These include: (a) research in cognitive psychology that examines the strengths and weaknesses of human judgment and decision making, (b) research in social psychology that examines the power of stereotypes, (c) issues related to the use of base rates in clinical practice, and (d) issues related to gender differences in the diagnosis of personality disorders.

Decision Making from the Perspective of Cognitive Psychology

Researchers in cognitive psychology have identified several heuristics individuals use in decision making, which can conflict with normative models. Because they form the

basis for many studies of decision making and represent an important area of investigation, the normative approach and some of these heuristics are relevant to this study and are reviewed here.

Normative theory of probability. The mathematical theory of probability is a normative theory of inference. This means that it involves the comparison of actual judgments and decisions to some standard of what they ought to be. Bayes' theorem incorporates base rates and the accuracy of diagnostic signs to produce a normative judgment (Baron, 1994).

Consider an example of a patient who is being tested for breast cancer. Based on her age and sex only, the probability that she has breast cancer is, say, .10. Assume further that a mammogram will correctly identify cancer 90% of the time when it is present, and that in women without cancer, an incorrect positive result will occur 20% of the time. Thus, the conditional probabilities for the four possible outcomes are summarized as:

		MAMMOGRAM	
		+	-
CANCER	+	$.10 \times .90 = .09$	$.10 \times .10 = .01$
	-	$.90 \times .20 = .18$	$.90 \times .80 = .72$

Once the result of the mammogram is obtained, Bayes' theorem can be used to provide an estimate of the probability that the patient has breast cancer, given that result. First, say the mammogram is positive. In this case, one need only consider the left column of the diagram. What is the probability that the patient has breast cancer, given a positive mammogram? It is the ratio of the probability of a true positive result to the probability of any positive result, that is, $.09 / (.09 + .18)$, or .33. It follows that the probability of a false positive result is $1 - .33$, or $.18 / (.09 + .18)$, or .67.

Next, say the mammogram is negative. In this case, one need only consider the right column of the diagram. What is the probability that the patient does not have breast cancer, given a negative mammogram? It is the ratio of the probability of a true negative result to the probability of any negative result, that is, $.72 / (.72 + .01)$, or .99. It follows that the probability of a false negative result is $1 - .99$, or $.01 / (.72 + .01)$, or .01.

The value of Bayes' theorem is that it includes both frequency information (a priori odds) and the diagnosticity of the sign in the computation of the probability that a condition exists. It allows us to construct judgments of the probability of some hypothesis or outcome (e.g., a diagnosis) given some observed data (e.g., a test result), on the basis of information about the probability of the data given the hypothesis (e.g., diagnosticity of the test) and about the prior probability of the hypothesis (e.g., frequency of the diagnosis). In this study, participants were provided with a base rate for a personality disorder, a test result, and the diagnostic accuracy of the test. Ideally, when asked for the probability that the patient has the disorder, they would formulate judgments that complied with Bayes' theorem.

Representativeness. Kahneman and Tversky (1972, 1973) described the representativeness heuristic as the tendency to judge the subjective probability of an event by the degree to which it (a) is similar in essential characteristics to its parent population, and (b) reflects the salient features of the process by which it is generated. This method of assigning probabilities is inconsistent with the normative approach because, among other things, it fails to properly incorporate base rates. By the same reasoning, it seems likely that clinicians may consider a female as more representative of the population of individuals with HPD, and males as more representative of the population of individuals with APD.

Availability. Tversky and Kahneman (1973) described the availability heuristic as the tendency of individuals to evaluate the probability of an event based on the ease of mentally generating relevant instances. For example, subjects believed that it was more

likely that words sampled at random from an English text had the letter K in the first, rather than the third, position. The availability heuristic explains this mistaken impression by positing that mentally, it is easier to generate examples of words that start with K than words with K in the third position. For the purposes of this study, the availability heuristic seems potentially applicable because, in our culture, examples of hysterical females and antisocial males abound, both in fact and fiction. Participants may or may not have treated large numbers of histrionic or antisocial patients, but their ability to generate examples of individuals with histrionic or antisocial traits may well have been influenced by the culture. It is hypothesized that these examples will include an association of gender with personality traits (i.e., examples of histrionic patients will more often be female and examples of antisocial patients will more often be male).

Illusory correlation. Chapman and Chapman (1967, 1969) described illusory correlation as the false perception, or overperception, of associations between variables. The Chapmans' work referred in part to the tendency of clinicians to erroneously associate psychodiagnostic signs with certain psychiatric symptoms or personality characteristics. Illusory correlations were formed because there was apparently some intuitive or seeming, rather than statistical, relationship between the two variables. It was not the intention of this study to determine the validity of the differential reported frequencies of HPD and APD in males and females. It may or may not be true that base rates for histrionic and antisocial traits and personality disorders differ by sex. Rather, this study aimed to discover if individuals perceive or formulate relationships between these personality traits and sex, above and beyond the statistical relationship indicated by the stimulus case. This bias, or stereotype, may represent an illusory correlation of sex and certain personality characteristics, which inappropriately affects clinical judgment.

Confirmatory bias. Confirmatory bias is a broad label that refers to a group of interrelated tendencies to overattend to or overweight positive evidence over negative

evidence. Research has shown that judges tend to favor their initial hypotheses, even when conflicting evidence is presented. A study in the perception of form asked participants to identify an object presented on a slide (Bruner & Potter, 1964). The initial presentation was a blurry image, and it gradually grew clearer, but the presentation was stopped before the image was shown in focus. Participants were asked to report what the object was. The nine groups of participants had three different starting points with respect to the clarity of the image and three different exposure times. (A standardization group had been used to determine the starting points and exposure times.) Those who started with the blurriest images and had the shortest exposure time did most poorly on this task. Those who started with the clearest images and had the longest exposure times were most likely to identify the picture correctly. Some insight into the process was gleaned from the members of the standardization group, who were asked to report identifications from the start of the presentation: hypotheses about the content of the picture are made despite the blur and are often maintained even when participants grow doubtful about their accuracy. The researchers concluded that it was more difficult for participants to dislodge an incorrect initial hypothesis, even when presented with conflicting evidence, than it was for them to generate a hypothesis based on limited information.

Research has also demonstrated individuals' selective recall of evidence, that is, we tend to remember information consistent with our decision and to forget information that was present but does not support our decision. Arkes and Harkness (1980) demonstrated that one result of making a diagnosis is the activation of a schema in the diagnostician's mind, which serves as the framework for information presented later. They presented symptoms to all participants and asked half of them for a diagnosis of the target patient. At a later time, they presented the original symptoms and additional ones that were related or unrelated to the diagnosis. Participants who had made a diagnosis were more likely to falsely recognize related symptoms that were not presented originally than were their

counterparts, who had not made a diagnosis. On the other hand, the participants who had made a diagnosis were also more likely to correctly reject unrelated symptoms. The act of making a diagnosis tended to influence participants' memory of symptoms presented.

The data collection process may also be affected by one's initial hypothesis. Clinicians may look for evidence to support a hypothesis, and ignore evidence that might disconfirm it. As one example, Temerlin and Trousdale (1969) documented the effect of a suggestion by a prestige person on the judgment of clinicians and lay people. They found that the subjects, asked to evaluate a man based on an audiotaped interview, were much more likely to describe the man as psychotic (despite, in fact, his normal status) when a prestige person suggested this diagnosis to them. Other work has demonstrated a tendency to gather information to support, rather than disconfirm, initial hypotheses suggested by pre-interview information (Copeland & Snyder, 1995; Strohmer, Boas, & Abadie, 1996) as well as counselor self-generated hypotheses (Haverkamp, 1993). Confirmatory bias is related to stereotyping in that a stereotype is, in a sense, a hypothesis or belief, such as "hysterical traits are female" or "antisocial traits are male." Research on confirmatory bias has demonstrated the power of beliefs or initial hypotheses on the analysis of information; this study attempted to quantify that influence.

The tendency to look for confirmatory data may result in self-fulfilling prophecies, that is, conclusions about data may be influenced by the observer's expectations. Further, an initial hypothesis, easily "confirmed" (whether correct or not) and difficult to challenge, may lead to overconfidence in one's diagnostic abilities, and thus influence future hypothesis formation. Mental health professionals, perhaps not unlike individuals in a range of other disciplines, have yet to rigorously study the outcomes of their clinical work and develop strategies for improving their techniques based on these data (Bickman, 1999). Bickman summarized existing research on clinicians' ability to evaluate their own performance, and he outlined a procedure that might help clinicians learn from their

experience. He argued that most clinical work is not subjected to serious scrutiny, and that the value of clinical experience is overrated. Certainly, then, clinicians who are unknowingly making decisions based on unsubstantiated initial hypotheses, as well as those who consciously place their trust in their first impressions, will likely make biased judgments repeatedly.

On a larger scale, the same type of channeling may influence the presumed (versus actual) base rate of a particular disorder. For example, if a gender stereotype from the society at large has either corrupted the diagnostic criteria of a disorder, or influenced clinicians' diagnoses for other reasons, then more patients of one gender will likely be diagnosed with the disorder. Over time, the presumed base rate in the population may show an ever-widening gender difference. Thus, even if clinicians used this presumed (but false) base rate properly, they might still be exacerbating the larger epidemiological problem.

Social cognition. Considerable research has examined decision making in different social contexts (Fiske & Taylor, 1984; Ross & Nisbett, 1991). One area that has received a great deal of attention has become known as attribution theory, that is, an attempt to explain the motivations that individuals assign to their own and others' behaviors. Although many studies have demonstrated different attributional styles based on differences in situations, on different expectations of the observer, and on degree of identification with the actor, a consistent theory has yet to emerge. One methodological problem in this area of research that is also relevant to this study is the discrepancy between the level of analysis of the dependent variables and that of the process of interest. That is, what is measurable is the decision and what is of interest is the process by which the decision is made. One cannot read the research on attribution theory and fail to appreciate the multitude of factors that contribute to human judgment. The malleability of those influences in the face of different social contexts adds another level of complexity to the problem.

Decision Making from the Perspective of Social Psychology

Covariation analysis. Why do people associate traits with groups? Sometimes individuals are portrayed such that their membership in a group is related to a particular trait, whether or not the association is statistically valid. Sometimes group membership alone is a valid predictor of a trait or behavior. For example, in the area of child development, there are some useful predictions that can be made about a child's behavior based primarily on age.

However, there are also instances when it is inappropriate to use group membership alone to predict an individual's behavior, or when the predictive value of group membership is overperceived or falsely perceived. For example, when a report of violent behavior appears in the news, the perpetrator is often identified by a group to which he is a member, such as a person who is homeless. This may lead some people to form an unjustifiably strong association between homelessness and violence. This is because an association between two variables has been suggested, based only on instances of homeless persons committing violent acts. A complete analysis of covariation is required to determine if this association is valid. For example, in a group of 1,100 people, the covariation matrix might look like:

		HOMELESS	
		+	-
VIOLENT	+	10	100
	-	90	900

By including and analyzing proportions among all four cells of the covariation matrix, it can be seen that, in this fictitious example, the association between homelessness and

violent behavior is not supported. The proportion of violent individuals is the same regardless of homeless status, that is, 1:9.

Stereotypes. Tajfel (1969) defined stereotyping as “the attribution of general psychological characteristics to large human groups” (p. 81). Stereotypes rely too strongly on group membership to formulate a judgment about a group member or to predict behavior. The use of stereotypes in decision making has been shown to be insidious, that is, human judges are unaware of their use of stereotypes in making judgments about others (Hamilton & Rose, 1980). Paradoxically, sometimes a stereotype reflects some truth (even if superficial or incomplete) about the state of nature, and thus, if not overused, might help us form more accurate judgments. However, this study was concerned with disentangling the roles of stereotypes and frequency data in the diagnostic process.

