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Effects of Speech Compression of Counseling Interviews on Therapeutic Process Variables

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EFFECTS OF SPEECH COMPRESSION OF COUNSELING INTERVIEWS ON THERAPEUTIC PROCESS VARIABLES

by

Reiko Schwab

A Dissertation Submitted to the Faculty of The Graduate College in partial fulfillment of the Degree of Doctor of Education

Western Michigan University Kalamazoo, Michigan April, 1972

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Reiko Schwab
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CHAPTER I

THE PROBLEM

The purpose of the study was to explore the applicability of speech compression to counselor education and supervision. Specifically, the study investigated the effects of compression of counseling dialogue upon the evaluation of four important variables in psychotherapeutic process, namely, the counselor's accurate empathy, nonpossessive warmth, genuineness, and the client's depth of self-exploration, as well as upon the comprehensibility of counseling dialogue.

The potential utility of speech compression as an efficient means to transmit information, as an aid in educational programs, and as a tool to study the basic nature of human information processing has been explored in recent years. The studies reported to date, however, have dealt with orally read materials, and no study has been reported which has applied speech compression to dialogue, such as a counseling interview. In counseling programs in which audio recording plays an indispensable role as the main medium for supervision, as a means of instruction, and as a research tool, benefits derived from more efficient ways to use audio recordings would be indisputable.

In this study 25 counselors and counselor educators listened to five different counseling tapes, one noncompressed tape and four tapes compressed by 20%, 30%, 40%, and 50% respectively. Subjects
then evaluated tapes according to the Truax Tentative Scale for the Measurement of Accurate Empathy, of Nonpossessive Warmth, of Genuine-ness, and of Depth of Self-Exploration and took a content comprehension test consisting of 30 true-false questions for each tape.

The data analyzed by a two-way analysis of variance indicated that moderate degrees of compression could be applied to counseling dialogue without significant effects upon either the evaluation of the above-mentioned process variables or the comprehension of counseling dialogue.

Discussions which follow in this chapter will present: (1) The Problem, (2) Statement of the Problem, (3) Importance of the Study, (4) Limitations of the Study, (5) Assumptions, (6) Definition of Terms, and (7) Summary.

The Problem

Technological development in education

Modern scientific and technological developments are making an enormous impact on American education. The impact is seen through the introduction of numerous educational media and innovative approaches to instruction as well as through changes in educational goals and objectives. Despite the fear and concern over the probability of detrimental effects upon education, intermingled with naive enthusiasm, the role of technology and the tremendous potentialities which technology has to offer have been increasingly recognized. The usefulness of technology in planning and implementing positive changes in educa-
tion and meeting ever-increasing challenges and demands placed upon education appears limited more by the imagination, resources and leadership of educators than by technological development.

Program innovations through the use of computer, television, audio and video tape recording, new film and microfilm storage and distribution systems, simulation techniques and countless sophisticated laboratory apparatus are becoming not only desirable but essential in effective teaching and learning. The appearance of the journal, Educational Technology, in 1960 is an indication of a growing awareness of the significant role which technology has in education.

Compressed speech as an educational medium

One recent and less well-known development in technology which appears to have wide application in education is speech compression. Speech compression refers to the technique by which recorded speech is reproduced at a speed greater than the original recording speed, so that the amount of time necessary for listening to recorded speech is reduced. The speech thus accelerated in speed and reduced in listening time is called time-compressed or speeded speech.

There are several ways to increase the speed of recorded speech (Foulke, 1970). One way to speed recorded speech is by simply speaking more rapidly than usual. A second way is to play a tape at a faster speed than the speed used during the original recording. Unfortunately, this method of speeding up speech distorts frequencies and voice pitch and produces speech with "Donald Duck"-like qualities.
A recorded speech can also be compressed in time by periodically discarding small segments of tape and splicing the remaining portions of tape together (Garvey, 1953). Although the speech reproduced this way is free of apparent distortion, such a method is far too time-consuming to be practicable. Fairbanks and his associates (1954) developed an electromechanical method to compress or expand speech to desired degrees with practically no distortion. It is possible for a speech-compressing machine such as the Tempo Regulator and the Whirling Dervish to time-compress a recorded speech by systematically transmitting segments of speech, thus deleting those brief signals not transmitted. This process results in the reproduction of the speech in less time than that required for its original recording. Recently computer technology has also been employed in the production of compressed speech.

Research studies concerning the use of compressed speech are not yet numerous, but evidence accumulated indicates a potentially high utility of compressed speech in educational programs. As will be reviewed in detail in Chapter 3, studies have consistently reported that messages with a certain amount of compression and with good acoustic qualities are both intelligible and comprehensible. An important application of compressed speech is in the education of the blind, who must rely heavily on auditory material as a means to obtain information. Compressed speech for the blind is comparable to rapid reading for the sighted. In an age which has witnessed an explosive proliferation of information, more efficient ways to obtain informa-
tion through auditory channels are welcome not only for the visually handicapped but also for people with normal sight.

