

## DIRECT BEHAVIORAL ANALYSIS OF PSYCHOTHERAPY SESSIONS BY CONJUGATELY PROGRAMED CLOSED-CIRCUIT TELEVISION<sup>1,2</sup>

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### INTRODUCTION

"Whatever the psychoanalysts do about research, the obligation is clearly upon experimental, physiological, and clinical psychologists to take seriously the field of psychodynamics, and to conduct investigations either independently or in collaboration with psychoanalysts." This statement was published by Ernest Hilgard over 15 years ago (Hilgard, 1952, p. 44). Ten years later we find Sandor Rado making a similar plea: "Psychodynamics *by itself* can not be expected to evolve methods of validation equalling those of the physical sciences" (Rado, 1962, p. 125).

It is clear that the need for more objective research in the field of psychotherapy has been articulately expressed. Why haven't experimental methodologists answered this call? The psychotherapeutic process is quite complicated from a behavioral point of view. Not only are the effects of psychodynamics subtle, but a two-person visual and auditory communication situation is very complicated for immedi-

ate and objective behavioral analysis. Most experimental methods are either too simple to handle this complicated social situation or not sufficiently objective to be sensitive to the subtle behavioral variables involved in psychodynamics.

Perhaps in order to develop new objective psychotherapeutic research methods we need a new kind of researcher. I have identified three species of the genus *clinicus*. These are 1) the Rigorless Magician, 2) the Rigor Mortician, and 3) the breed we most need, the Rigorous Clinician.

The *Rigorless Magician* ignores rigor in order to work on important problems. He is often found conducting psychotherapy and at the same time trying to publish his case histories as some sort of research contribution. His habits are sitting and building loose theories, his habitat upholstered chairs, and his coloration dark-framed glasses. He often displays the motto "Loose Theories Never Die."

The *Rigor Mortician* ignores the problem in order to work with maximum rigor. He escapes from important problems into the protective custody of an established field of science. He often followed members of the genus mathamagician, unaware of their magical powers. His habits are standing and building rigid apparatus, his habitat the small animal laboratory, and his coloration a white lab coat. He often displays the motto "Rigid Apparatus Lasts Forever." His lack of humor makes him vulnerable to experimental punning.

The *Rigorous Clinician* is the rarest but most adjustive species of clinical researcher. As a true scientist, he brings what rigor he can to important problems and continually searches for techniques to increase this rigor without destroying or evading the problem.

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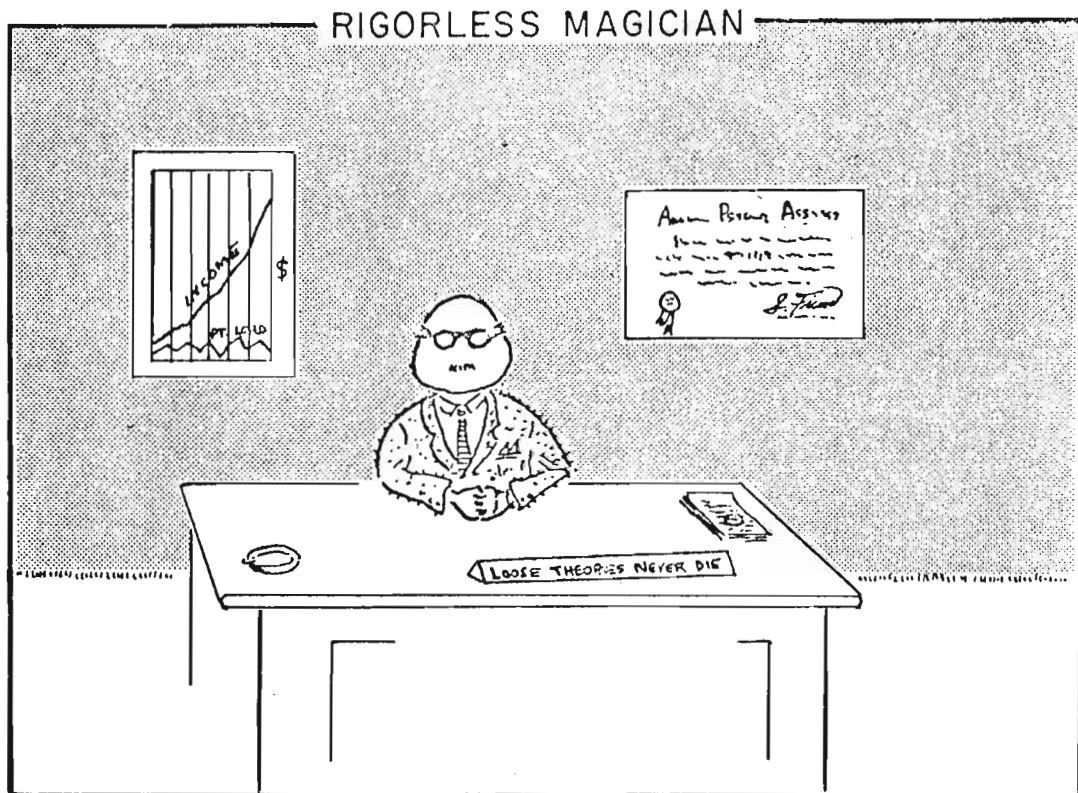


FIGURE 1. Species: Rigorless Magician; Habits: Sitting and Building Loose Theories; Habitat: Upholstered Chairs; Coloration: Dark-framed Glasses.

His habits are most often broken, his habitat is the human research laboratory, and his coloration is protective. He has never had time to select a motto. In Figure 3 he is facing away so that we can all identify with this noble creature.

The rarity of the species Rigorous Clinician may be due to the fact that its creation depends upon crossfertilization between the Rigorless Magician and the Rigor Mortician. Since these two species repel each other, Rigorous Clinicians are bred only by chance under very unusual social circumstances.