Stereotypes and Bayes’ theorem. The assumptions and methodologies in research on the use of gender stereotypes are informative. They illustrate the perplexing conceptual and practical issues involved in distinguishing the influences of stereotypes, frequency information, and individuating information on judgments. Bayes’ theorem includes the prior probability of an event as a factor to consider when determining the probability of a current or future event. For example, the prior probability of a diagnosis is a base rate. However, some researchers (Locksley, Borgida, Brekke, & Hepburn, 1980; Locksley, Hepburn, & Ortiz, 1982) have interpreted the concept of prior probability as a participant’s subjective belief that the event will occur, with this research often involving stereotypes. These researchers’ studies on assertiveness found that a very small amount of individuating information was sufficient for subjects to abandon their gender stereotype. Participants were said to be forming “normative” judgments (i.e., using their personal base rates) when they applied their stereotypes to their decisions, and they were said to be overriding their stereotypes when they made judgments based on individuating information.

Such an interpretation seems to confuse and conflate distinct concepts. For one, a

base rate and a stereotype are not the same thing. A base rate refers to frequency data and, at least conceptually, has an existence separate from the human perceiver. For example, the number of squirrels in the woods has a true external correlate. A stereotype is a subjective perception or belief about an association. Of course, one's assumption about base rates may or may not be correct, or may be distorted by subjective judgmental processes, but this does not mean that a base rate is nothing more or less than a subjective judgment or lacks an external correspondence. Thus, base rates and stereotypes should not be treated as identical.

Second, one needs to distinguish between base rates, stereotypes, and correct versus incorrect application of frequency data in decision making. Whether a base rate or perception of frequency is correct or not needs to be separated from whether that presumed frequency is properly integrated into decision making. For example, it may or may not be correct that 20% of animals in the woods are squirrels, but working from that figure, we can see if it is properly incorporated into decisions when we learn that a test with 70% accuracy indicates that a squirrel has stolen the stash of acorns. A correct figure may be used incorrectly and vice versa. For example, the assumption of a 90% association between group membership and aggressiveness may reflect a stereotype, but that 90% figure, though wrong, may still be properly combined with a diagnostic sign. This is Bayes' theorem gone awry, not because it was executed wrongly but because an underlying number or base rate was wrong. Substitution of the correct base rate would lead to the correct answer. In contrast, correct inputs to Bayes' theorem (i.e., the base rate and the diagnosticity of a sign) may be available, but they may be improperly combined (i.e., in some other formula than Bayes' theorem, or in no particular method) to produce an incorrect result. In fact, research suggests that clinicians often fail to use base rate data properly, underestimating frequencies when base rates are high (Ginosar & Trope, 1980) and overestimating frequencies when base rates are low (Kennedy, 1994). It is easy to see

how such misuse, even when unrelated to stereotypes at all, could be confused with the latter. Thus, unless the distinction between base rates, stereotypes, and utilization of probability data are kept in mind, interpretation of studies can become hopelessly muddled.

Bayes' theorem also includes the diagnosticity of the sign in the calculation of a posterior probability. In the Locksley et al. studies (1980, 1982), the diagnosticity of the sign cannot be quantified. Stimulus materials described behaviors (i.e., the diagnostic signs) and asked participants for their assessment of a personality trait in the target individual. They assumed that their materials were sufficient to completely represent the trait and to elicit the stereotype. When they found that participants were more susceptible to individuating information than to stereotypes, they called this an example of the base rate fallacy. Overall, the use of Bayes' theorem did not clarify the distinction between stereotypes and individuating information because these influences could not be quantified.

Beckett and Park (1995) replicated the results of one of Locksley et al.'s (1982) studies, but suggested that the gender of the target could have been easily overlooked because it was provided solely by the target's name. To make gender more salient for the participant, they included a photograph of a male or female target, instead of simply a name, and they found contradictory results when they did so. They concluded that when category membership was made more salient, gender stereotypes were not overridden by individuating information. However, their use of Bayes' theorem suffered the same drawbacks as did that of Locksley et al. (1982). The apparent confusion between prior probabilities, stereotypes, and base rates in these studies demonstrates the difficulty in defining and quantifying the elements of the problem.

Conclusions from Cognitive and Social Psychology

Bayes' theorem provides a way to compute the probability of an event based on the prior probability, or base rate, and the diagnostic or predictive value of a sign. Research has demonstrated that, in general, individuals do not faithfully conform to judgments

dictated by Bayes' theorem when making decisions, and sometimes blatantly deviate from the normative model (Kennedy, 1994; Lyon & Slovic, 1976). Specific heuristics such as representativeness and availability work to make more salient conditions or outcomes appear more likely. A tendency to form illusory correlations, which is reinforced by collecting data that support the illusion, solidify social stereotypes in our minds. Research has been equivocal on the specific impact of individuating information and social stereotypes on decision making. However, it can be concluded with reasonable assurance that we rely on an individual's membership in a group at least sometimes and in some cases to make decisions about the individual.

Use of Base Rates in Clinical Practice

Underutilization of base rates. Research suggests that mental health professionals, like the subjects in many of the studies discussed thus far, often do not consistently or properly use base rates when formulating conclusions or diagnoses. Rather, they tend to let individuating information override base rates when estimating probabilities that a condition exists (Dawes, Faust, & Meehl, 1989), or they rely too heavily on invalid psychodiagnostic signs (Chapman & Chapman, 1967). This phenomenon has become known as the base rate fallacy. It has further been shown that preference for individuating information over base rate data when both are available results in an underestimation of the probability of an event in a high base rate condition (Ginosar & Trope, 1980), and the overestimation of the probability of an event in a low base rate condition (Kennedy, 1994).

Kennedy (1994) tested the base rate fallacy with school psychologists and reported results consistent with studies of lay persons. She found that, absent other information, school psychologists used base rate information correctly and consistently to diagnose a fictitious student with a learning disability. However, when participants were provided with other information, their utilization of base rate information declined. All cases included the same base rate information and indicated that the child received a positive

result on a diagnostic test, but cases varied in the additional information presented. Some cases included data on the accuracy of a diagnostic test, some included irrelevant, individuating information designed to assess susceptibility to illusory correlation, and some included both types of data. In addition, Kennedy varied the salience of the link between the base rate information and the child's condition. She found no difference in judgments based on the salience of this link.

Contrary to expectation, participants who received the irrelevant illusory correlation information with the base rate were more accurate than those who received the relevant accuracy rate information with the base rate. Kennedy speculated on the possible reasons for this puzzling result. For one, the extreme value of the accuracy rate information (i.e., true positive rate of 80%) and individuals' tendency to use this information in lieu of base rates (Lyon & Slovic, 1976) may have increased participants' error. Further, the illusory correlation information may have been insufficient to provoke a significant deviation from the normative response. Thus, manipulations specific to Kennedy's study likely contributed to this unusual result. Overall, in this study, school psychologists used base rate information appropriately when no other information was available, but their judgments did not conform to Bayes' theorem when both base rate and diagnostic test accuracy information were available.

Reference classes. A base rate refers to the prevalence of a disorder in a particular population, or reference class. Correct use of a base rate requires the clinician to first determine if the patient is a member of the reference class. Meehl (1954) suggested that when several reference classes are available, each of which is a subset of the previous, the smallest class with stable relative frequencies should be used. For example, suppose that the base rate for Borderline Personality Disorder is 1% in the general population of the U.S., 3% for females in the U.S., 10% for females in the U.S. who had been sexually abused as children, 50% for females in the U.S. who had been sexually abused as children

and who had made at least one suicidal gesture, and 70% for females in the U.S. who had been sexually abused as children, who had made at least one suicidal gesture, and who chronically abuse substances. One can easily appreciate that the smallest reference class appropriate to a given patient would provide the most predictive power.

When reference classes are not hierarchically related, however, the clinician's decision about which base rates to use may be guided by a causal theory that may or may not be correct. For example, suppose a physician who is examining a patient knows the patient is an ex-football player, 60 years old, and recently divorced. These factors place the patient into reference classes which may or may not be relevant to the diagnosis at hand. The physician's diagnostic task may thus contribute to the selection of reference classes. For example, if the patient's knee problems are being assessed, history of football playing may be most salient to the physician. If potential heart problems are being assessed, age may indicate the use of a different reference class and associated base rate. However, if another problem is being assessed, one for which the available reference classes offer no obvious causal relationship, the choice of population from which to draw base rates for this patient is unpredictable. The physician may rely on an intuitive causal theory that does not contribute to diagnostic accuracy. For example, if the doctor is assessing the patient for depression, the base rate for depression among individuals of the patient's gender, or that for depression in older adults, or that for depression in the recently divorced may be used, depending on what the physician considers the most likely causal explanation for the depression.

Gender Differences in Personality Disorders

For many psychiatric disorders, reported frequencies of a diagnosis differ for males and females. For example, the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1994) reported a much higher frequency of APD for males than females, but the reverse for HPD.

Similarities among patients with APD and HPD have been documented. Compared to normal controls, levels of overall mental status were found to be significantly lower among all the dramatic personality disorders, that is, histrionic, narcissistic, borderline, and antisocial (Burgess, 1992). DSM-IV highlighted the differential diagnoses of APD and HPD, offering guidelines to distinguish them from each other. Individuals with APD and HPD share a tendency to be impulsive, superficial, excitement seeking, reckless, seductive, and manipulative, but persons with HPD tend to be more exaggerated in their emotions and do not characteristically engage in antisocial behaviors. Individuals with HPD are manipulative to gain nurturance, whereas those with APD are manipulative to gain profit, power, or some other material gratification (p. 657).

Gender considerations in the diagnosis of the two disorders have also been investigated. Ford and Widiger (1989) attempted to distinguish the effects of sex bias in diagnosis from the actual variation in base rates of HPD and APD. Psychologists evaluated case histories and either provided a diagnosis or rated the severity of the symptoms. The researchers varied the sex of the patient and the explicitness of the description of the disorder, assuming that sex bias would be more evident in an ambiguous case than when the patient clearly met the criteria for the disorder. In fact, the results suggested that sex differences in diagnoses could not be readily explained by either a marked bias or a careful consideration of base rates. In the ambiguous case, there were no significant differences based on sex (i.e., male, female, or unspecified). In the strongly antisocial case, respondents rated males significantly more likely to be antisocial than females, but they also rated females significantly more likely to be histrionic than males. In the strongly histrionic case, respondents rated females significantly more likely to be histrionic than males. These conflicting results suggest that another methodology may help to uncover relationships between sex bias and prevalence data in the diagnosis of personality disorders.

Research Questions and Hypotheses

The focus of this dissertation was on developing one possible approach for distinguishing the effects of stereotypes and the appropriate and inappropriate use of base rates on the diagnostic process. Although few studies have examined clinicians' use of Bayes' theorem in the diagnostic process, many studies have concluded that individuals do not apply Bayes' theorem properly when making probability estimates. Therefore, simply comparing participants' judgments to what Bayes' theorem would predict will not help to distinguish the inappropriate use of base rates from the probable influence of stereotypes.

