ness is aggravated by excessive body weight and the use of behavior therapy to help the patient gain better control of his eating behavior. A comprehensive survey of available behavior therapy procedures would be inappropriate, except on an elective basis.

At the residency level adequate attention must be given to these same general behavioral principles since many residents enter training with no knowledge or experience in this area. Some direct experience with the application of behavioral techniques with patients is also desirable. The especially interested resident will want experience with a wide range of behavior therapy procedures. No doubt the best format for the latter is an individual tutorial relationship with an experienced behavior therapist. At minimum, residents in psychiatry should have some training in both the theory and practice of behavior therapy. In the training program in which I participate (at the University of Pennsylvania) residents are offered a 24-hour seminar on behavioral principles and analysis. This is followed and complemented by a weekly "behavior therapy clinic" in which residents present their own patients for behavioral analysis. When appropriate, a behavioral treatment program is evolved for the individual patient based on the behavioral analysis and assessment. In most cases the resident then proceeds to treat the patient with preceptorial help from an experienced behavior therapist and the progress of the therapeutic intervention is reported periodically at later sessions of the clinic.

Gelfand (7) describes an intensive 3-month training program in behavior modification for psychiatric residents which has a different format. This ambitious program includes didactic material on basic principles of learning, animal laboratory exercises, a review of the clinical behavior modification literature, and supervised experience in the application of specific treatment.

Only a small proportion of psychiatric training centers offers residents such an opportunity for substantial, systematic training in behavior therapy. Hopefully, additional well planned and comprehensive programs will evolve as interest in a behavioral approach continues to grow and a sufficient number of adequately trained teachers and clinical preceptors becomes available.

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COVERT PROCESSES AND BEHAVIOR MODIFICATION

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Covert procedures used for behavior modification are discussed. These methods are labeled "covert conditioning" procedures because it is assumed that empirical generalizations of overt conditioning apply to the manipulation of covert processes. Four covert conditioning procedures are discussed: covert sensitization, covert positive reinforcement, covert negative reinforcement, and covert extinction. These procedures are conceptualized within the operant framework and it is assumed that the parameters of overt operant conditioning procedures are similar to those of covert conditioning. Clinical examples of the application of covert conditioning are presented together with references to experimental literature.

COVERT PROCESSES AND BEHAVIOR MODIFICATION

Until recently, covert processes of human beings have not been the subject of speculation or investigation by behavioristically oriented psychologists. The first major break of great import within the behavioristic tradition was Wolpe's development of systematic desensitization (45). In my opinion, Wolpe's greatest contribution to behavior modification was the demonstration that various manipulations of covert processes in the consulting room could affect overt behavior outside of the dyadic therapeutic situation. Further extension of the use of imagery in behavior modification was developed by Lazarus and Abramovitz's (25) work on emotive imagery and Stampfl's technique of implosive therapy (40).

Since 1966, I have developed a series of procedures that I recently subsumed under the rubric of "covert conditioning." These procedures have a somewhat different theoretical orientation from desensitization and emotive imagery (respondent conditioning) and implosive therapy (Mowrer's two-factor theory). My conceptualization of the covert conditioning procedures follows the operant paradigm. According to Homme, covert operants (20) are just as valid as overt ones. Indeed, Skinner has stated that private events obey the same laws as overt events (38). Incidentally, this assumption has also been held by Pavlov (31). In a private communication, Skinner has told me that the procedures I label as covert conditioning are valid processes that fall within the operant framework. Skinner does object to the use of the word "imagery" as implying that what is in a person's head is a photocopy of the outside world. He suggests rather the use of the terms "covert behaving" or "covert sensing." Certainly Skinner's point about the photocopy notion is a valid one. The use of the word "imagery" by me is one of convenience rather than containing the assumption of a photocopy theory.

In this paper, I will attempt to show that the covert conditioning procedures can affect overt and covert behavior in a manner similar to overt manipulation of stimuli and responses. Operant technology is an attempt to alter frequency of responses by manipulation of consequences. Some of the procedures for reducing response frequency are punishment and extinction. Positive and

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negative reinforcement procedures are employed to increase response probability. The covert conditioning procedures developed by me are analogous to those presented above. They are: covert sensitization (8, 12) (punishment), covert extinction (5), covert positive reinforcement (7), and covert negative reinforcement (6). In all of the covert procedures the *S* is instructed to imagine the response to be decreased or increased and then is asked to imagine the consequences immediately.