The research described in this paper is an attempt to generate more members of the species Rigorous Clinician by demonstrating the adaptability of free-operant conditioning methods to the direct behavioral measurement of the psychotherapeutic process. In earlier papers we have shown that operant conditioning methods can be used to measure the effects of psychotherapeutic outcome on chronic psychotic patients (Lindsley, 1960, 1961).

#### METHODOLOGICAL PRECURSORS

The method to be presented in this paper is an outgrowth of *free-operant conditioning* techniques which have been highly successful in small animal research, in the development of teaching machines and programmed instruction, in behavioral pharmacology, and in behavior pathology. The full environmental control and *continuous, direct measurement* provided by those techniques make them sensitive to the action of subtle behavioral variables. Since these techniques provide a means of determining the effect of some variable on the functioning behavior of a subject, they are even more useful for the investigation of psychodynamic variables, for even though psychodynamic variables are seldom objectively measured, they are often functionally defined. Application of such techniques to the investigation of interactions between two persons (Cohen, 1962; Cohen and Lindsley, 1962; and Lindsley, 1966) have made it even more plau-

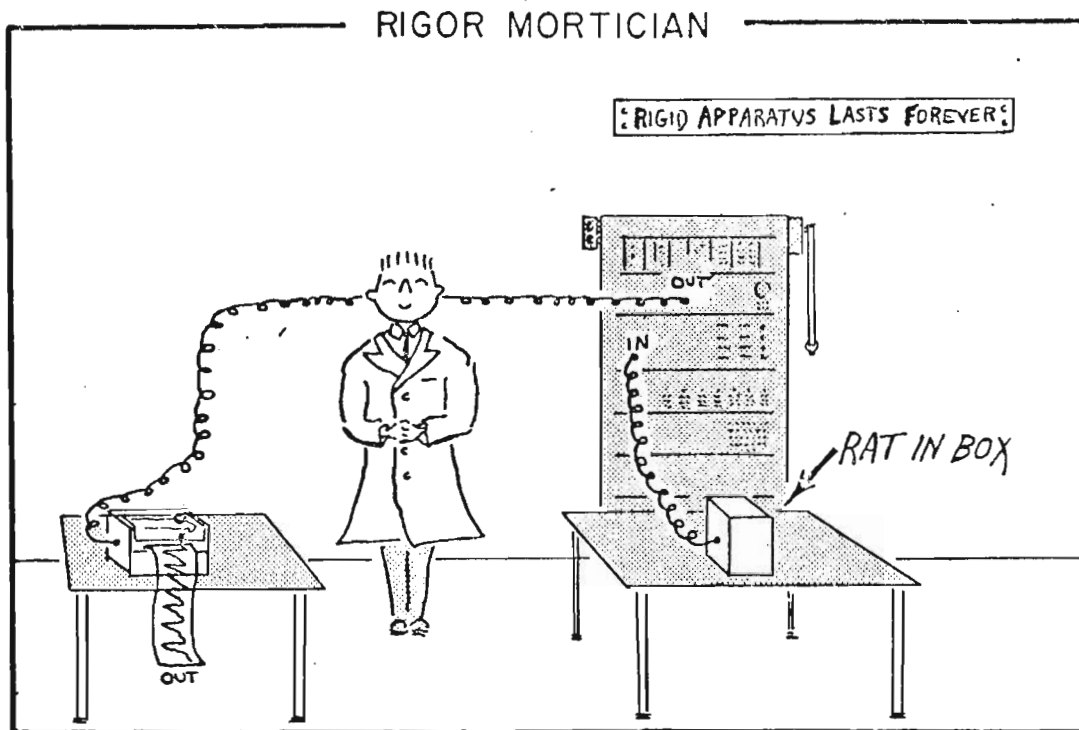


FIGURE 2. Species: Rigor Mortician; Habits: Standing and Building Rigid Apparatus; Habitat: Small Animal Laboratory; Coloration: White Lab Coat.