To help make this separation, each case sent to participants for evaluation described a patient with one of three disorders: APD, HPD, or an unnamed condition ("X"). Participants were asked to rate the probability that the patient in the case has one of the disorders. Theoretically, these probability estimates could and should be compared to the result expected by applying Bayes' theorem, but, as noted, research has shown that individuals do not use Bayes' theorem correctly or consistently. Thus, the baseline for comparison must be responses to cases without information that might elicit a gender bias. The unnamed condition ("X") served this purpose. Participants' responses to the cases of X were used as the baseline for comparison to the responses for APD and HPD. It was predicted that responses to the cases of X would not adhere to the normative (i.e., Bayesian) standard. Significant differences between X and APD or HPD would, therefore, represent gender bias.

Figure 1, a plot of the base rate against the probability that a patient has the diagnosis, illustrates the normative standard and the predicted responses to the different cases. Line 1 represents the Bayesian prediction, that is, the equality of the base rate and the probability of the diagnosis. Line 2 represents the stereotype-consistent responses, that is, females with HPD and males with APD. Line 3 represents the predicted responses to the cases with X, that is, those without a gender stereotype. Line 4 represents the

stereotype-inconsistent responses, that is, males with HPD and females with APD. Thus, lines 2, 3, and 4 represent the predicted responses in the three study conditions. They differ from the Bayesian prediction in two ways, magnitude (reflecting gender stereotype) and slope (reflecting overestimation and underestimation). It was predicted that the influence of gender stereotypes would cause a deviation in the magnitude, that is, that stereotype-consistent cases would be judged more likely than the base rate to have the diagnosis, that stereotype-inconsistent cases would be judged less likely than the base rate to have the diagnosis, and that stereotype-neutral cases would be judged to have the diagnosis at the same probability as the base rate. If this were the only deviation predicted, Lines 2, 3, and 4 would be parallel to Line 1. The change in slope represents the prediction that the probability of the diagnosis would be estimated to be greater than the base rate in the low base rate condition, equal to the base rate in the medium base rate condition, and less than the base rate in the high base rate condition, due to underuse of base rate information. A significant effect of stereotype (i.e., the magnitude of Line 2 versus Line 3 versus Line 4) was predicted. A significant effect was also predicted for the underuse of base rates in the high base rate condition and the overuse of base rates in the low base rate condition (i.e., the slope of the lines).

Question and Hypothesis 1. Do clinicians overestimate probability in the low base rate condition and underestimate probability in the high base rate condition? It was hypothesized that respondents would overestimate probabilities in the low base rate condition and underestimate probabilities in the high base rate condition.

Question and Hypothesis 2. Are clinicians overly influenced by gender stereotypes, beyond a level that can be explained by utilization of base rates? It was hypothesized that a significant main effect of stereotype would be found when the responses to the HPD and APD cases were compared to the X cases, specifically that females would be judged more likely to have HPD and males would be judged more likely

to have APD, and, conversely, that males would be judged less likely to have HPD and females would be judged less likely to have APD.

Question and Hypothesis 3. Are clinicians more likely to diagnose women with personality disorders in general? It was hypothesized that a main effect of sex would be found, illustrating a bias toward women in general in the diagnostic process, in the direction of greater psychopathology for women.

Method

Participants were presented with base rate information for a stereotype-neutral, stereotype-consistent, or stereotype-inconsistent disorder with individuating information about the patient. Each participant received one case and was asked to determine the probability that the patient has the disorder (the dependent variable Probability Estimate) and to provide a level of confidence in the answer (the dependent variable Confidence). The cases varied across three dimensions, that is, sex of patient (3 levels: male, female, and neutral), stereotype (3 levels), and base rate (3 levels). By varying sex and disorder, it was possible to examine the potential impact of participants' beliefs about the relative frequencies of certain disorders in males and females. Varying the base rate provided a means for measuring the relative impact of such information and for examining the differential and combined effects of base rates and gender stereotypes on the diagnostic process. In addition, it was thought that participants would be more confident with high base rates than with low ones. In total, there were three between-group variables with three levels each.

Independent Variables

Sex of patient. One-third of the cases described a male patient, one-third described a female patient, and one-third of the cases did not mention the sex of the patient.

Stereotype. For males and females, three cases of different stereotype level were used. The stereotype-neutral cases supplied a base rate for an unnamed disorder (i.e., X).

The stereotype-consistent cases supplied a base rate for APD for males and one for HPD for females. The stereotype-inconsistent cases supplied a base rate for APD for females and one for HPD for males.

Base rate. For each case, the base rate supplied was low (20%), medium (50%), or high (80%).

Dependent Variables

Probability estimate. Each participant was asked to indicate the probability that the patient has the disorder on a scale from 0% to 100%.

Confidence. Each participant was asked to indicate the degree of confidence in his or her probability estimate on a scale from 0% to 100%.

Participants

Participants were randomly selected from the computerized data base of the members of the American Psychological Association who indicated that they were practicing clinical psychologists. Participants held the degree of Ph.D., Psy.D., or Ed.D. Only licensed clinicians were included. Based on figures typically reported in surveys of clinicians, a return rate of about 30% was expected. In order to achieve statistical power of .8, the desired sample size was 270, 10 participants in each of the 27 cells. Therefore, questionnaires were mailed to 900 clinical psychologists. This estimate of power was made by using the Statistical Power Analysis computer program (Borenstein & Cohen, 1988), with the following assumptions: 3 groups, alpha level of .05, and a medium-sized effect (accounting for 6% of the variance between groups).

Materials

The materials sent to the participants are included in the Appendix. These materials are: an introductory letter with instructions, a case vignette, questions regarding the case, and a page of demographic and professional questions. The latter was included so that only those clinicians actively engaged in clinical practice with an adult population would

comprise the sample. The intent was to present a straightforward case, with a minimum of individuating information (i.e., sex in two-thirds of the cases and disorder in two-thirds of the cases), and with only a weak suggestion that the person had the disorder (i.e., the positive result on a diagnostic test that is no more accurate than the toss of a coin). The best probability estimate is, thus, the base rate itself.

Procedure

The materials were mailed to each participant along with a return envelope and a return postcard (to be mailed separately) requesting the results of the study. After 2 weeks, a reminder postcard was sent to all participants. Participation in the study was anonymous.

Results

Participants

Twenty-one mailings were returned as undeliverable. Two potential participants responded to the reminder postcard and requested a second copy of the materials. These questionnaires were sent to them. Overall, responses were received from 265 practitioners; of these, seven individuals expressed philosophical objections to the study (e.g., that psychiatric disorders in general, or APD or HPD in particular, do not really exist). Another five people indicated that they were excluding themselves because the questionnaire was outside their area of expertise (e.g., they worked only with children, they were retired, or they worked primarily in research). Another four stated that a probability estimate could not be determined because insufficient information was provided. All respondents indicated that they spent the majority of their time in clinical activities. This left 237 potentially usable questionnaires. Eight of the remaining 237 cases were excluded because they were outliers, as listed in Table 1. These eight cases were considered outliers because their values for Probability Estimate were extremely different from the others in their group, and because they were unique in their extreme distance from the others in their group. Possibly they did not understand the task. It should be noted that, in any case,

reanalysis of the data with the outliers included made no practical difference in the results.

A response was included in the analyses if values for both Probability Estimate and Confidence were specified. This condition is required by SPSS MANOVA. The ultimate sample size was 229, yielding a response rate of 25% relative to the overall number of questionnaires mailed, or 26% of those received by individuals qualified to participate in the study. The sample included 103 females and 126 males. As can be seen in Table 2, the average length of time since licensure was over 17 years, with most of the participants in clinical practice for 9 years or more. The primary professional activities of the participants in the sample are psychotherapy, psychological assessment, and administrative tasks, and most of the participants' services are rendered to adults. Thus, as desired, the sample consists of psychologists working as psychotherapists who treat adults in at least part of their practice.

Data Analyses

A 3 x 3 x 3 (i.e., 3 levels of Sex, 3 levels of Disorder, and 3 levels of Base Rate) multivariate analysis of variance (MANOVA) was conducted for the two dependent variables, Probability Estimate and Confidence. Because the cell sizes are so widely discrepant, a test for homogeneity of variance was conducted. The very sensitive Box's M test produced $F(75, 17350) = 1.418, p > .001$. Thus, homogeneity of variances is assumed.

Means and standard deviations for Probability Estimate are reported in Table 3, and for Confidence in Table 4. With Pillai's Trace = .394, results revealed a significant main effect for Base Rate, $F(4, 404) = 24.76, p < .05$. Pillai's Trace was used because it is the most robust of the multivariate statistics. There were no main effects for Sex or Disorder and no significant interactions, all p values $> .05$.

For Probability Estimate, the significant main effect for Base Rate can be understood as an expected dose-response relationship between the base rate given in the

case and the participant's estimate. That is, the mean of responses in the base rate 20% group is significantly less than that for the 50% group, which in turn was significantly less than that for the 80% group. This finding reflects the levels of the independent variable Base Rate and does not contribute to a meaningful test of the research hypotheses.

For Confidence, univariate post hoc tests were used to compare the means by Base Rate. A one-way analysis of variance (ANOVA) revealed significant differences among the three groups, $F(2, 226) = 4.564, p < .05$. Tukey's procedure demonstrated that Confidence in the 80% group ($M = 79.80, SD = 22.47$) was significantly greater than in the 20% group ($M = 67.98, SD = 28.91$), $p < .05$, and in the 50% group ($M = 68.41, SD = 31.41$), $p < .05$.

Research has shown that judges tend to decrease their use of base rate information when individuating information is available (Kahneman & Tversky, 1973; Kennedy, 1994; Lyon & Slovic, 1976). Kahneman and Tversky did not ask participants to rate their confidence in their answers. Although Kennedy asked participants for their confidence in their probability estimate in the case without individuating information, she did not report it. Lyon and Slovic did not have a case without individuating information. In order to gain some insight into the participants' experience of confidence with varying amounts of individuating information, and because Confidence in the 80% group was significantly greater than in the other two groups, further analysis of Confidence in the 80% group was conducted based on the amount of individuating information provided in the case. Data were compared across three groups: no individuating information (i.e., sex and disorder not specified), some individuating information (i.e., sex or disorder specified), and all individuating information (i.e., sex and disorder specified). A one-way ANOVA revealed significant differences among the 3 groups, $F(2, 79) = 3.356, p < .05$. A follow-up Tukey test found a significant difference between the mean of the group with no individuating information ($M = 98.33, SD = 4.08$) and the mean of the group with all individuating

information ($M = 74.56$, $SD = 24.81$), $p < .05$. This result suggests that when participants were given base rate information in the absence of case-specific details, their confidence in their judgment was greater than when they were provided with individuating information in addition to the base rate. This implies that clinicians do not intrinsically mistrust or undervalue base rate data, but that their confidence in their judgments decreases when additional information is available. They may feel compelled to include all available information in their decision making, but the additional complexity of correctly doing so negatively affects their confidence in their decisions.

In recognition of the problem created by unequal cell sizes and a total sample size smaller than ideal, a number of exploratory analyses were conducted in which data were collapsed across cells in order to examine for possible trends in the data. First, for each base rate, prototypical cases (i.e., males with APD and females with HPD) were combined, anti-prototypical cases (i.e., males with HPD and females with APD) were combined, and neutral cases (i.e., males with X, females with X, and all cases of unspecified sex) were combined. Tables 5 and 6 present the means and standard deviations for Probability Estimate and Confidence, respectively, based on prototypicality. There was no main effect for prototypicality, $p > .05$. This result suggests that gender stereotypes did not influence clinicians' judgments.