GENERAL DESCRIPTION OF ALL PROCEDURES

A behavioral analysis is first performed to define operationally the response to be changed and to determine the antecedents and consequences of that behavior (4). The patient is then given the following rationale:

"Your behavior occurs because it is maintained by the environment. Whenever you perform that behavior, it is rewarded or punished by other people. There are many studies which indicate that if the consequences of behavior can be manipulated, then the behavior can be increased or decreased in frequency. We have found that just by having people imagine they are performing certain behaviors and then imagine particular consequences, that behavior can change in a similar manner. I am going to have you imagine certain scenes, and ask you to imagine you are really there. Try not to imagine that you are simply seeing what I describe; try to use your other senses as well. If in the scene you are sitting in a chair, try to imagine you can feel the chair against your body. If, for example, the scene involves being at a party, try to imagine you can hear people's voices, hear glasses tinkling and even smell the liquor and food. Now remember, the main point is that you are actually there experiencing everything. You don't see yourself there, but are actually there. First, let's determine if you can imagine the scene clearly. Close your eyes and try to imagine everything I describe. Ready? Raise your right index finger when the scene is clear."

After the patient signals, he is asked if the scene was clear and how he felt about it. If the scene was clear and he could imagine the consequences as described, he is then asked to imagine the scene by himself. (If there is any difficulty, the scene is repeated by the therapist with modified or elaborated instructions, depending on what was difficult for the patient to imagine.)

The patient is told that whenever he finishes imagining a scene by himself, he is to indicate this to the therapist by raising his right index finger. At that point, further inquiry is made about the clarity of the scene. The scene is then repeated 10 times by the therapist, alternating with 10 trials by the patient.

The patient is then asked to practice the scene at least 10 times a day at home. Sometimes he is asked to modify the scene slightly each day. The behavioral analysis determines the situations which have to be practiced.

SPECIFIC PROCEDURES

COVERT SENSITIZATION

Covert sensitization is analogous to the overt punishment paradigm. The procedure is used to treat such maladaptive approach behaviors as alcoholism, obesity, smoking, sexual problems, and drug abuse.

Covert sensitization is described to the patient as an aversive conditioning technique in which he imagines he is performing a behavior (*e.g.*), smoking a cigarette, drinking alcohol) and then imagines something noxious or aversive. Vomiting is one of the more frequently used noxious stimuli, but others such as rats, spiders, or worms are also used. A typical smoking scene is as follows:

"You are sitting at your desk in the office preparing your lectures for class. There is a pack of cigarettes to your right. While you

are writing, you put down your pencil and start to reach for a cigarette. As soon as you start reaching for the cigarette, you get a nauseous feeling in your stomach. You begin to feel sick to your stomach, like you are about to vomit. You touch the package and bitter spit comes into your mouth. When you take the cigarette out of the pack, some pieces of food come into your throat. Now you feel sick and have stomach cramps. As you are about to put the cigarette in your mouth, you puke all over the cigarette, all over your hand, and all over the package of cigarettes. The cigarette in your hand is very soggy and full of green vomit. There is a stink coming from the vomit. Snots are coming from your nose. Your hands feel all slimy and full of vomit. The whole desk is a mess. Your clothes are full of puke. You get up from your desk and turn away from the vomit and cigarettes. You immediately begin to feel better being away from the cigarettes. You go to the bathroom and wash up and feel great being away from the cigarettes."

After the scene is described to the *S*, he is asked how clearly he visualized the scene and whether he felt some nausea and disgust. He is then asked to repeat the scene himself, trying to see the cigarettes as clearly as possible and trying to see and smell the vomit.

Other scenes are given in a similar manner concerning other places in which he smokes, *e.g.*, if he takes a cigarette after coffee in the morning a scene is described in which he is about to smoke but gets sick and vomits all over the table and the cigarette.

Alternating with an aversive scene is an escape or self-control scene. A typical self-control scene is:

"You are at your desk working and you decide to smoke. As soon as you decide to smoke you get this funny, sick feeling at the pit of your stomach. You say to yourself, 'The hell with it; I'm not going to smoke!' As soon as you decide not to smoke you feel fine and proud that you resisted temptation."

Similar scenes can be constructed with obesity problems (*e.g.*, vomiting after eating a chocolate cake), sexual problems (*e.g.*, vomiting after exposing oneself), and even compulsive behaviors such as handwashing (*e.g.*, vomiting as the client is about to wash his hands).