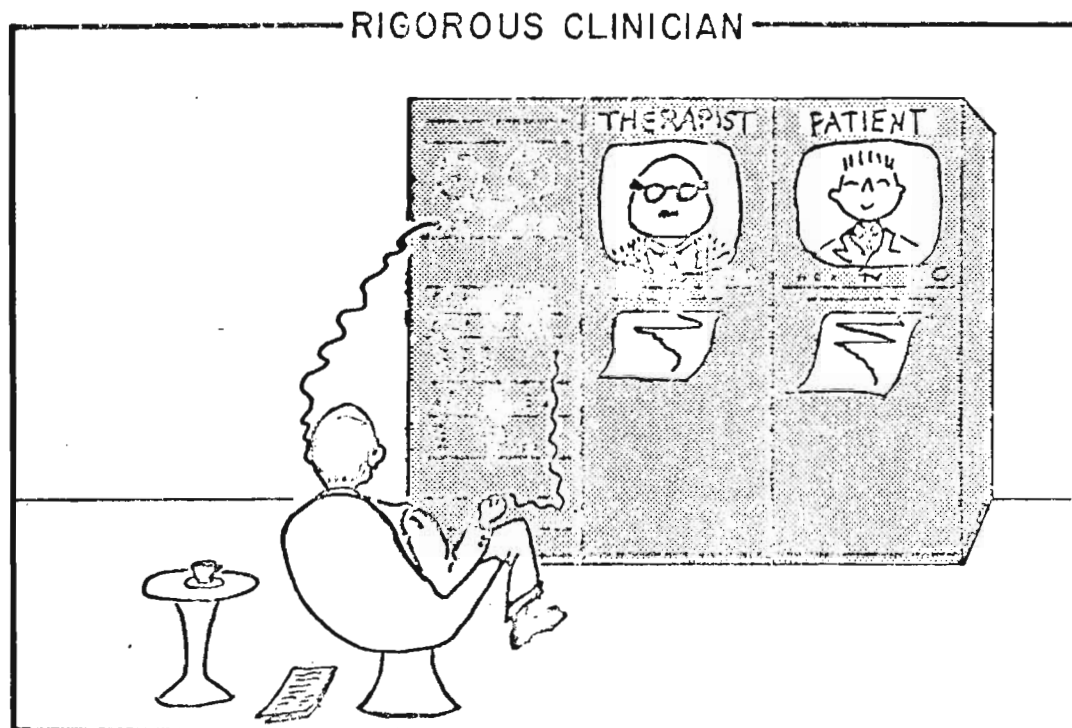


FIGURE 3. Species: Rigorous Clinician; Habits: Most Often Broken; Habitat: Human Laboratory; Coloration: Protective.

sible that these methods are appropriate to psychotherapy research.

#### METHOD

A therapist sits in a comfortably furnished, sound attenuated room watching a television screen. His behavior is monitored by a microphone and a television camera ("M" and "C" in Figure 4). The output of the camera is fed through a conjugate programmer<sup>3</sup> to a television receiver ("R") located in an adjoining room, where it may be viewed by the patient. By pressing a handswitch<sup>4</sup> the patient can briefly illuminate the television screen in front of him and thereby catch a glimpse of his therapist.

<sup>3</sup> Conjugate programming equipment (Cat. No. CR2S-624) was purchased from Behavior Research Company, Belmont 78, Mass.

<sup>4</sup> Handswitches (Cat. No. E-800-6) were manufactured by Grason-Stadler Company, West Concord, Mass.

By pressing the switch at a high rate (above 60 responses per minute), the patient can continuously see his therapist on the screen at maximum intensity. At intermediate rates of responding the picture dims. If the patient pauses for even a few seconds, the therapist is lost to view. These looking responses of the patient are automatically and continuously recorded on a counter and a cumulative response recorder. The paper on the cumulative response recorder moves continuously in time, while the pen moves up the paper one small unit with each response. Thus, a high rate of responding is indicated as a steep line, and periods of no responding are indicated by horizontal lines on the record. This continuous, automatic recording of the looking behavior of the patient provides an objective record of his "interests" in what is on the television screen. These looking responses have been shown to be extremely sensitive to moment-to-moment

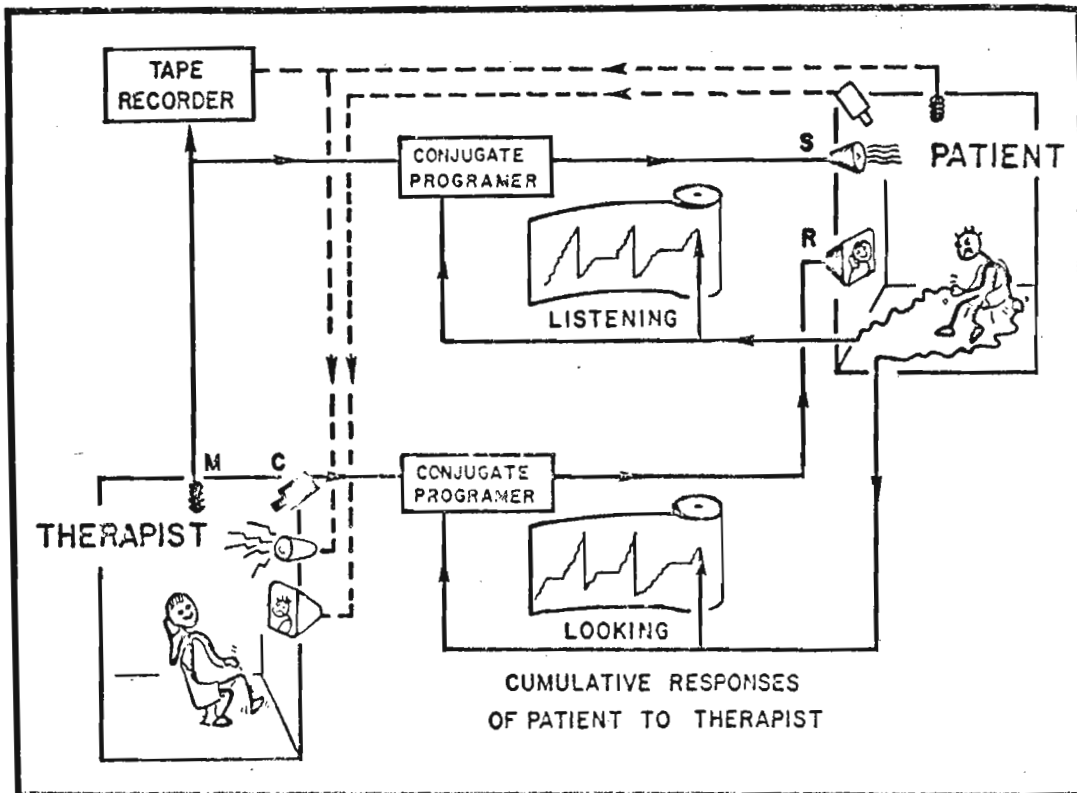


FIGURE 4. Apparatus schema for direct measurement of listening and looking responses of patient to therapist in psychotherapeutic interview. (The equipment used for direct recording of patient's talking responses to therapist is not shown in this figure.)

changes in the content of television programs (Lindsley 1962b).

The output from a microphone in the therapist's room ("M" in Figure 4) is fed through a second conjugate programmer to a speaker ("S") in the patient's room. By operating a second handswitch at high rates the patient can hear what the therapist is saying to him. These listening responses are continuously recorded on a second cumulative response recorder. The circuits are drawn as solid black lines in Figure 4.