A second exploratory analysis was directed towards research that has shown the dominance of individuating information over base rates in decision making (Kahneman & Tversky, 1973; Kennedy, 1994; Lyon & Slovic, 1976). Cells were combined based on the amount of individuating information provided in the case description. For base rates of 20% and 80%, cases with no individuating information (i.e., disorder X and unspecified sex) were combined, cases with one piece of individuating information (i.e., sex or disorder was specified) were combined, and cases with two pieces of individuating information (i.e., sex and disorder were both specified) were combined. Cases with the

50% base rate were excluded because the participants' response strategy could not be determined, that is, it was impossible to tell if the use of 50% as the answer was inspired by the base rate or the diagnosticity of the test. Tables 7 and 8 present the means and standard deviations for Probability Estimate and Confidence, respectively, by individuating information. For Probability Estimate the ANOVA did not produce a main effect for amount of individuating information, $p > .05$. There were no significant differences for Confidence in the 20% condition. The effects for Confidence in the 80% condition have already been discussed. These results indicate that varying amounts of individuating information did not affect the accuracy of the probability judgments, but they did affect the confidence participants experienced in their responses in the high base rate group.

Yet another exploratory, post hoc approach was to create a new variable, Deviation from Ideal Judgment, based on the absolute value of the difference of Probability Estimate from the normative value. Three one-way ANOVA's were conducted, one for each base rate. The data were grouped according to amount of individuating information. There was a significant difference only among the means in the 80% group, $F(2, 83) = 4.572$, $p < .05$. The means and standard deviations of these subgroups are: no individuating information ($M = 0.00$, $SD = 0.00$), one item of individuating information ($M = 19.65$, $SD = 17.13$), and two items of individuating information ($M = 15.50$, $SD = 16.17$). Thus, the combination of a high base rate and a lack of individuating information produced the most accurate judgments in the sample and the highest confidence. Unfortunately, this is probably the situation most unlike everyday clinical encounters. Most psychiatric disorders, unless limited to a very specific population such as APD in the prison population, do not have a base rate of 80%, and a patient's mere presentation in the clinic provides a wealth of individuating information, even before a more formal assessment is conducted. Ironically, a very low base rate essentially has the same predictive power as a very high base rate, so a base rate of 80% should produce the same level of diagnostic

accuracy as a base rate of 20%. However, the results of this study do not support adherence to this normative principle, that is, the participants in the base rate 80% group responded quite differently in terms of accuracy and confidence from those in the base rate 20% group.

A nonparametric analysis of variance was also conducted for Probability Estimate. For each base rate, the data were grouped by prototypicality, ranked, and the Kruskal-Wallis test statistic, H , was computed. For all three base rates, there were no significant differences between the groups, $p > .05$.

Discussion

It was hypothesized that gender stereotypes would unduly influence psychologists' estimates that a patient has a particular personality disorder, that is, that clinicians would underutilize base rate information and rely on their prototypes of two personality disorders to make diagnostic decisions. It was also hypothesized that clinicians would assign higher probabilities for psychopathology to females than to males overall. Although psychologists underutilized base rates as predicted, gender stereotypes did not appear to influence their decision making. Rather, they were swayed by an irrelevant piece of information, a test result no more accurate than a coin toss. Even when the data were regrouped according to prototypicality, or by the amount of individuating information supplied, there were no significant differences based on the sex or disorder of the patient. The lack of stereotyping certainly might be viewed as a positive or encouraging outcome, especially given what is often the presumption that clinicians are overly influenced by gender stereotypes. The results might mean that, at least in some contexts, clinicians are not unduly influenced by gender stereotypes in the psychiatric diagnostic process as predicted and do not attribute more psychopathology to women than men overall. However, both the influence of the test result and the limitations of this study may explain, or partly explain, the negative findings. Consideration of participants' response styles, potential demand characteristics

of the study, and the expected customary situation in clinical practice may aid in understanding these results.

Participants' Response Styles

A closer look at the responses seemingly allows a grouping into four response styles: Baseraters, Testers, Multipliers, and Idiosyncratic. A fifth group, Ambiguous, includes respondents who cannot be classified in one of the four groups. Table 9 summarizes the responses according to these groups. Baseraters used the base rate provided in the case as their probability estimate for the patient having the disorder. (This was the best estimate based on the information given.) Testers relied on the 50% accuracy of the diagnostic test as the basis for their estimate and answered exactly 50%. Multipliers used the product of the base rate and the 50% accuracy of the test as their estimate. The Idiosyncratic responses fall into none of these categories. The Ambiguous group are the participants in the 50% base rate group who responded with an estimate of 50%. They are ambiguous responders because it is impossible to determine the process by which they reached their answer (i.e., by using the base rate or by using the accuracy of the diagnostic test).

The large majority of cases (149) fell into the first three categories. Only 15 cases were idiosyncratic, and another 65 were ambiguous. This not only led to a skewed distribution of the data, but also to a clustering of the data in each cell. For example, in the groups with the base rate of 80%, 37 of the 82 respondents answered with the base rate and another 29 respondents used the diagnostic accuracy of the test, 50%. Thus, in each cell, the data were clustered primarily into two groups: the base rate and 50%. Further, few respondents answered in unique ways. In the group with the base rate of 80%, only 8 participants answered in a way that cannot be arrived at by simple arithmetic. The low volume of idiosyncratic responses was insufficient to demonstrate a gender bias. The total number of idiosyncratic responses across all base rates was only 15; thus, the tendency to

rely on gender stereotypes was not typical.

Demand Characteristics

The demand characteristics of the stimulus case may have contributed to the clustering of responses. Because there was so little individuating information included, participants may have perceived the task before them as no more than a math problem. There may not have been sufficient individuating information to elicit gender stereotypes. As such, there were only three response strategies available: use the base rate, use the diagnosticity of the test, or multiply the base rate by the diagnosticity of the test. The case itself may have limited the range of possible answers.

In a general clinical outpatient practice, psychologists rarely have knowledge of base rates that are specific to the population they treat. Perhaps a base rate of 80% for APD would be found in a prison setting, but that is likely a far reach from the work setting of most of the study participants. In a more general practice, it would be unlikely that any disorder would reach a base rate of 80%, or even 50%. The atypical nature of the stimulus case in terms of base rate, then, may also have contributed to the clustering of the results. Taken together, the stimulus materials and the participants' consequential response styles may have artificially forced the data into clusters that precluded the detection of between-group differences and biases.

Influence of Accuracy Information

As illustrated in Figure 2, the general pattern of probability estimates followed the first prediction: that responses would tend toward the midpoint, that is, the means of responses in the base rate 20% group are all greater than 20%, the means of responses in the base rate 50% group are all roughly 50%, and the means of responses in the base rate 80% group are all less than or equal to 80%. There are two possible interpretations of this result. For one, this pattern is consistent with prior studies (Ginosar & Trope, 1980; Kennedy, 1994) that have demonstrated a tendency for participants to underestimate

probability in a high base rate condition and to overestimate it in a low base rate condition. A second interpretation of this pattern of responses involves the diagnosticity of the test, 50%, which also happens to be the midpoint of the interval of possible responses. In the 20% and 80% base rate conditions, there was a marked tendency for participants' answers to deviate from the base rate toward the test accuracy rate of 50%, regardless of the amount of individuating information provided, as seen in Table 7. This pattern is consistent with that found in other studies. Using a problem involving very different base rates of blue and green cabs in a city, and an estimate of the accuracy of an eyewitness to a nighttime accident, Tversky and Kahneman (1982, p. 156, from an earlier unpublished study) demonstrated the tendency for subjects to disregard base rate information and form a conclusion based on the accuracy of the eyewitness. A similar result was found by Lyon and Slovic (1976). In modifications of the blue and green cab problem, they varied the base rates of the cab colors and the accuracy of the eyewitness. They found that their college student subjects favored the accuracy of the witness over the base rate of the cab color whether the witness confirmed or disconfirmed the base rate. A further study with different content but similar structure produced similar results. In the current study, the tendency for judges to rely on test accuracy in lieu of base rates may well have overridden the potential impact of gender biases in the diagnostic process.

Effect of Individuating Information

Also noteworthy are the means of Probability Estimate and Confidence in a single group, that with base rate of 80%, with sex unspecified and with disorder X. This represents the highest base rate and no individuating information. This group contained six participants, all of whom assigned the correct probability estimate of 80%. Five of the six indicated a confidence level of 100%, and one placed it at 90%. The consistency of the responses in this group is unique in the sample. It may be understood as the result of the strongest evidence for a diagnosis: a very high base rate and no other information to

distract participants from using it. Even the chance result on the diagnostic test did not successfully compete for consideration by the participants in this group.

Overall, participants' confidence provided little insight into their decision making. The group of psychologists who received the least information in the high base rate condition were the most confident in the entire sample. Confidence was inconsistent with that found by Kennedy (1994). In that study, confidence increased as the amount of information increased, yet confidence was not related to accuracy. In the present study, the most confident psychologists were provided with the least amount of individuating information (i.e., disorder X and sex of patient unspecified) and with the highest base rate (i.e., 80%). These participants were also the most accurate in their probability estimates. The inconsistency of the results of these two studies suggests that psychologists may have limited insight into their diagnostic decision making process and the appropriate application of principles of probability.

Limitations Due to Size and Scope of the Study

The sample was notable for unequal group sizes and an overall sample size that was less than ideal. Only 25% of the questionnaires mailed were usable in the MANOVA. This percentage is lower than in other similar published studies, and much lower than a similar study conducted by this researcher. There may be specific reasons for the low response rate in this study and differences in individuals' motivation to take part in it. For example, psychologists who appreciate the complexity of the diagnosis of personality disorders may have dismissed the study as frivolous. On the other hand, those who participated may have responded to the simple "math problem" nature of the questions. After the dataset was assembled, the collection of additional data was considered. However, this idea was rejected because of the clustering of the data already received. It seemed likely that the additional time and money spent recruiting additional respondents would have produced results similar to those already obtained, that is, with some cases using the base rate and

some cases using the accuracy of the test. For example, negative results on key statistical analyses demonstrated no trends towards significance; and thus it is unlikely that an enlarged sample size would change matters. Further, a post hoc power analysis was considered unlikely to shed any light on the results. Because the fifteen participants who responded in the Idiosyncratic style were so few, and because that response style was the only one that could have demonstrated a gender bias, a post hoc power analysis did not seem warranted.

Overall, this study was limited because a single case study was used, and generalization to other or “real life” cases is questionable. Generalization to other cases and methods would, if more than one case had been used, be more likely to hold, for example. Further, the case was constructed to greatly reduce the effects of individuating information. Although this strategy may have decreased the face validity of the study (i.e., evaluation of a reductionistic printed case study does not closely resemble a psychiatric evaluation), it served to focus the participants on the variables of interest. In that regard, the study showed that even if psychologists were provided with base rate information, they would likely underutilize that information. Another consideration is that the diagnostic problem may have appeared oversimplified. This may have decreased participation overall, and it may have channelled the answers into specific categories. A richer case with additional details that more closely mirrored everyday clinical situations could have produced a different result.

Conclusions

Many factors influence decision making across domains, from the simple to the complex. This study attempted to distinguish the effects on two potential factors on judgment -- base rates and gender stereotypes -- by comparing responses to the normative standard. Overall, the majority of respondents did not use Bayes’ theorem correctly in the assignment of probability, but the participants’ choice of algorithm was unexpected. It was

predicted that participants would underutilize base rates in favor of gender stereotypes, but, in actuality, instead of using the base rate, most of the participants relied on the accuracy of a diagnostic test that was irrelevant to the correct formula. Contrary to prediction, gender stereotypes did not appear to play a role in the psychologists' evaluation of the case. This result suggests that, at least in some contexts, psychologists are not influenced by gender stereotypes in psychiatric diagnosis. If this result can be replicated, it will provide a positive demonstration of psychologists' impartiality.