Experimental evidence indicates that sexual disorders[2, 3] (3, 17, 36), alcoholism[4, 5] (2, 10), obesity (11, 21, 28, 33, 42), drug abuse[6] (19, 30, 44), and smoking[7, 8] (13).

COVERT POSITIVE REINFORCEMENT

The first step in covert positive reinforcement (CPR) is to discover possible reinforcing stimuli. For this goal, three possible sources are utilized. The main source for identifying reinforcing stimuli is the Reinforcement Survey Schedule (9, 14) which is administered as part of the behavioral analysis. A second method of determining possible reinforcers is to ask the patient to

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[3] Callahan, E. J., and Leitenberg, H. Aversion therapy for sexual deviation: A within-*Ss* comparison of contingent shock and covert sensitization. Unpublished study, University of Vermont, 1972.

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suggest other events not on the Reinforcement Survey Schedule which would be pleasurable to him. Further information about possible reinforcing stimuli can be derived from case histories, relatives, friends, and ward personnel (if the patient is institutionalized).

It is important to have a number of possible reinforcing stimuli available for each patient so that satiation will not occur. If a reinforcer is used too frequently, it can lose its effectiveness. For this reason, the reinforcers are often varied, even within the same session.

When CPR is used, it is not necessary to teach relaxation formally, nor is it necessary to construct a hierarchy as in the desensitization procedure. Whereas desensitization is used to modify maladaptive avoidance behavior and covert sensitization is employed to modify maladaptive approach behavior, the CPR procedure can be used to modify both maladaptive approach and avoidance behaviors. A typical example of the application of the CPR procedure is presented below.

A male *S* treated for homosexuality, who had lost sexual urges toward males by the use of covert sensitization, was reluctant to call a girl for a date. He claimed he was nervous and sometimes even forgot our instructions about calling a particular girl he knew well. He was instructed then as follows:

"In a minute I'm going to ask you to try to relax and close your eyes. Then I will describe a scene to you. When you can imagine the scene as clearly as possible, raise your right index finger. I will then say the word 'reinforcement.' As soon as I say the word, 'reinforcement,' try to imagine the reinforcing scene we practiced before, the one about swimming on a hot day, feeling the refreshing water, and feeling wonderful. As soon as the reinforcing scene is clear, raise your finger. Do you understand the instructions? Remember to try to imagine everything as vividly as possible, as if you were really there. All right, now close your eyes and try to relax."

After the patient has closed his eyes and appears comfortable, the therapist presents a scene such as this one:

"I want you to imagine that you are at home in the kitchen and you say to yourself, 'I think I'll call Jane for a date.' As soon as you have the scene clearly, raise your finger. (When he raises his finger to signal clear imagery, the therapist says, 'reinforcement.') Was the delivery of the reinforcement clear? All right, let's continue. After you've decided to call Jane, you walk toward the phone and you start to dial. Raise your finger when this is clear. ('Reinforcement.') You have finished dialing. Jane answers. You say, 'Hello' and ask her if she is free Saturday night and tell her that you would like to take her out. Raise your finger when this is clear. ('Reinforcement.') Now do the whole procedure yourself. Imagine you decide to call. Deliver the reinforcement to yourself. Imagine you are dialing. Deliver the reinforcement to yourself. Then imagine you are asking for a date and deliver the reinforcement to yourself. When you are all finished, raise your index finger. Now take your time. Make sure you get clear imagery. You can see the kitchen; you can see and feel the telephone, etc. Also try to imagine that you are comfortable and confident while you are in the kitchen going through the procedure. All right, start."

Experimental data indicate that the CPR procedure is effective in modifying behavior[9-11] (15, 16, 18, 23, 41).

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[11] Wisocki, P. A. An application of covert reinforcement to the treatment of test anxiety. Unpublished doctoral dissertation, Boston College, 1970.

COVERT NEGATIVE REINFORCEMENT

One of the problems sometimes encountered with the use of covert positive reinforcement is that some clients claim that there are no reinforcing stimuli in their lives or that they can't clearly imagine anything reinforcing. For these clients, I have developed a procedure based on the escape-conditioning paradigm which I have labeled covert negative reinforcement (CNR).