The therapist is provided with a television screen and a speaker which receive the visage and speech of the patient from a camera and microphone located in the patient's room. These circuits are shown as dashed lines in Figure 4.

The patient's talking responses are filtered through a voice key<sup>3</sup> and automatically and continuously recorded on a third cumulative graphic recorder. The voice key and this third recorder are not shown in Figure 4. A two-channel audio tape recorder records the therapist's speech on one channel and the patient's speech on the other channel for correlations with the records of the patient's talking, listening, and looking. The audio tape recording and the three cumulative records permit complete, objective analysis of the relationship between the content of the therapeutic discussion and the patient's rates of talking, listening, and looking.

#### EXPLORATORY RESULTS

Sample experimental analyses of single psychotherapeutic sessions are presented here to show the use of the method in determining 1) effects of different types of therapists, 2) effects of different types of speech by a therapist, and 3) effects of different emotional states in a patient. These three variables were maximized in the demonstration experiments in order to maximize the probability of obtaining effects. Eventually the method will be refined for maximal sensitivity by determining optimal required response rates and forces.

*Adjustment to Experimental Situation.* Both patients, and therapists adjust to the artificial property of closed-circuit television

within 10 to 15 minutes. Also, the subjects rapidly became unaware of pressing the switches to look and listen. At the end of the first session, a patient spontaneously said, "Can I come back and do it tomorrow? It is fun to see each other on television!" Another subject offered, "It is amazing. In only a few minutes I forgot all about the switches." A therapist remarked, "I think it is very, very good. In no time at all the artificial quality of the situation completely disappeared, and I felt in more than visual and auditory contact with my patient."

Such rapid loss of the "artificial property" of the handswitches and conjugate programming has been found in other applications of conjugate reinforcement (Lindsley, 1962b, Lindsley and Morgan, 1966). This absence of behavioral effects of the measurement device itself is important for valid and sensitive behavioral measurement.

*Effect of Type of Therapist.* In Figure 5 a chronic psychotic adult is the patient, and another patient and a psychologist (both strangers to the patient) are compared as experimental therapists. The cumulative talking, listening, and looking records of the patient to these two different types of therapists are presented. In segment 1, with the other patient acting as therapist, the patient's talking rate dropped off within six minutes, his listening rate in 8 minutes, and his looking rate in 13 minutes.

In segment 2, immediately after the psychologist took the place of the other patient as therapist, the patient responded at a high even rate to talk to, listen to, and look at the psychologist. After 12 minutes of rapid responding, the patient stopped listening but continued to talk to and look at the psychologist. This portion of the record demonstrates the independence of the listening and looking behaviors. After 10 minutes of no listening, 3 minutes of no looking, and 2 minutes of no talking, the patient was taken from the patient's room into a lounge for a 25 minute rest.

In segment 3, after the rest period, all three responses were restored to a high, even rate. This shows that the patient's attention had recovered during the rest period.

In segment 4, during which the other pa-

<sup>3</sup>The voice key (Cat. No. E7300A) was manufactured by Grason-Stadler Company, also.