Future studies should attempt to explain some of the unpredicted findings in this study. For example, participants relied on a test that was essentially no more useful than a coin toss for assigning probability, and it would be interesting to explore how pervasive this reliance on test results is. In what cases would a psychologist disregard or discount the value of test results in favor of other information? In addition, because considerations of gender permeate so many aspects of life in general, and medical care in particular, exploration into the possibility that gender plays a role in the diagnostic process should be continued. The methodology used in this study could be improved by either eliminating the diagnostic test result, or by varying it so that its effect can be measured. Finally, interventions that attempt to increase psychologists' use of base rates should be developed and tested.

References

- American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders. (4th ed.). Washington DC: Author.
- Arkes, H. R., & Harkness, A. R. (1980). Effect of making a diagnosis on subsequent recognition of symptoms. Journal of Experimental Psychology: Human Learning and Memory, 6, 568-575.
- Baron, J. (1994). Thinking and deciding. (2nd ed.). Cambridge, UK: Cambridge University Press.
- Beckett, N. E., & Park, B. (1995). Use of category versus individuating information: Making base rates salient. Personality and Social Psychology Bulletin, 21, 21-31.
- Bickman, L. (1999). Practice makes perfect and other myths about mental health services. American Psychologist, 54, 965-978.
- Borenstein, M., & Cohen, J. (1988). Statistical Power Analysis: A computer program [Computer software]. Hillsdale, NJ: Erlbaum.
- Bruner, J. S., & Potter, M. C. (1964). Interference in visual recognition. Science, 144, 424-425.
- Burgess, J. W. (1992). Neurocognitive impairment in dramatic personalities: Histrionic, narcissistic, borderline, and antisocial disorders. Psychiatry Research, 42, 283-290.
- Chapman, L. J., & Chapman, J. P. (1967). Genesis of popular but erroneous psychodiagnostic observations. Journal of Abnormal Psychology, 72, 193-204.
- Chapman, L. J., & Chapman, J. P. (1969). Illusory correlation as an obstacle to the use of valid psychodiagnostic signs. Journal of Abnormal Psychology, 74, 271-280.
- Copeland, J., & Snyder, M. (1995). When counselors confirm: A functional analysis. Personality and Social Psychology Bulletin, 21, 1210-1220.

Dawes, R. M. (1982). The value of being explicit when making clinical decisions. In T. A. Wills (Ed.), Basic processes in helping relationships, (pp. 37-58). New York: Academic Press.

Dawes, R. M., Faust, D., & Meehl, P. E. (1989). Clinical versus actuarial judgment. Science, 243, 1668-1674.

Faust, D. (1986). Research on human judgment and its application to clinical practice. Professional Psychology: Research and Practice, 17, 420-430.

Fiske, S. T., & Taylor, S. E. (1984). Social cognition. Reading, MA: Addison-Wesley.

Ford, M. R., & Widiger, T. A. (1989). Sex bias in the diagnosis of histrionic and antisocial personality disorders. Journal of Consulting and Clinical Psychology, 57, 301-305.

Ginosar, Z., & Trope, Y. (1980). The effects of base rates and individuating information on judgments about another person. Journal of Experimental Social Psychology, 16, 228-242.

Hamilton, D. L., & Gifford, R. K. (1976). Illusory correlation in interpersonal perception: A cognitive basis of stereotypic judgments. Journal of Experimental Social Psychology, 12, 392-407.

Hamilton, D. L., & Rose, T. (1980). Illusory correlation and the maintenance of stereotypic beliefs. Journal of Personality and Social Psychology, 39, 832-845.

Haverkamp, B. E. (1993). Confirmatory bias in hypothesis testing for client-identified and counselor self-generated hypotheses. Journal of Counseling Psychology, 40, 303-315.

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. Cognitive Psychology, 3, 430-454.

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction.

Psychological Review, 80, 237-251.

Kennedy, M. L. (1994). The base-rate fallacy in school psychology: Implications for decision-making. Unpublished doctoral dissertation, University of Rhode Island.

Locksley, A., Borgida, E., Brekke, N., & Hepburn, C. (1980). Sex stereotypes and social judgment. Journal of Personality and Social Psychology, 39, 821-831.

Locksley, A., Hepburn, C., & Ortiz, V. (1982). Social stereotypes and judgments of individuals: An instance of the base-rate fallacy. Journal of Experimental Social Psychology, 18, 23-42.

Meehl, P. E. (1954). Clinical versus statistical prediction: A theoretical analysis and a review of the evidence. Minneapolis: University of Minnesota Press.

Meehl, P. E., & Rosen, A. (1955). Antecedent probability and the efficiency of psychometric signs, patterns, or cutting scores. Psychological Bulletin, 52, 194-216.

Ross, L., & Nisbett, R. E. (1991). The person and the situation: Perspectives of social psychology. Philadelphia: Temple University Press.

Strohmer, D. C., Boas, G. J., & Abadie, M. N. (1996). The role of negative information in mental health counselor hypothesis testing. Journal of Mental Health Counseling, 18, 164-178.

Tajfel, H. (1969). The cognitive aspects of prejudice. Journal of Social Issues, 25, 79-94.

Temerlin, M. K., & Trousdale, W. W. (1969). The social psychology of clinical diagnosis. Psychotherapy: Theory, Research and Practice, 6, 24-29.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. Cognitive Psychology, 5, 207-232.

Tversky, A., & Kahneman, D. (1982). Evidential impact of base rates. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), Judgment under uncertainty: Heuristics and biases (pp. 153-160). New York: Cambridge University Press.

Table 1

Deleted Outliers

Sex	Disorder	Base Rate	Probability	
			Estimate	Confidence
Female	APD	20%	1%	90%
Female	HPD	20%	80%	60%
Male	APD	20%	5%	25%
Male	APD	50%	10%	10%
Male	APD	80%	20%	20%
Unspecified	APD	80%	15%	75%
Unspecified	HPD	50%	2%	100%
Unspecified	X	50%	10%	0%

Table 2

Means and Standard Deviations of Respondent Demographics

Characteristic	
<hr/>	
Years of Direct Service	17.44 (8.09)
% Time Spent Doing:	
Psychotherapy	58.25 (32.19)
Psychological Assessment	14.71 (20.96)
Teaching	3.94 (10.64)
Supervision	6.10 (8.99)
Research	1.96 (7.63)
Administrative Activities	11.58 (18.85)
Other	3.54 (12.88)
% Patients in Caseload Who Are:	
Adults (age 18 and over)	65.23 (28.21)
Children (under age 18)	18.73 (22.72)
Families and Couples	13.51 (15.24)

Table 3

Means and Standard Deviations of Probability Estimate by Sex, Disorder, and Base Rate

Base Rate	Disorder			Marginal Means
	APD	HPD	X	
Females (<u>n</u> = 83)				
20%	44.00 (13.42) (<u>n</u> = 5)	31.00 (18.07) (<u>n</u> = 10)	33.33 (18.62) (<u>n</u> = 6)	34.76 (17.28) (<u>n</u> = 21)
50%	48.21 (6.68) (<u>n</u> = 14)	43.75 (11.31) (<u>n</u> = 12)	42.86 (12.20) (<u>n</u> = 7)	45.45 (9.79) (<u>n</u> = 33)
80%	67.00 (17.67) (<u>n</u> = 10)	70.00 (19.15) (<u>n</u> = 7)	69.17 (16.21) (<u>n</u> = 12)	68.62 (16.84) (<u>n</u> = 29)
Males (<u>n</u> = 78)				
20%	41.43 (14.64) (<u>n</u> = 7)	42.00 (17.89) (<u>n</u> = 5)	43.33 (16.33) (<u>n</u> = 6)	42.22 (15.17) (<u>n</u> = 18)
50%	37.50 (13.36) (<u>n</u> = 8)	47.92 (7.22) (<u>n</u> = 12)	48.64 (17.76) (<u>n</u> = 11)	45.48 (13.74) (<u>n</u> = 31)
80%	67.14 (16.04) (<u>n</u> = 7)	64.33 (20.80) (<u>n</u> = 12)	59.50 (19.21) (<u>n</u> = 10)	63.34 (18.79) (<u>n</u> = 29)
Unspecified (<u>n</u> = 68)				
20%	32.00 (16.43) (<u>n</u> = 5)	37.50 (14.88) (<u>n</u> = 8)	36.50 (17.65) (<u>n</u> = 10)	35.87 (15.86) (<u>n</u> = 23)
50%	42.86 (12.20) (<u>n</u> = 7)	45.83 (10.21) (<u>n</u> = 6)	46.88 (8.84) (<u>n</u> = 8)	45.24 (10.06) (<u>n</u> = 21)
80%	55.00 (16.04) (<u>n</u> = 8)	55.00 (16.50) (<u>n</u> = 10)	80.00 (0.00) (<u>n</u> = 6)	61.25 (17.52) (<u>n</u> = 24)
Grand Means (<u>n</u> = 229)				
20%				37.34 (16.21) (<u>n</u> = 62)
50%				45.41 (11.32) (<u>n</u> = 85)
80%				64.60 (17.80) (<u>n</u> = 82)

Table 4

Means and Standard Deviations of Confidence by Sex, Disorder, and Base Rate

Base Rate	Disorder			Marginal Means
	APD	HPD	X	
Females ($\underline{n} = 83$)				
20%	66.00 (26.08) ($\underline{n} = 5$)	61.00 (33.57) ($\underline{n} = 10$)	80.00 (24.49) ($\underline{n} = 6$)	67.62 (29.35) ($\underline{n} = 21$)
50%	68.93 (36.54) ($\underline{n} = 14$)	75.42 (29.58) ($\underline{n} = 12$)	63.57 (26.88) ($\underline{n} = 7$)	70.15 (31.61) ($\underline{n} = 33$)
80%	80.40 (19.59) ($\underline{n} = 10$)	77.14 (34.98) ($\underline{n} = 7$)	84.17 (20.21) ($\underline{n} = 12$)	81.17 (23.54) ($\underline{n} = 29$)
Males ($\underline{n} = 78$)				
20%	77.14 (30.39) ($\underline{n} = 7$)	60.00 (41.83) ($\underline{n} = 5$)	53.33 (16.33) ($\underline{n} = 6$)	64.44 (30.53) ($\underline{n} = 18$)
50%	40.63 (39.86) ($\underline{n} = 8$)	80.42 (23.59) ($\underline{n} = 12$)	71.36 (34.94) ($\underline{n} = 11$)	66.94 (35.30) ($\underline{n} = 31$)
80%	68.57 (19.30) ($\underline{n} = 7$)	71.67 (26.57) ($\underline{n} = 12$)	96.00 (6.58) ($\underline{n} = 10$)	79.31 (22.90) ($\underline{n} = 29$)
Unspecified ($\underline{n} = 68$)				
20%	59.00 (37.82) ($\underline{n} = 5$)	85.63 (18.02) ($\underline{n} = 8$)	65.50 (27.33) ($\underline{n} = 10$)	71.09 (28.16) ($\underline{n} = 23$)
50%	63.57 (28.39) ($\underline{n} = 7$)	73.33 (29.44) ($\underline{n} = 6$)	67.50 (23.45) ($\underline{n} = 8$)	67.86 (25.82) ($\underline{n} = 21$)
80%	70.00 (23.30) ^a ($\underline{n} = 8$)	74.00 (19.97) ^b ($\underline{n} = 10$)	98.33(4.08) ^{a,b} ($\underline{n} = 6$)	78.75 (21.48) ($\underline{n} = 24$)
Grand Means ($\underline{n} = 229$)				
20%				67.98 (28.91) ($\underline{n} = 62$)
50%				68.41 (31.41) ($\underline{n} = 85$)
80%				79.80 (22.47) ($\underline{n} = 82$)

^aMeans are significantly different ($p < .05$).^bMeans are significantly different ($p < .05$).