Besides the use of the interview, we use the Fear Survey Schedule (46) and the Covert Conditioning Survey Schedule[12] to identify possible aversive stimuli. A suitable aversive stimulus has the following properties: a) the patient says the stimulus (*e.g.*, rat) elicits fear; b) the patient reports he can clearly imagine the stimulus; c) the image of the stimulus produces responses similar to those to its external presentation (*i.e.*, fear); and d) the patient is able to terminate the image immediately at the request of the therapist with little or no residual discomfort. This is necessary to avoid contiguity between the aversive stimulus and the response to be increased. Otherwise, a *decrease* in the probability of the response may occur.

The following are two examples of the application of CNR:

1. A man who was impotent was asked to imagine that his boss was yelling at him (aversive stimulus). Then immediately he switched to a scene in which he was lying in bed naked next to his wife and feeling relaxed.

2. A girl who was afraid to say anything at a party when a man walked up to her imagined she was just about to fall off a high building (aversive stimulus) and then shifted to responding to a man's questions about her work, hobbies, *etc.*

When I first contemplated the use of the CNR procedure, I was concerned over the possibility of increasing the reaction to the aversive stimulus to such as extent that it would be detrimental to the patient. This concern, however, was not only not realized, but some patients actually reported a decrease in the aversive properties of the aversive stimulus. There are a number of possible reasons for this: a) satiation may have occurred as a result of repeated exposure. There is some experimental evidence that animals (22) and humans (27, 35, 37) have decreased responding after repeated presentations of shock. In animals, sometimes higher levels of shock are needed to maintain responses such as leg flexion. In humans, decreases in physiological measures, general body movements, and verbal reports of painfulness have been noted. b) The patient has control over the aversive stimulus and can terminate it when he so desires. This control over the aversive stimulus can result in a decrease in its aversive properties (43). c) The organism learns to make an adaptive response (even if it is unrelated to the aversive stimulus) when the aversive stimulus occurs. The aversive stimulus becomes associated with appropriate responding and therefore loses some of its aversive properties.

It is probably not good procedure to use stimuli that produce nausea because it is unlikely that nausea will disappear immediately when the patient is requested to stop thinking of that stimulus. If the nausea is present when the response to be increased is presented, then by contiguous conditioning the response to be increased may acquire aversive properties, and thereby actually decrease response probability. There is some empirical evidence for this assumption. In an experimental study on the effect of covert sensitization on alcoholism, Ashem and Donner (2) found that in a backward conditioning group in which nausea was presented before the conditioned stimulus, the treatment was as effective as in a forward conditioning group in

[12] Cautela, J. R., and Ascher, L. M. Covert conditioning survey schedule. Unpublished questionnaire, Boston College, 1972.

reducing alcohol intake. Some of the *S*s in the backward conditioning group indicated that they felt nausea when the conditioned stimulus was presented in imagination.

Since CNR is a relatively new procedure, there is only some preliminary evidence that it is effective in increasing response probability[13] (1).

COVERT EXTINCTION

The covert extinction procedure was developed because sometimes the home or institutional environment of the patient was reinforcing behavior at a higher rate than could be extinguished in the private therapy situation. For example, a family may reinforce "depressed" behavior of a patient by paying attention to him only when he exhibits particular behaviors such as crying, immobility, or self-derogatory remarks. A schoolteacher may reinforce a student's disruptive behavior in a classroom by paying attention to him only when he teases another student. In these cases, co-operation can sometimes be achieved by presenting the family or institutional staff with the rationale for treatment. In other cases, when it is not possible to achieve co-operation, the covert extinction procedure has been found to be a valuable method in extinguishing behavior reinforced by the environment at a high rate.

Covert extinction involves having the client imagine the behavior to be reduced (*e.g.,* stuttering) and then having him imagine that he is not receiving the reinforcement that is maintaining that behavior (*e.g.,* no one notices his stuttering in any way).

In employing covert extinction, the therapist must be very careful to explain the rationale to the client. Often the client finds it difficult to believe that his loved ones are reinforcing his maladaptive behavior. They often say: "You mean I have all these fears because I want attention?"

The following example is typical of a covert extinction scene in the treatment of obesity:

"I want you to imagine that you are eating your favorite ice cream but you are surprised to find that you really don't taste anything. The ice cream tastes like cold water mixed with some other tasteless stuff."

Another example of the application of covert extinction involves a treatment of fear of being left alone:

"You are at home with your husband. He says he wants to go bowling. You tell him you don't want him to go because you are afraid of being left alone. But he says, 'I'm sorry. I'm going anyway.' Then he leaves you alone." (In these cases there is often great resentment by the individuals unwittingly administering the reinforcement because they feel trapped (they are!) by the patient's problems.)