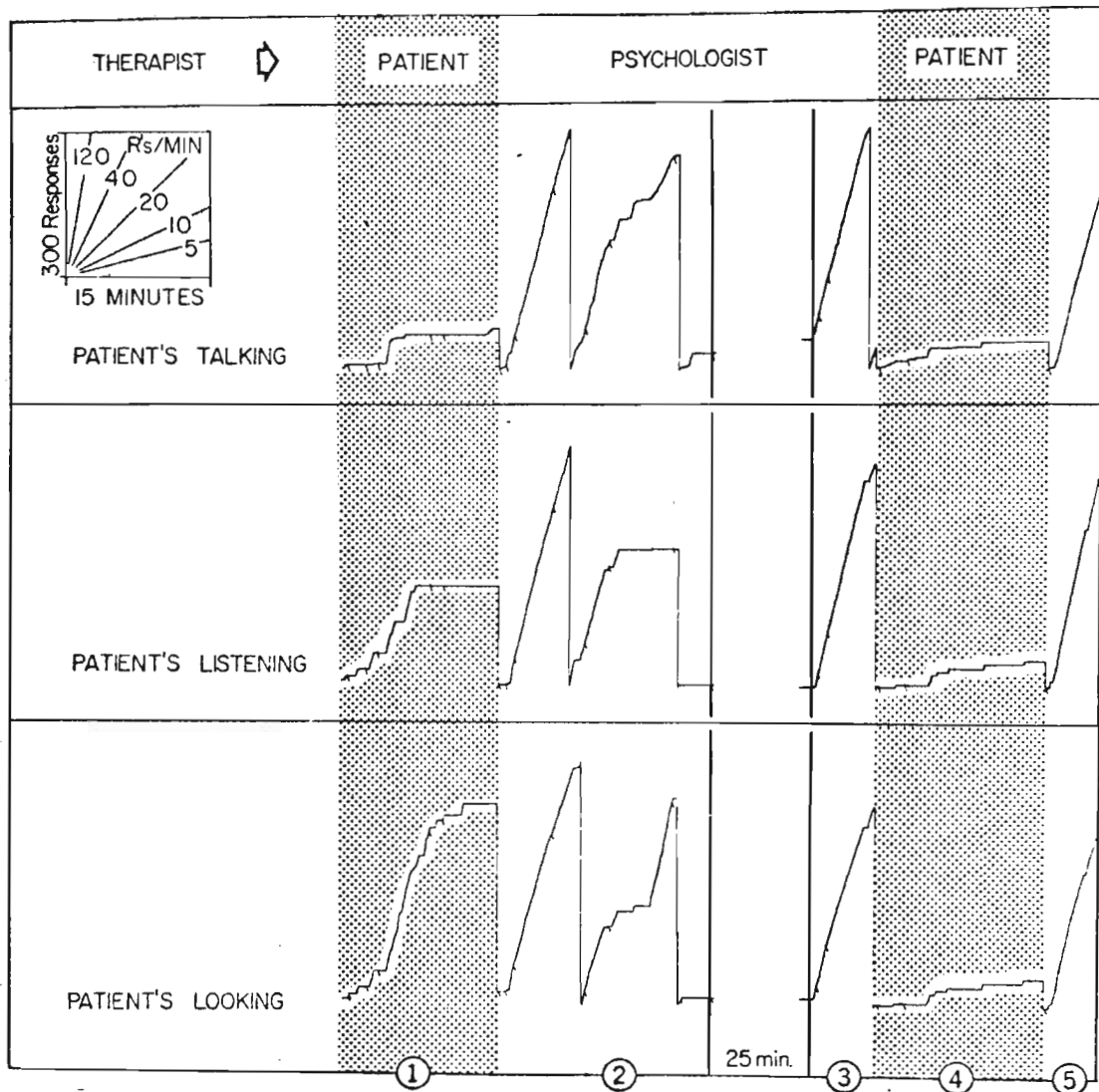


FIGURE 5. A psychologist can elicit and maintain the talking, listening, and looking behavior of a chronic psychotic adult for at least 10 to 15 minutes. However, another psychotic patient serving as a therapist cannot hold the patient's attention.

tient again served as the therapist, the rate of all three responses immediately fell. This shows that the method is sensitive to moment-to-moment changes in therapeutic conditions and that the talking, listening, and looking responses do not have to undergo experimental extinction. Although the rates of responding in segment 4 are lower than those in segment 1, the talking, listening, and looking responses decreased in rate in the same order.

Following our maxim of "leave them responding," the psychologist was again placed

in the therapist's role, and a high even rate of all three responses was recorded. This demonstrates that in segment 4, when the other patient was serving as therapist, the low rates were not due to satiation, boredom, or fatigue, but to the inability of a patient to hold another patient's attention. The psychologist reported that it was extremely difficult and tiring to hold this chronic psychotic's attention for more than 10 minutes at a time.

*Effect of Type of Therapist's Speech.* In Figure 6, the cumulative talking, listening

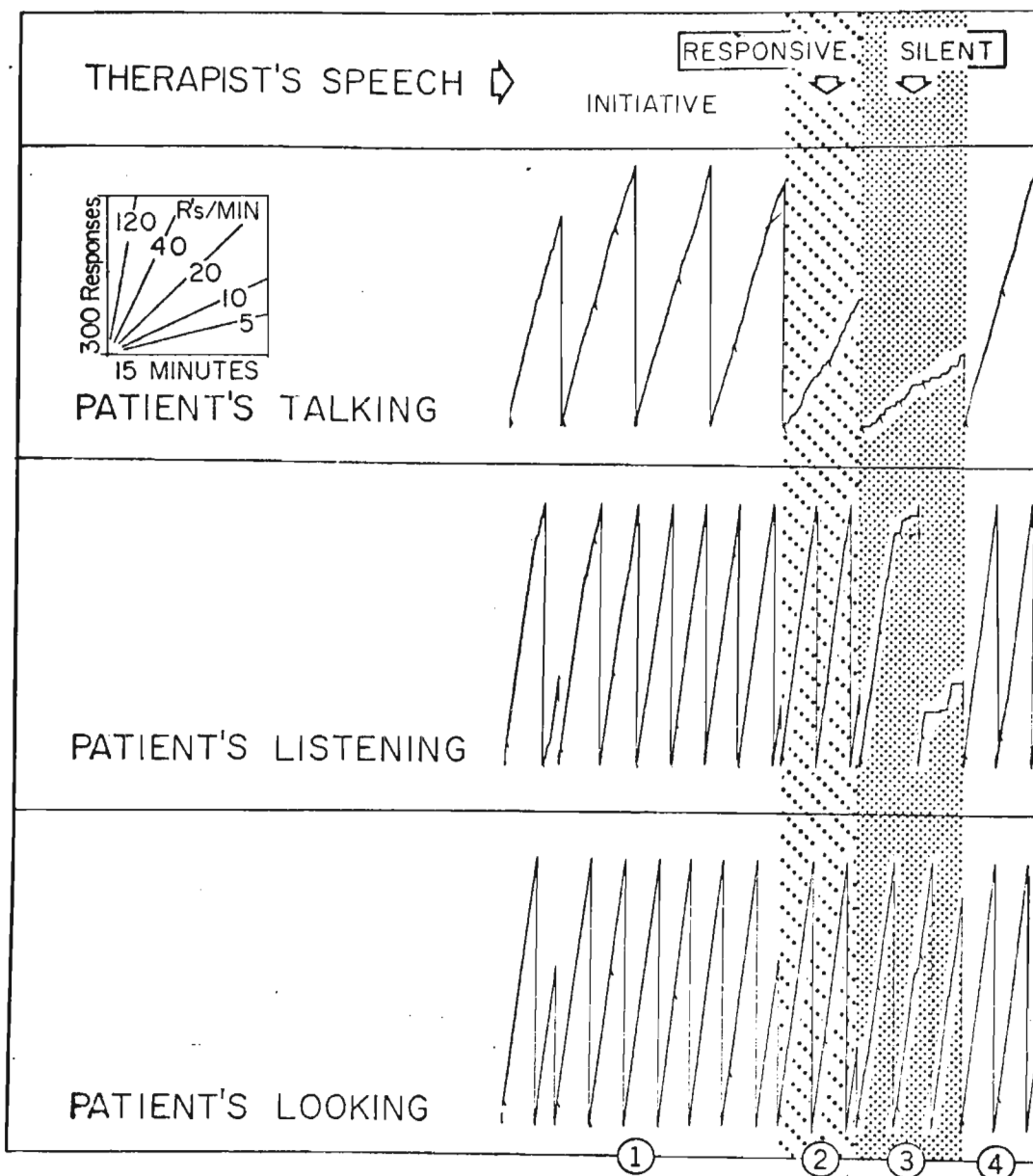


FIGURE 6. When a therapist initiates conversation the patient talks, listens, and looks at a high rate. The patient's talking rate drops when his therapist only responds to questions, and when the therapist is silent the patient's talking drops even lower and his listening also declines.