Table 5

Means and Standard Deviations of Probability Estimate by Prototypicality and Base Rate

Base Rate	Prototypicality		
	Prototypical	Anti-Prototypical	Neutral
	(<u>n</u> = 51)	(<u>n</u> = 58)	(<u>n</u> = 120)
20%	35.29 (17.09) (<u>n</u> = 17)	43.00 (14.94) (<u>n</u> = 10)	36.71 (16.22) (<u>n</u> = 35)
50%	41.25 (12.23) (<u>n</u> = 20)	48.08 (6.79) (<u>n</u> = 26)	45.77 (12.80) (<u>n</u> = 39)
80%	68.57 (17.03) (<u>n</u> = 14)	65.55 (19.03) (<u>n</u> = 22)	62.93 (17.59) (<u>n</u> = 46)

Table 6

Means and Standard Deviations of Confidence by Prototypicality and Base Rate

Base Rate	Prototypicality		
	Prototypical	Anti-Prototypical	Neutral
	(<u>n</u> = 51)	(<u>n</u> = 58)	(<u>n</u> = 120)
20%	67.65 (32.36)	63.00 (33.02)	69.57 (26.61)
	(<u>n</u> = 17)	(<u>n</u> = 10)	(<u>n</u> = 35)
50%	61.50 (37.38)	74.23 (31.20)	68.08 (28.16)
	(<u>n</u> = 20)	(<u>n</u> = 26)	(<u>n</u> = 39)
80%	72.86 (27.51)	75.64 (23.54)	83.91 (19.77)
	(<u>n</u> = 14)	(<u>n</u> = 22)	(<u>n</u> = 46)

Table 7

Means and Standard Deviations of Probability Estimate by Amount of Individuating Information and Base Rate

Base Rate	<u>Amount of Individuating Information</u>		
	None (<u>n</u> = 16)	Sex or Disorder (<u>n</u> = 65)	Sex and Disorder (<u>n</u> = 63)
20%	36.50 (17.65) (<u>n</u> = 10)	36.84 (16.00) (<u>n</u> = 25)	38.15 (16.48) (<u>n</u> = 27)
80%	80.00 (0.00) (<u>n</u> = 6)	60.38 (17.48) (<u>n</u> = 40)	66.72 (18.09) (<u>n</u> = 36)

Table 8

Means and Standard Deviations of Confidence by Amount of Individuating Information and Base Rate

Base Rate	<u>Amount of Individuating Information</u>		
	None	Sex or Disorder	Sex and Disorder
	(<u>n</u> = 16)	(<u>n</u> = 65)	(<u>n</u> = 63)
20%	65.50 (27.33)	71.20 (26.70)	65.93 (32.05)
	(<u>n</u> = 10)	(<u>n</u> = 25)	(<u>n</u> = 27)
80%	98.33 (4.08) ^a	81.75 (20.30)	74.56 (24.81) ^a
	(<u>n</u> = 6)	(<u>n</u> = 40)	(<u>n</u> = 36)

^aMeans are significantly different ($p < .05$).

Table 9

Number and Percentage of Responses by Response Strategy and Base Rate

Response Strategy	Base Rate		
	20%	50%	80%
Baseraters ($\underline{n} = 53$)	16 (26%)	Ambiguous	37 (45%)
Testers ($\underline{n} = 65$)	36 (58%)	Ambiguous	29 (35%)
Multipliers ($\underline{n} = 31$)	6 (10%)	17 (20%)	8 (10%)
Idiosyncratic ($\underline{n} = 15$)	4 (6%)	3 (4%)	8 (10%)
Ambiguous ($\underline{n} = 65$)	n/a	65 (76%)	n/a
Total	62 (100%)	85 (100%)	82 (100%)

Figure 1. Normative Standard and Predicted Responses

KEY

- 1 Bayesian prediction
- 2 Predicted stereotype-consistent responses
- 3 Predicted no-stereotype responses
- 4 Predicted stereotype-inconsistent responses

Figure 2. Normative Standard and Actual Responses

KEY

- 1 Bayesian prediction
- 2 Actual stereotype-consistent responses
- 3 Actual no-stereotype responses
- 4 Actual stereotype-inconsistent responses

Appendix
Letter to Participants

Dear Dr. _____,

I am a graduate student at the University of Rhode Island. For my doctoral dissertation research, I am conducting a study on clinical judgment, particularly, clinicians' diagnostic impressions of presenting patients. I know that you are very busy, and I would greatly appreciate a few minutes of your time to complete the enclosed materials. I would be happy to send you a summary of the results; just return the enclosed post card separately.

The case description almost assuredly contains less information than you would normally require in working with an actual patient, but should provide enough useful information to allow you to generate an answer to the questions proposed. Please respond to all questions and return the completed questionnaire in the enclosed envelope. You will not receive a second mailing of these materials.

The decision to participate in this research project is yours. You do not have to participate and you may refuse to answer any question. Your participation in this study is anonymous. The materials you return are not marked in any way that will identify you. There may be no benefit to you by participating, but your answers may help illuminate an aspect of clinical decision making.

Participation in this study is not expected to be harmful or injurious to you. However, if you are not satisfied with the way this study is performed, you may discuss it with Maureen McCormick, 401-874-2193, or David Faust, Ph.D., 401-874-4237, anonymously, if you choose. In addition, you may contact the office of the Vice Provost for Research, 70 Lower College Road, University of Rhode Island, Kingston RI 02881, 401-874-2635.

You are at least 18 years of age. Returning this questionnaire implies your consent to participate in this study. Thank you very much for participating.

Sincerely,

Maureen McCormick, M.A.

Appendix, continued

Reply Postcard

Please send a summary of the results of
the diagnosis study to:

participant address label

Appendix, continued

Reminder Postcard

A few weeks ago I sent you a case description and questionnaire. I am sending this reminder to all recipients. It is very important to the research to obtain as many responses as possible, so if you have not returned the materials, I would be most appreciative if you could take a few minutes to do so. If you have already responded, thank you very much.

Maureen McCormick, M.A.

mem48@cornell.edu

Appendix, continued

Case Descriptions

1. Female Patient, Low Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have a particular disorder, X, is 20%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

2. Female Patient, Low Base Rate, Stereotype Consistent

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have Histrionic Personality Disorder (HPD) is 20%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

3. Female Patient, Low Base Rate, Stereotype Inconsistent

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have Antisocial Personality Disorder (APD) is 20%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

4. Female Patient, Medium Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have a particular disorder, X, is 50%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

5. Female Patient, Medium Base Rate, Stereotype Consistent

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have Histrionic Personality Disorder (HPD) is 50%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

6. Female Patient, Medium Base Rate, Stereotype Inconsistent

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have Antisocial Personality Disorder (APD) is 50%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

7. Female Patient, High Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have a particular disorder, X, is 80%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

8. Female Patient, High Base Rate, Stereotype Consistent

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have Histrionic Personality Disorder (HPD) is 80%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

9. Female Patient, High Base Rate, Stereotype Inconsistent

Please read the following information and answer the questions below.

You have been informed that the base rate of women who come to your clinic who have Antisocial Personality Disorder (APD) is 80%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old female seeks services at your clinic. She is a high school graduate and a divorced mother of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that she has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

10. Male Patient, Low Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have a particular disorder, X, is 20%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

11. Male Patient, Low Base Rate, Stereotype Consistent

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have Antisocial Personality Disorder (APD) is 20%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

12. Male Patient, Low Base Rate, Stereotype Inconsistent

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have Histrionic Personality Disorder (HPD) is 20%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

13. Male Patient, Medium Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have a particular disorder, X, is 50%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

14. Male Patient, Medium Base Rate, Stereotype Consistent

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have Antisocial Personality Disorder (APD) is 50%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

15. Male Patient, Medium Base Rate, Stereotype Inconsistent

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have Histrionic Personality Disorder (HPD) is 50%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

16. Male Patient, High Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have a particular disorder, X, is 80%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

17. Male Patient, High Base Rate, Stereotype Consistent

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have Antisocial Personality Disorder (APD) is 80%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

18. Male Patient, High Base Rate, Stereotype Inconsistent

Please read the following information and answer the questions below.

You have been informed that the base rate of men who come to your clinic who have Histrionic Personality Disorder (HPD) is 80%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old male seeks services at your clinic. He is a high school graduate and a divorced father of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that he has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

19. No-Gender Patient, Low Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have a particular disorder, X, is 20%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

20. No-Gender Patient, Low Base Rate, Female Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have Histrionic Personality Disorder (HPD) is 20%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

21. No-Gender Patient, Low Base Rate, Male Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have Antisocial Personality Disorder (APD) is 20%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

22. No-Gender Patient, Medium Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have a particular disorder, X, is 50%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

23. No-Gender Patient, Medium Base Rate, Female Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have Histrionic Personality Disorder (HPD) is 50%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

24. No-Gender Patient, Medium Base Rate, Male Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have Antisocial Personality Disorder (APD) is 50%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

25. No-Gender Patient, High Base Rate, No Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have a particular disorder, X, is 80%. A diagnostic instrument for X has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has disorder X? _____

How confident (0% to 100%) are you in your probability estimate? _____

26. No-Gender Patient, High Base Rate, Female Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have Histrionic Personality Disorder (HPD) is 80%. A diagnostic instrument for HPD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has HPD? _____

How confident (0% to 100%) are you in your probability estimate? _____

27. No-Gender Patient, High Base Rate, Male Stereotype

Please read the following information and answer the questions below.

You have been informed that the base rate of adults who come to your clinic who have Antisocial Personality Disorder (APD) is 80%. A diagnostic instrument for APD has been developed. It correctly identifies patients 50% of the time.

A 30-year-old seeks services at your clinic. The patient is a high school graduate and a divorced parent of two who has a positive result on the diagnostic instrument.

What is the probability (0% to 100%) that the patient has APD? _____

How confident (0% to 100%) are you in your probability estimate? _____

Appendix, continued
Demographic Questions

Please answer the following questions about yourself which will help in interpreting the results.

1. What is your gender?

_____ FEMALE

_____ MALE

2. How many years, if any, of direct client or patient service have you provided (since licensure)?

_____ YEARS

3. Indicate the percentage of time you spend in each of the following professional activities (should total 100%):

_____ PSYCHOTHERAPY

_____ PSYCHOLOGICAL ASSESSMENT

_____ TEACHING

_____ SUPERVISION

_____ RESEARCH

_____ ADMINISTRATIVE ACTIVITIES

_____ OTHER (please specify) _____

4. Indicate the percentage of your caseload in each of the following populations (should total 100%):

_____ ADULTS (age 18 and over)

_____ CHILDREN (under age 18)

_____ FAMILIES AND COUPLES

Bibliography

Achenbach, T. M., & McConaughy, C. (1996). Relations between DSM-IV and empirically based assessment. School Psychology Review, 25, 329-341.

Acorn, D. A., Hamilton, D. L., & Sherman, S. J. (1988). Generalization of biased perceptions of groups based on illusory correlations. Social Cognition, 6, 345-372.

Adler, D. A., Drake, R. E., & Teague, G. B. (1990). Clinicians' practices in personality assessment: Does gender influence the use of DSM-III Axis II? Comprehensive Psychiatry, 31, 125-133.