It is important to point out to the patient that withdrawal of reinforcement is sometimes followed by a temporary increase in responding (24). Another possible side effect of reinforcement withdrawal is instigation of aggression (39). Some patients report great resentment at being asked to imagine that reinforcement is being withheld. For example, a female became angry at her husband when she was asked to imagine that he did not respond to her psychosomatic complaints. As the patient continues the treatment sessions, the resentment usually decreases. It is sometimes helpful to explain that resentment is a natural consequence of reinforcement withdrawal. Also, if necessary, covert reinforcement can be used to decrease resentment.

The few experimental studies thus far available have shown that covert extinction is an effective procedure in the extinguishing of certain conditioned responses[14] (19).

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WHY "COVERT CONDITIONING"?

The term "covert conditioning" is not used for its honorific value. If we assume that covert behavior follows the same laws as overt behavior, then the empirical generalizations obtained from learning studies can be used to derive other clinical procedures based on imagery. For example, we are currently investigating the procedure of covert response-cost. This appears effective anecdotally, but we are in the process of developing experimental studies to test its effect on modifying behavior.

The parameters of overt conditioning can be employed to make covert conditioning procedures more effective, *e.g.,* starting at 100 per cent reinforcement, then going on to partial reinforcement (26); continuing treatment after the behavior is at a desirable level to get extinction below zero (31).

ADVANTAGES IN THE USE OF IMAGERY

Even if the major assumption concerning covert conditioning is correct, why use covert conditioning procedures when other procedures involving conditioning are available? Certainly it appears more parsimonious to utilize overt conditioning which does not involve the additional assumption of "something going on in the head." Although there are some difficulties in using imagery for behavior modification, I believe that the disadvantages can be easily overcome with proper care and that the advantages justify imagery manipulation as a valid procedure.

In employing aversive external stimuli to decrease the probability of a particular undesirable behavior, it has often happened that some patients drop out of treatment because they find the procedure so disagreeable. To date, investigators employing covert sensitization have not reported any significant drop-out rate.

Sometimes in using strong aversive stimuli, overgeneralization may occur. In treating an alcoholic, Sanderson *et al.* (34) found that after treatment, lighter fluid along with alcohol became highly aversive. The effects of covert sensitization, on the other hand, are much more specific to the response class which is to be eliminated. For instance, in treating alcoholics with covert sensitization, it is necessary to sensitize patients to different types of alcoholic beverages (8, 10).

Imagery can easily be used as a self-control procedure. The patient can produce the necessary imagery whenever he is confronted with situations that lead to maladaptive behavior. Some investigators (29, 32) claim that effective self-control procedures increase self-confidence and reduce anxiety. In the study by Rehm and Marston (32) college students reinforced themselves by giving themselves points for appropriate social responses. An increase in self-confidence and reduction in anxiety were reported by the students.

With the use of imagery, there is less reliance on equipment, and procedures can be applied in almost any situation.

The use of imagery is not limited to practical reality. In imagination, events that the patient is unable to initiate (*e.g.,* asking for a date) or that are impractical (*e.g.,* witnessing a plane crash) can be made to occur.

Even though imagery is not directly observable, it can be used as an intervening variable or logical construct. After all, learning itself is not directly observable, but is inferred from behavior. As long as the concept of imagery can be anchored on both stimulus and response sides, the variable is useful in the modification of behavior.

[14] Ascher, L. M. Covert extinction: An experimental test. Unpublished data, State University of New York, Fredonia, 1970.