and looking records of a young chronic schizophrenic patient are shown under three different conditions of responsivity in a therapist. The therapist was a psychologist who had not been conducting regular therapy with this patient. In segment 1, during which the therapist's speech was initiative, a high rate of

talking, listening, and looking was emitted by the patient. In segment 2, during which the therapist did not initiate conversation, but merely responded, the patient's talking rate dropped. However, there was no decrease in the rate of listening and looking.

In segment 3, the therapist maintained si-

lence, and the patient's talking rate immediately dropped to less than 30 responses per minute. Within 3 minutes his listening responses became erratic and decreased in rate. Although there were several brief pauses, his looking responses were maintained at a high rate throughout this period of therapeutic silence. In segment 4, the therapist again initiated conversation, and the high rates of talking, listening, and looking which the patient emitted in segment 1 were restored. This showed that the reduction in the patient's

talking rate and listening rate was not due to general boredom or fatigue, but was caused by the therapist's lack of conversational initiative, and silence.

*Effects of Emotional State of Patient.* Figure 7 shows talking, listening, and looking rates of a chronic schizophrenic youth with his therapist. A psychologist, the therapist had been conducting daily one-hour therapy sessions with this patient for over a year. Since no experimental changes were introduced during this therapeutic session, segment

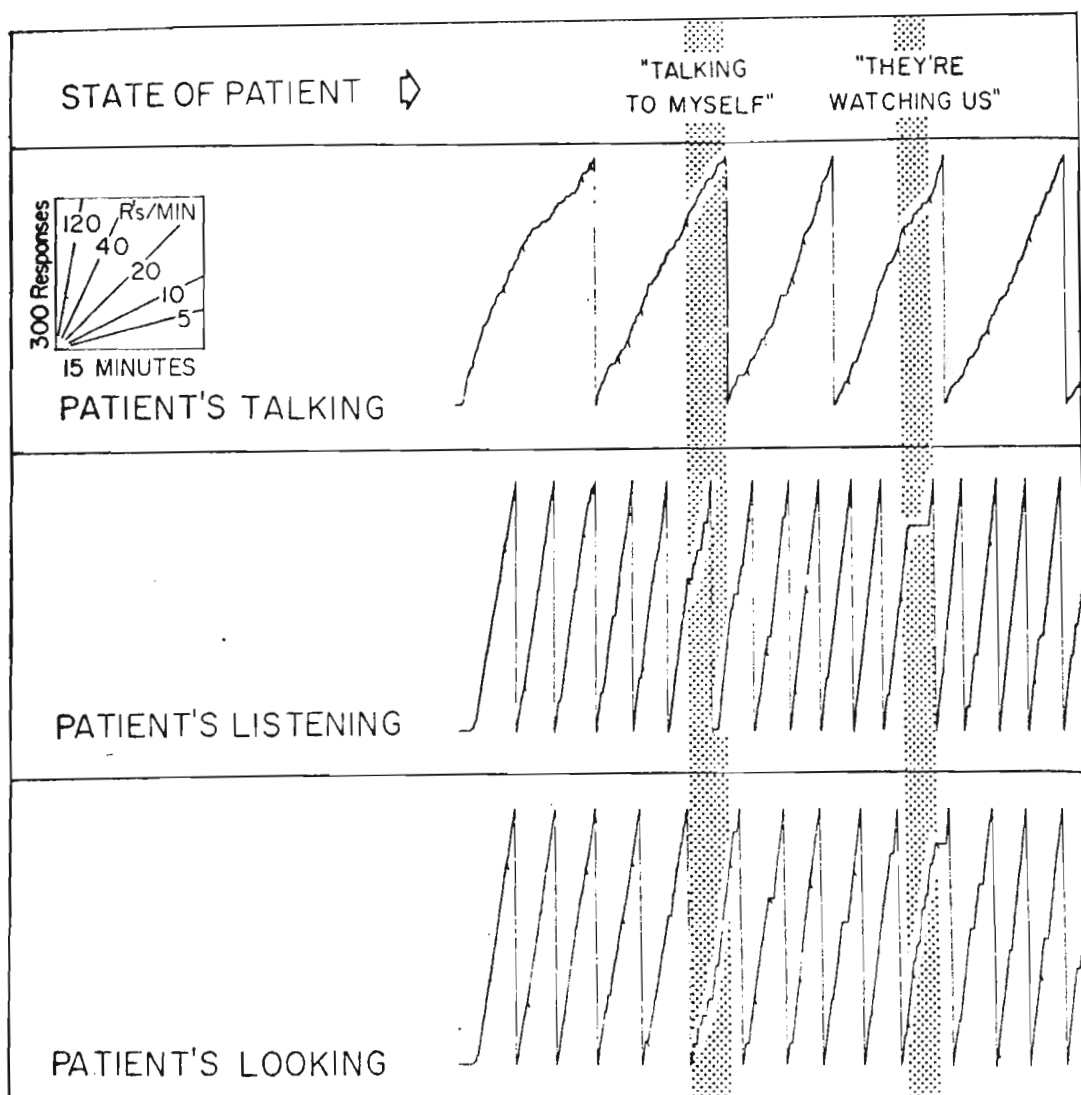


FIGURE 7. Hallucinatory periods ("I'm talking to myself") and apprehensive periods ("they're watching us") disturb the listening and looking responses of a chronic psychotic patient to his long-term therapist.



numbers, which indicate changes in experimental variables, do not appear on these records.