Alloy, L. B., & Tabachnik, N. (1984). Assessment of covariation by humans and animals: The joint influence of prior expectations and current situational information. Psychological Review, 91, 112-149.

American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders. (4th ed.). Washington DC: Author.

Arkes, H. R. (1989). Principles in judgment/decision making research pertinent to legal proceedings. Behavioral Sciences and the Law, 7, 429-456.

Arkes, H. R., & Harkness, A. R. (1980). Effect of making a diagnosis on subsequent recognition of symptoms. Journal of Experimental Psychology: Human Learning and Memory, 6, 568-575.

Arkes, H. R., & Harkness, A. R. (1983). Estimates of contingency between two dichotomous variables. Journal of Experimental Psychology: General, 112, 117-135.

Arkes, H. R., & Rothbart, M. (1985). Memory, retrieval, and contingency judgments. Journal of Personality and Social Psychology, 49, 598-606.

Bar-Tal, D., Graumann, C. F., Kruglanski, A. W., & Stroebe, W. (Eds.). (1989). Stereotyping and prejudice: Changing conceptions. New York: Springer-Verlag.

Baron, J. (1994). Thinking and deciding. (2nd ed.). Cambridge, UK: Cambridge

University Press.

Batson, C. D., O'Quin, K., & Pych, V. (1982). An attribution theory analysis of trained helpers' inferences about clients' needs. In T. A. Wills (Ed.), Basic processes in helping relationships, (pp. 59-80). New York: Academic Press.

Becker, D., & Lamb, S. (1994). Sex bias in the diagnosis of borderline personality disorder and posttraumatic stress disorder. Professional Psychology: Research and Practice, 25, 55-61.

Beckett, N. E., & Park, B. (1995). Use of category versus individuating information: Making base rates salient. Personality and Social Psychology Bulletin, 21, 21-31.

Benson, M. J. (1989). Attributional measurement techniques: Classification and comparison of approaches for measuring causal dimensions. Journal of Social Psychology, 129, 307-323.

Berndsen, M., Van der Pligt, J., Spears, R., & McGarty, C. (1996). Expectation-based and data-based illusory correlation: The effects of confirming versus disconfirming evidence. European Journal of Social Psychology, 26, 899-913.

Bickman, L. (1999). Practice makes perfect and other myths about mental health services. American Psychologist, 54, 965-978.

Biernat, M. (1993). Gender and height: Developmental patterns in knowledge and use of an accurate stereotype. Sex Roles, 29, 691-713.

Birnbaum, M. H. (1982). Controversies in psychological measurement. In B. Wegener (Ed.), Social attitudes and psychophysical measurement, (pp. 401-485). Hillsdale, NJ: Lawrence Erlbaum Associates.

Birnbaum, M. H. (1983). Base rates in Bayesian inference: Signal detection analysis of the cab problem. American Journal of Psychology, 96, 85-94.

Borenstein, M., & Cohen, J. (1988). Statistical Power Analysis: A computer

program [Computer software]. Hillsdale, NJ: Erlbaum.

Borum, R., Otto, R., & Golding, S. (1993). Improving clinical judgment and decision making in forensic evaluation. Journal of Psychiatry and Law, 21, 35-76.

Bruner, J. S., Postman, L., & Rodrigues, J. (1951). Expectation and the perception of color. American Journal of Psychology, 64, 216-227.

Bruner, J. S., & Potter, M. C. (1964). Interference in visual recognition. Science, 144, 424-425.

Burgess, J. W. (1992). Neurocognitive impairment in dramatic personalities: Histrionic, narcissistic, borderline, and antisocial disorders. Psychiatry Research, 42, 283-290.

Casscells, W., Schoenberger, A., & Graboys, T. B. (1978). Interpretation by physicians of clinical laboratory results. New England Journal of Medicine, 299, 999-1001.

Castlebury, F. D., Hilsenroth, M. J., Handler, L., & Durham, T. W. (1997). Use of the MMPI-2 Personality Disorder Scales in the assessment of antisocial, borderline, and narcissistic personality disorders. Assessment, 4, 155-168.

Chapman, L. J. (1967). Illusory correlation in observational report. Journal of Verbal Learning and Verbal Behavior, 6, 151-155.

Chapman, L. J., & Chapman, J. P. (1967). Genesis of popular but erroneous psychodiagnostic observations. Journal of Abnormal Psychology, 72, 193-204.

Chapman, L. J., & Chapman, J. P. (1969). Illusory correlation as an obstacle to the use of valid psychodiagnostic signs. Journal of Abnormal Psychology, 74, 271-280.

Chodoff, P. (1982). Hysteria and women. American Journal of Psychiatry, 139, 545-551.

Copeland, J., & Snyder, M. (1995). When counselors confirm: A functional analysis. Personality and Social Psychology Bulletin, 21, 1210-1220.

Cosmides, L., & Tooby, J. (1996). Are humans good intuitive statisticians after all? Rethinking some conclusions from the literature on judgment under uncertainty. Cognition, 58, 1-73.

Davidson, D., & Hirtle, S. C. (1990). Effects of nondiscrepant and discrepant information on the use of base rates. American Journal of Psychiatry, 103, 343-357.

Davidson, K. M., & Tyrer, P. (1996). Cognitive therapy for antisocial and borderline personality disorders: Single case study series. British Journal of Clinical Psychology, 35, 413-429.

Davis, D. A. (1979). What's in a name? A Bayesian rethinking of attributional biases in clinical judgment. Journal of Consulting and Clinical Psychology, 47, 1109-1114.

Dawes, R. M. (1982). The value of being explicit when making clinical decisions. In T. A. Wills (Ed.), Basic processes in helping relationships, (pp. 37-58). New York: Academic Press.

Dawes, R. M. (1989). Experience and validity of clinical judgment: The illusory correlation. Behavioral Sciences and the Law, 7, 457-467.

Dawes, R. M., Faust, D., & Meehl, P. E. (1989). Clinical versus actuarial judgment. Science, 243, 1668-1674.

Dawes, R. M., Mirels, H. L., Gold, E., & Donahue, E. (1993). Equating inverse probabilities in implicit personality judgments. Psychological Science, 4, 396-400.

Dohrenwend, B. P., & Dohrenwend, B. S. (1976). Sex differences and psychiatric disorders. American Journal of Sociology, 81, 1447-1454.

Elwood, R. W. (1993a). Clinical discriminations and neuropsychological tests: An appeal to Bayes' theorem. Clinical Neuropsychologist, 7, 224-233.

Elwood, R. W. (1993b). Psychological tests and clinical discriminations: Beginning to address the base rate problem. Clinical Psychology Review, 13, 409-419.

Faust, D. (1986). Research on human judgment and its application to clinical practice. Professional Psychology: Research and Practice, 17, 420-430.

Faust, D., & Miner, R. A. (1986). The empiricist and his new clothes: DSM III in perspective. American Journal of Psychiatry, 143, 962-967.

Faust, D., & Nurcombe, B. (1989). Improving the accuracy of clinical judgment. Psychiatry, 52, 197-208.

Fischhoff, B., & Bar-Hillel, M. (1984). Diagnosticity and the base-rate effect. Memory and Cognition, 12, 402-410.

Fiske, S. T., & Taylor, S. E. (1984). Social cognition. Reading, MA: Addison-Wesley.

Ford, M. R., & Widiger, T. A. (1989). Sex bias in the diagnosis of histrionic and antisocial personality disorders. Journal of Consulting and Clinical Psychology, 57, 301-305.

Funder, D. C. (1995a). On the accuracy of personality judgment: A realistic approach. Psychological Review, 102, 652-670.

Funder, D. C. (1995b). Stereotypes, base rates, and the fundamental attribution mistake: Towards a content-based approach to judgmental accuracy. In Y.-T. Lee, L. Jussim, & C. McCauley (Eds.), Stereotype accuracy: Toward appreciating group differences, (pp. 141-156). Washington, DC: American Psychological Association.

Gacono, C. B., Meloy, J. R., & Berg, J. L. (1992). Object relations, defensive operations, and affective states in narcissistic, borderline, and antisocial personality disorder. Journal of Personality Assessment, 59, 32-49.

Garcia-Marques, L., & Hamilton, D. L. (1996). Resolving the apparent discrepancy between the incongruity effect and the expectancy-based illusory correlation effect: The TRAP model. Journal of Personality and Social Psychology, 71, 845-860.

Ginosar, Z., & Trope, Y. (1980). The effects of base rates and individuating

information on judgments about another person. Journal of Experimental Social Psychology, 16, 228-242.

Give, W. R., & Tudor, J. F. (1973). Adult sex roles and mental illness. American Journal of Sociology, 78, 812-835.

Gnys, J. A., Willis, W. G., & Faust, D. (1995). School psychologists' diagnoses of learning disabilities: A study of illusory correlation. Journal of School Psychology, 33, 59-73.

Hamburger, M. E., Lilienfeld, S. O., & Hogben, M. (1996). Psychopathy, gender, and gender roles: Implications for antisocial and histrionic personality disorders. Journal of Personality Disorders, 10, 41-55.

Hamilton, D. (1979). A cognitive-attributinal analysis of stereotyping. In L. Berkowitz (Ed.), Advances in experimental social psychology, (Vol. 12, pp. 53-84). New York: Academic Press.

Hamilton, D. L., Dugan, P. M., & Trolie, T. K. (1985). The formation of stereotypic beliefs: Further evidence for distinctiveness-based illusory correlations. Journal of Personality and Social Psychology, 48, 5-17.

Hamilton, D. L., & Gifford, R. K. (1976). Illusory correlation in interpersonal perception: A cognitive basis of stereotypic judgments. Journal of Experimental Social Psychology, 12, 392-407.

Hamilton, D. L., & Rose, T. (1980). Illusory correlation and the maintenance of stereotypic beliefs. Journal of Personality and Social Psychology, 39, 832-845.

Hamilton, D. L., & Sherman, S. J. (1989). Illusory correlations: Implications for stereotype theory and research. In D. Bar-Tal, C. F. Gravmann, A. W. Kruglanski, & W. Stroebe (Eds.), Stereotyping and prejudice: Changing conceptions, (pp. 59-82). New York: Springer-Verlag.

Hamilton, D. L., Sherman, S. J., & Ruvolo, C. M. (1990). Stereotype-based

expectancies: Effects on information processing and social behavior. Journal of Social Issues, 46(2), 35-60.

Hamilton, D. L., & Zanna, M. P. (1972). Differential weighting of favorable and unfavorable attributes in impressions of personality. Journal of Experimental Research in Personality, 6, 204-212.

Hamilton, S., Rothbart, M., & Dawes, R. (1986). Sex bias, diagnosis, and DSM-III. Sex Roles, 15, 269-274.

Hare-Mustin, R. T. (1983). An appraisal of the relationship between women and psychotherapy: 80 years after the case of Dora. American Psychologist, 38, 593-601.

Haverkamp, B. E. (1993). Confirmatory bias in hypothesis testing for client-identified and counselor self-generated hypotheses. Journal of Counseling Psychology, 40, 303-315.

Henry, K. A., & Cohen, C. I. (1983). The role of labeling processes in diagnosing borderline personality disorder. American Journal of Psychiatry, 140, 1527-1529.

Hilton, J. L., & Fein, S. (1989). The role of typical diagnosticity in stereotype-based judgments. Journal of Personality and Social Psychology, 57, 201-211.

Holden, R. J., Pakula, I. S., & Mooney, P. A. (1997). A neuroimmunological model of antisocial and borderline personality disorders. Human Psychopharmacology, 12, 291-308.