EXPERIMENTAL VERIFICATION WITHIN THE OPERANT PARADIGM

Since the covert conditioning techniques described above are conceptualized within an operant framework, it seems appropriate to test the efficacy of the procedures by the use of the ABAB operant paradigm. In this paradigm, a baseline of the frequency of behavior to be changed is determined (A), then the consequences are manipulated for a number of sessions while behavioral measures are continuously being taken, *e.g.*, covert sensitization introduced (B), then the treatment withdrawn (A), then treatment reinstituted (B). A number of studies have been performed within this paradigm utilizing covert conditioning procedures. Barlow *et al.* (3) first obtained baseline measures of sexual arousal for patients with long histories of homosexual and pedophiliac experiences. These measures were acquired while the *S*s were imagining sexually arousing scenes. In each treatment session, *S*s were given relaxation instructions and presented with scenes in which they imagined themselves approaching the desirable sexual object, feeling nauseous, and vomiting. Alternate scenes in which *S*s imagined themselves about to approach the object, beginning to feel sick and turning away, feeling relieved and relaxed were also presented. The *E*s found that all measures of sexual arousal (GSR and self-report) decreased during this phase of treatment. After six acquisition sessions, extinction was introduced. The extinction procedure consisted of presentations of the sexually arousing scene without the aversive imagery. During this phase, all measures of arousal increased. The final phase of reacquisition was then initiated and all measures dropped to zero.

Blanchard and Draper[9] obtained similar results utilizing the operant paradigm in treating a clinical phobia by covert reinforcement.

One could assert, however, that the results of the treatment were due to the expectancies established in *S*s by the procedures. Indeed, Murray and Jacobson (29) claim that the treatment outcome in all behavior modification procedures employing imagery, such as desensitization (45), implosive therapy (40), and emotive imagery (25), is more parsimoniously explained in terms of the expectancies of the *S* who is convinced the procedure will be effective.

To test this assumption, Barlow *et al.*[2] employed an operant paradigm to manipulate the instructions in the application of covert sensitization with two male homosexuals. After establishing a baseline of arousal, with measures of penile volume while viewing sexual scenes, ratings of those scenes, and self-report, *S*s were told that their arousal would decrease if they relaxed and viewed slides of male nudes. During this phase arousal increased, contrary to the expectations of the *S*s. Then *S*s were told that their sexual urges would increase a bit if they paired sexually arousing scenes with images of vomiting (covert sensitization) because the investigators felt it necessary to "heighten the tension." During this period their measures of arousal decreased. A 6-month follow-up indicated no relapse. Therefore, it appears that *S*s' expectancies had no significant effect on treatment outcome.

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THE EFFECTS OF WHITE NOISE AND MESSAGE REPETITION ON PROVERB INTERPRETATION IN GOOD AND POOR PREMORBID SCHIZOPHRENICS

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A total of 29 male *S*s (10 good premorbid schizophrenics, 11 poor premorbid schizophrenics, and 8 normal controls) were administered the Lafayette Clinic Proverbs Test. Each *S* answered half of the test items under a condition of white noise and half without white noise. As a separate experimental dimension, each *S* repeated half of the proverb items before his answer and did not repeat the other half of the items. Results indicated that voice volume was significantly increased in all groups when performing under white noise. Analysis of generalization (G) scores (abstraction) indicated that within the general context of normals exceeding good premorbid schizophrenics and goods exceeding poors, white noise had opposing effects on the good and poor premorbid schizophrenic *S*s, especially under the no repetition condition. Good premorbids increased and poor premorbids decreased G scores under the white noise. Information (I) scores were significantly higher among normals than among the poor premorbid schizophrenics, with the good premorbid schizophrenics falling in between. Results on the symbolic reasoning (SR = G × I) followed the G score results but were less strong. The results were discussed in terms of proprioceptive feedback, redundancy, and arousal interpretations of schizophrenia.

Proverb interpretation has been one of the most frequently used methods for measuring schizophrenic thought disorder (2). The test has been used as a measure of an abstract-concrete dimension (8, 9, 11, 13–16), overinclusiveness (12, 22–24), and autism (26).

Lafayette Clinic Proverbs Test. In an attempt to differentiate the major components of schizophrenic thought disorder, Freides *et al.* (10) devised a two-dimensional system for scoring proverb interpretations. The two dimensions are generalization (G) and information (I). Generalization is defined as the degree to which a proverb statement is treated as referring to a generic class of events rather than to a single concrete event. Thus, with high G, the response does not explicitly repeat the original terms contained in the proverb. Information is defined as the degree to which the subject's response preserves the meaning appropriate to the symbol being interpreted. The product of these two scores, G and I, was defined as SR, symbolic reasoning.

Grisell and Cohen originally reported in 1961 and more recently published (18) a rationale for the two-dimensional system. Following Cameron's (5) suggestion, they deduced hypotheses concerning G and I. If schizophrenic thought disorder is characterized by loss in ability to communicate but not in ability to abstract, then the proverb interpretations of schizophrenics should be characterized by low I scores but relatively unimpaired G scores. Brain-damaged patients, typically concrete (as described by

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