During the first shaded period, when the patient said "I'm talking to myself," there were many pauses for as long as 30 seconds in the patient's looking and listening responses. However, there was no change in the patient's talking rate. This appears to indicate an hallucinatory episode in the patient. Although it is difficult to determine exactly when the episode ended, it is clear that it lasted for at least 4 minutes.

Such periods of temporarily lowered response rate are common in psychotic patients and have been described elsewhere (Lindsley, 1960). It is clear that these psychotic episodes should be expected in psychotherapy with psychotics and should be anticipated and planned for by therapists. Our method provides a way of immediately detecting their severity and duration. Such immediate detection would permit psychotherapeutic changes to recover ground that was disturbed by their occurrence.

Eighteen minutes later the patient said to his therapist, "Do you think they are watching us?" At this time his talking rate decreased from approximately 30 to 20 responses per minute, and his listening rate fell to zero for 2 minutes. During this period of time there were many pauses in looking responses. For 3 minutes the patient made many references which indicated a brief paranoid state accompanied by disturbed communication with his therapist.

The records of these three exploratory sessions are presented to demonstrate the kind of records obtained with our method and to indicate the method's sensitivity to clinically relevant variables.

#### OTHER APPLICATIONS

This new method has many interesting applications in psychotherapeutic research, selection, training, and practice. Some examples are mentioned below.

*Research.* The method can be used in basic social behavioral research to determine the effects of speech and expression as social reinforcers and aversive stimuli. In addition, many aspects of psychodynamic theory can be

tested by determining the differential effects of therapeutic content upon the behavior of a patient. For example, the aversive effects of emotional problem areas should be revealed by a reduced rate of responding when these areas are mentioned by the therapist. Transference should be revealed by increased rates of responding.

*Selection.* Since the method can be used to determine the differential effects of directive and permissive therapy (Frank, 1951, p. 234) on individual patients, it provides an objective means of selecting the psychotherapeutic method most appropriate for each patient. Also, the choice of a particular therapist for a particular patient can be objectively determined, as well as the optimal duration of psychotherapy sessions for a given patient at a given stage of his illness.

*Training.* Ewalt (1960) has stressed the need for more efficient methods of training psychotherapists. Our method could be used not only to evaluate a therapist's effectiveness with specific types of patients at varying stages of his training, but also as a training device. Dials or lights which indicate the patient's looking and listening responses, can be placed in front of the therapist to provide immediate feedback of his moment-to-moment ability to hold the patient's interest. As the therapist learns to react to changes in the patient's speech and facial expression the lights can be gradually dimmed until they are no longer needed at all.

Skilled therapeutic supervisors can monitor the therapy of their students from a control room and listen to the speech and watch the facial expressions of both the patient and the therapist, as well as watching the records of the patient's talking, listening, and looking responses. The supervisor can suggest immediate corrective steps to his student by speaking through a microphone into a small ear phone which the student wears in one ear. In this way suggestions and corrective actions can be taken during the psychotherapy session in which the error is made and not delayed for a day or a week as it now must be.

*Practice.* The use of these corrective feedback stimuli could help the therapist make intrasession corrections of his procedures in private practice. Also, the relationship of psycho-

therapist and patient could be checked with this method at different stages within a course of psychotherapy. This would provide information about the degree of progress and would permit objective evaluation of psychotherapeutic outcome.

Since the method is fully automatic, remote therapy as well as remote therapeutic research could be conducted. By using "phonovision" and the telephone system, the therapist can be in New York, the patient in Los Angeles, and the research data collected and analyzed in Chicago.

It is also possible to add a third conjugate programmer to the apparatus which would require a relatively high rate of talking by the patient in order for him to see his therapist. This procedure might shorten the course of therapy for patients who otherwise resist talking during psychotherapy sessions.

#### FURTHER METHODOLOGICAL REFINEMENTS

In addition to adding feedback stimuli to report the state of the patient's attention to the therapist, the talking, listening, and looking *responses of the therapist* could be recorded also. This would permit full experimental analysis of the talking, listening, and looking behavior of both therapist and patient and should reveal much of the psychodynamic interaction and cross transference that occurs during psychotherapy sessions.

Facial expressions could be automatically recorded and their interrelationship with the therapeutic discussion provided by adding a two-channel *video tape recorder* to the camera circuits. This information would be extremely useful in experimentally analyzing the effects of visual communication and in providing accurate material for training of new therapists. Although black and white television does not appear to detract from the realistic properties of psychotherapy, *color closed-circuit television*, which is now available, would insure that the artificial property of the situation was minimized.

We are currently determining the ideal *response costs* to use with different patients at different stages of therapy. This involves selecting the ideal force required for each press of the switch and the ideal rate of pressing required to maintain the sound and television

picture at maximal intensities. If the response costs are too high, a patient will not respond to see and hear the therapist. If they are too low the method becomes insensitive to subtle psychotherapeutic variables, since the patient simply presses the switches continuously. Therefore the selection of optimal response costs is important in order to maximize the sensitivity of this method to subtle and relevant clinical variables.