Hudziak, J. J., Boffeli, T. J., Kriesman, J. J., Battaglia, M. M., Stanger, C., & Guze, S. B. (1996). Clinical study of the relation of borderline personality disorder to Briquet's syndrome (hysteria), somatization disorder, antisocial personality disorder, and substance abuse disorders. American Journal of Psychiatry, 153, 1598-1606.

Jacowitz, K. E., & Kahneman, D. (1995). Measures of anchoring in estimation tasks. Personality and Social Psychology Bulletin, 21, 1161-1166.

Jones, R. A., Scott, J., Solernou, J., Noble, A., Fiala, J., & Miller, K. (1977).

Availability and formation of stereotypes. Perceptual and Motor Skills, 44, 631-638.

Jussim, L. (1992). Prejudice, stereotypes, base rates, and saber-toothed tigers. Psychological Inquiry, 3, 169-170.

Kahneman, D. (1992). Reference points, anchors, norms, and mixed feelings. Organizational Behavior and Human Decision Processes, 51, 296-312.

Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. Psychological Review, 93, 136-153.

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. Cognitive Psychology, 3, 430-454.

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. Psychological Review, 80, 237-251.

Kaplan, M. (1983a). The issue of sex bias in DSM-III: Comments on the articles by Spitzer, Williams, and Kass. American Psychologist, 38, 802-803.

Kaplan, M. (1983b). A woman's view of DSM-III. American Psychologist, 38, 786-792.

Kass, F., Spitzer, R., & Williams, J. (1983). An empirical study of the issue of sex bias in the diagnostic criteria of DSM-III Axis II personality disorders. American Psychologist, 38, 799-801.

Kennedy, M. L. (1994). The base-rate fallacy in school psychology: Implications for decision-making. Unpublished doctoral dissertation, University of Rhode Island.

Kerlinger, F. N. (1986). Foundations of behavioral research. (3rd ed.). Orlando: Harcourt Brace.

Koehler, J. J. (1996). The base rate fallacy reconsidered: Descriptive, normative, and methodological challenges. Behavioral and Brain Sciences, 19, 1-53.

Krosnick, J. A., Li, F., & Lehman, D. R. (1990). Conversational conventions, order of information acquisition, and the effect of base rates and individuating information

on social judgments. Journal of Personality and Social Psychology, 59, 1140-1152.

Krueger, J., & Rothbart, M. (1988). Use of categorical and individuating information in making inferences about personality. Journal of Personality and Social Psychology, 55, 187-195.

Kurtz, R. M., & Garfield, S. L. (1978). Illusory correlation: A further exploration of Chapman's paradigm. Journal of Consulting and Clinical Psychology, 46, 1009-1015.

Langer, E. J., & Abelson, R. P. (1974). A patient by any other name . . . : Clinician group difference in labelling bias. Journal of Consulting and Clinical Psychology, 42, 4-9.

Lee, Y.-T., Jussim, L. J., & McCauley, C. R. (1995). Stereotype accuracy: Toward appreciating group differences. Washington, DC: American Psychological Association.

Lilienfeld, S. O., VanValkenburg, C., Larntz, K., & Akiskal, H. S. (1986). The relationship of histrionic personality disorder to antisocial personality and somatization disorders. American Journal of Psychiatry, 143, 718-722.

Locksley, A., Borgida, E., Brekke, N., & Hepburn, C. (1980). Sex stereotypes and social judgment. Journal of Personality and Social Psychology, 39, 821-831.

Locksley, A., Hepburn, C., & Ortiz, V. (1982). Social stereotypes and judgments of individuals: An instance of the base-rate fallacy. Journal of Experimental Social Psychology, 18, 23-42.

Lyon, D., & Slovic, P. (1976). Dominance of accuracy information and neglect of base rates in probability estimation. Acta Psychologica, 40, 287-298.

McArthur, L. Z., & Friedman, S. A. (1980). Illusory correlation in impression formation: Variations in the shared distinctiveness effect as a function of the distinctive person's age, race, and sex. Journal of Personality and Social Psychology, 39, 615-624.

McConnell, A. R., Sherman, S. J., & Hamilton, D. J. (1994). Illusory correlation

in the perception of groups: An extension of the distinctiveness-based account. Journal of Personality and Social Psychology, *67*, 414-429.

McConnell, A. R., Sherman, S. J., & Hamilton, D. L. (1997). Target entitativity: Implications for information processing about individual and group targets. Journal of Personality and Social Psychology, *72*, 750-762.

Meehl, P. E. (1954). Clinical versus statistical prediction: A theoretical analysis and a review of the evidence. Minneapolis: University of Minnesota Press.

Meehl, P. E., & Rosen, A. (1955). Antecedent probability and the efficiency of psychometric signs, patterns, or cutting scores. Psychological Bulletin, *52*, 194-216.

Mirowsky, J., & Ross, C. E. (1989). Psychiatric diagnosis as reified measurement. Journal of Health and Social Behavior, *30*, 11-25.

Morrow, K. A., & Deidan, C. T. (1992). Bias in the counseling process: How to recognize and avoid it. Journal of Counseling and Development, *70*, 571-577.

Nelson, T. E., Biernat, M. R., & Manis, M. (1990). Everyday base rates (sex stereotypes): Potent and resilient. Journal of Personality and Social Psychology, *59*, 664-675.

Nichols, W. C. (1996). Persons with antisocial and histrionic personality disorders in relationships. In F. W. Kaslow (Ed.), Handbook of relational diagnosis and dysfunctional family patterns, (pp. 287-299). New York: John Wiley and Sons.

Ofir, C. (1988). Pseudodiagnosticity in judgment under uncertainty. Organizational Behavior and Human Decision Processes, *42*, 343-363.

Read, S. J. (1984). Analogical reasoning in social judgment: The importance of causal theories. Journal of Personality and Social Psychology, *46*, 14-25.

Rienzi, B. M., & Scrams, D. J. (1991). Gender stereotypes for paranoid, antisocial, compulsive, dependent, and histrionic personality disorders. Psychological Reports, *69*, 976-978.

Robertson, J., & Fitzgerald, L. F. (1990). The (mis)treatment of men: Effects of client gender role and life-style on diagnosis and attribution of pathology. Journal of Counseling Psychology, 37, 3-9.

Rosch, E., & Lloyd, B. B. (Eds.). (1978). Cognition and categorization. Hillsdale, NJ: Lawrence Erlbaum Associates.

Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortions in the attribution process. In L. Berkowitz (Ed.), Advances in experimental social psychology, (Vol. 10, pp. 173-220). New York: Academic Press.

Ross, L., & Nisbett, R. E. (1991). The person and the situation: Perspectives of social psychology. Philadelphia: Temple University Press.

Rossi, J. S. (1985). Tables of effect size for z score tests of differences between proportions and between correlation coefficients. Educational and Psychological Measurement, 45, 737-743.

Sanbonmatsu, D. M., Shavitt, S., & Gibson, B. D. (1994). Salience, set size, and illusory correlation: Making moderate assumptions about extreme targets. Journal of Personality and Social Psychology, 66, 1020-1033.

Sanbonmatsu, D. M., Shavitt, S., Sherman, S. J., & Roskos-Ewoldsen, D. R. (1987). Illusory correlation in the perception of performance by self or a salient other. Journal of Experimental Social Psychology, 23, 518-543.

Sanbonmatsu, D. M., Sherman, S. J., & Hamilton, D. L. (1987). Illusory correlation in the perception of individuals and groups. Social Cognition, 5, 1-25.

Schwarz, N., Strack, F., Hiltin, D., & Naderer, G. (1991). Base rates, representativeness, and the logic of conversation: The contextual relevance of "irrelevant" information. Social Cognition, 9, 67-84.

Snyder, C. R. (1977). "A patient by any other name" revisited: Maladjustment of attributional locus of problem? Journal of Consulting and Clinical Psychology, 45, 101-

Spalt, L. (1980). Hysteria and antisocial personality: A single disorder? Journal of Nervous and Mental Disease, 168, 456-464.

Starr, B. J., & Katkin, E. S. (1969). The clinician as an aberrant actuary: Illusory correlation and the incomplete sentences blank. Journal of Abnormal Psychology, 74, 670-675.

Stevens, S. S., & Greenbaum, H. B. (1966). Regression effect in psychophysical judgment. Perception and Psychophysics, 1, 439-446.

Stroessner, S. J., Hamilton, D. L., & Mackie, D. M. (1992). Affect and stereotyping: The effect of induced mood on distinctiveness-based illusory correlations. Journal of Personality and Social Psychology, 62, 564-576.

Strohmer, D. C., Boas, G. J., & Abadie, M. N. (1996). The role of negative information in mental health counselor hypothesis testing. Journal of Mental Health Counseling, 18, 164-178.

Strohmer, D. C., & Shivy, V. A. (1994). Bias in counselor hypothesis testing: Testing the robustness of counselor confirmatory bias. Journal of Counseling and Development, 73, 191-197.

Tajfel, H. (1969). The cognitive aspects of prejudice. Journal of Social Issues, 25, 79-94.

Temerlin, M. K., & Trousdale, W. W. (1969). The social psychology of clinical diagnosis. Psychotherapy: Theory, Research and Practice, 6, 24-29.

Trolier, T. K., & Hamilton, D. L. (1986). Variables influencing judgments of correlational relations. Journal of Personality and Social Psychology, 50, 879-888.

Tversky, A., & Kahneman, D. (1971). Belief in the law of small numbers. Psychological Bulletin, 76, 105-110.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging

frequency and probability. Cognitive Psychology, 5, 207-232.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. Science, 185, 1124-1131.

Tversky, A., & Kahneman, D. (1982). Evidential impact of base rates. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), Judgment under uncertainty: Heuristics and biases (pp. 153-160). New York: Cambridge University Press.

Tversky, A., & Kahneman, D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. Psychological Review, 90, 293-315.

Tyrer, P. (1992). Flamboyant, erratic, dramatic, borderline, antisocial, sadistic, narcissistic, histrionic and impulsive personality disorders: Who cares which? Criminal Behaviour and Mental Health, 2, 95-104.

Varela, F. J., Thompson, E., & Rosch, E. (1991). The embodied mind: Cognitive science and human experience. Cambridge, MA: MIT Press.

Warner, R. (1978). The diagnosis of antisocial and hysterical personality disorders: An example of sex bias. Journal of Nervous and Mental Disease, 166, 839-845.

Weber, E. U., Bockenholt, U., Hilton, D. J., & Wallace, B. (1993). Determinants of diagnostic hypothesis generation: Effects of information, base rates, and experience. Journal of Experimental Psychology: Learning, Memory, and Cognition, 19, 1151-1164.

Wedding, D., & Faust, D. (1989). Clinical judgment and decision making in neuropsychology. Archives of Clinical Neuropsychology, 4, 233-265.

Wegener, B. (Ed.). (1982). Social attitudes and psychophysical measurement. Hillsdale, NJ: Lawrence Erlbaum Associates.

Williams, J. B. W., & Spitzer, R. L. (1983). The issue of sex bias in DSM-III: A critique of "A woman's view of DSM-III" by Marcie Kaplan. American Psychologist, 38, 793-798.

Wilson, M. (1993). DSM-III and the transformation of American psychiatry: A

history. American Journal of Psychiatry, 150, 399-410.

Zarin, D. A., & Earls, F. (1993). Diagnostic decision making in psychiatry. American Journal of Psychiatry, 150, 197-206.

Zukier, H., & Pepitone, A. (1984). Social roles and strategies in prediction: Some determinants of the use of base-rate information. Journal of Personality and Social Psychology, 47, 349-360.