#### DISCUSSION

What is measured by this method can be interpreted as the moment-to-moment changes in the patient's interest or attention, or, more rigorously, as a special case of the differential effect of social reinforcement. In other words, the voice and visage of the therapist reinforce the switch-pressing response of the patient. The latter interpretation, which led to the development of the method, is supported by our results. This interpretation also suggests ways of further refining the method and of integrating the results with other experimental approaches to the investigation of social reinforcement (see Lindsley, 1962a) and social behavior (Cohen, 1962; Cohen and Lindsley, 1962; and Lindsley, 1966).

As with all behavior, psychotherapy can be influenced by three general classes of variables. These are: 1) the momentary state of the patient's health (influenced by physiological and behavioral pathology), 2) changes in the strength of the behavior produced by changes in the intensity of the immediate discriminative and reinforcing stimuli, and 3) competing responses elicited by other stimuli in the immediate environment. It is necessary to control the immediate environment to insure that no external stimulation produces competing responses which might disturb the switch-pressing behavior. For this reason, the patient and therapist are in isolated rooms. Our exploratory results show the effects of both the patient's health and the intensity and appropriateness of the social stimuli. Both these classes of variables must, therefore, be manipulated or controlled in the analysis of psychotherapeutic behavior.

Since both therapists and patients rapidly adjust to the psychotherapeutic situation required by our method (the use of the closed-

circuit television and the handswitches), there appears to be *no distortion* of the psychotherapeutic process by the method. In fact, the direct measurement insures a valid measurement of the psychotherapeutic process, and it appears that the method becomes even more reliable the longer it is used with the same therapist-patient team. The longer a given therapist and patient use the method, the more they adjust to it and the more sensitive it appears to become to the subtle psychodynamic variables. Therefore, the method appears to meet the requirement stressed by Kubie (1952, p. 118): ". . . It seems clear, therefore, that if we are ever to understand psychoanalysis deeply, we must begin by solving the problem of how to make adequate recordings of the therapeutic process *without at the same time distorting the process.*"

Since the method provides a direct measure of the talking, listening, and looking behavior involved in the psychotherapeutic process, it can be used in conjunction with the measurement of physiological responses and classically conditioned responses to monitor ongoing psychotherapy (Greenblatt, 1959).

The research vistas opened by this method suggest that experimental methodologists should apply their skills in developing novel techniques for the field of psychotherapy. In order to have a truly experimental clinical psychology, we must develop many more methods similar to this one. In 1865, when Claude Bernard was developing experimental physiological medicine, he wrote ". . . Discovery of a new tool for observation or experiment is much more useful than any number of systematic or philosophic dissertations" (Bernard, 1865, p. 171).

#### REFERENCES

- BERNARD, C. *An introduction to the study of experimental medicine*. 1855. Trans. H. C. Greene. Henry Schuman, 1927.
- COHEN, D. J. Justin and his peers: An experimental analysis of a child's social world. *Child Developm.*, 1962, 33, 697-717.
- COHEN, D. J. & LINDSLEY, O. R. Effects of human discriminative stimuli on acquisition of cooperation. 1962 (In preparation).
- EWALT, J. R. Psychotherapy and public health. In J. H. Masserman and J. L. Moreno (Eds.) *Progress in psychotherapy V: Review and integrations*. New York: Grune & Stratton, 1960, 67-77.
- FRANK, J. D. *Persuasion and healing: A comparative study of psychotherapy*. Baltimore: Johns Hopkins Press, 1961.
- GREENBLATT, M. Discussion of G. Saslow and J. D. Matarazzo, A technique for studying changes in interview behavior, and J. I. Lacey, Psychophysiological approaches to the evaluation of psychotherapeutic process and outcome. In E. A. Rubinstein & M. B. Parloff (Eds.) *Research in psychotherapy*. Washington D.C.: Amer. Psychol. Ass., 1959, 209-220.
- HILGARD, E. R. Experimental approaches to psychoanalysis. In E. Pumpian-Mindlin (Ed.) *Psychoanalysis as science*. New York: Basic Books, 1952, 3-45.
- KUBIE, L. S. Problems and techniques of psychoanalytic validation and progress. In E. Pumpian-Mindlin (Ed.) *Psychoanalysis as science*. New York: Basic Books, 1952, 46-124.
- LINDSLEY, O. R. Characteristics of the behavior of chronic psychotics as revealed by free-operant conditioning methods. *Dis. nerv. Sys.*, monogr. suppl., 1960, 21, 66-78.
- LINDSLEY, O. R. Free-operant conditioning, persuasion, and psychotherapy. Paper read at Amer. Psychol. Ass., Chicago, May 1961.
- LINDSLEY, O. R. Experimental analysis of social reinforcement: Terms and methods. Paper read at Amer. Orthopsychiat. Ass., Los Angeles, March 1962. (a)
- LINDSLEY, O. R. A behavioral measure of television viewing. *J. advertising Res.*, 1962, 2, 1-12.
- LINDSLEY, O. R. Experimental analysis of cooperation and competition. In T. Verhave (Ed.) *The experimental analysis of behavior*. New York: Appleton-Century-Crofts, 1966, 470-501.
- LINDSLEY, O. R., & CONRAN, P. Operant behavior during EST: A measure of depth of coma. *Dis. nerv. Sys.*, 1962, 23, 407-409.
- LINDSLEY, O. R., HOBICA, J. H., & ETSTEN, B. E. Operant behavior during anesthesia recovery: A continuous and objective measure. *Anesthesiology*, 1961, 22, 937-946.
- MORGAN, B. J., & LINDSLEY, O. R. Operant preference for stereophonic over monophonic music. *J. music Ther.*, 1966, 135-143.
- RADO, S. Towards the construction of an organized foundation for clinical psychiatry. In P. H. Hoch & J. Zubin (Eds.) *The future of psychiatry*. New York: Grune & Stratton, 1962, 116-126.