There is a growing interest in the investigation of compressed speech as a tool to study the basic nature of human information processing and as an aid to educational programs (Foulke, 1968; Orr, 1968). No study, however, is known to this writer which is concerned with the possible application of speech compression to counselor education programs.

**Application of speech compression to counselor education**

One place in which speech compression could profitably be applied to counselor education programs is in counseling supervision where audio recording is a frequently used medium. Counseling supervision, simply defined, is a tutorial process by which advanced practitioners of counseling assist beginners in learning therapeutic skills necessary for the practice of counseling (Ekstein & Wallerstein, 1958). It is through practical counseling experiences under the supervision of advanced practitioners that counselor trainees develop their therapeutic skills and digest psychotherapeutic concepts beyond the mere acquisition of theoretical knowledge about counseling previously gained through didactic course work. The process of supervision is one of the most important aspects of counselor education, but it is highly time-consuming. With counselor trainees, supervisors discuss various aspects of the trainees' counseling sessions. Supervision is based on the verbal reports of the trainees' counseling ex-
periences, the supervisors' own observations of the sessions, and media such as audio and audio-video recordings.

Observation of the counseling session through a one-way mirror or via an audio-video recording will provide both auditory and visual data and would be ideal means to capture what has transpired during the session. Most prevalent, however, is the use of audio tapes for supervision. The heavy reliance upon the audio recording is partly due to a lack or limited availability of laboratory rooms with one-way mirrors and audio-video recording systems as well as the impracticability for a supervisor, in a limited amount of time, to be physically present to observe each supervisee's live counseling session. Conversely, tapes and tape recorders, to which most individuals have easy access, are more practical, and thus have attracted a wider audience. In fact, so prevalent has the use of audio recording systems become that even a decade ago it would have been difficult to find a counselor education program which did not utilize audio recording systems in some way (Demos, 1964).

For many years the audio recording system has occupied a valuable role in counselor education and supervision. Not only has the audio recording been employed profitably and with relative ease for counseling supervision, but also it has opened wide a door for scientific investigations of counseling and psychotherapy. Audio recordings have provided scientists with a common set of data which were not available prior to the introduction of audio recording systems (Auld & Murray, 1955; Redlich, Dollard, & Newman, 1950; Rogers, 1942).
Despite the common and frequent use of audio recordings, the potential applicability of speech compression is at present unknown in counselor education and supervision. Moreover, studies reported have dealt with compressed recordings of material read by a trained reader, no studies having been reported that have applied speech compression to dialogue, such as a counseling interview. As a form of communication, dialogue differs in many ways from a well-read speech. In dialogue one may find periods of silence, interruptions, emotional outbursts, groping for words, and reiteration, which are foreign to the well-rehearsed, uninterrupted speech taped in a recording room. What would the effects be of time-compression upon dialogue such as a counseling interview?

Critical variables in the therapeutic process

The present study is believed to be the first attempt to investigate the application of time-compression to dialogue and to discover whether counseling dialogue is amenable to compression without significantly affecting the evaluation of critical variables of the therapeutic process. The effect of compression upon the comprehension of verbal content in the counseling interaction was also assessed. Variables in the therapeutic process deemed critical included the counselor's accurate empathy, nonpossessive warmth, genuineness, and the client's depth of self-exploration.

The role of these four variables in bringing about positive changes in people has been articulated by Rogers (1961) in his theo-
retical position and has also been discussed intensively by Truax and Carkhuff in their recent book entitled *Toward Effective Counseling and Psychotherapy* (1969). After reviewing the literature of a number of prominent theorists with different theoretical orientations (Adler, Bordin, Freud, Moustakas, Rank, Rogers, Rotter, Shoben, Sullivan, Wolpe, and others), Truax and Carkhuff have identified accurate empathy, nonpossessive warmth, and genuineness as those common elements which most theorists emphasize in effecting therapeutic change. Truax and Carkhuff state:

Despite the bewildering array of divergent theories and the difficulty in translating concepts from the language of one theory to that of another, several common threads weave their way through almost every major theory of psychotherapy and counseling, including the psychoanalytic, the client-centered, the behavioristic, and many of the more eclectic and derivative theories. In one way or another, all have emphasized the importance of the therapist's ability to be integrated, mature, genuine, authentic or congruent in his relationship to the patient. They have all stressed also the importance of the therapist's ability to provide a nonthreatening, trusting, safe or secure atmosphere by his acceptance, nonpossessive warmth, unconditional positive regard, or love. Finally, virtually all theories of psychotherapy emphasize that for the therapist to be helpful he must be accurately empathic, be "with" the client, be understanding, or grasp the patient's meaning (p. 25).

Research evidence that has been accumulated over the years tends to confirm the hypothesis that there is a significant positive relationship between the levels of such therapeutic conditions as accurate empathy, nonpossessive warmth, and genuineness on the part of the counselor or therapist and therapeutic outcome (Betz, 1963a, 1963b; Dickerson & Truax, 1966; Foulds, 1969; Strupp, Wallach, Wogan,

The importance of the client's depth of self-exploration has been stressed by Rogers as well as by psychoanalytic theorists such as Freud and Rank and has been explored through various research studies. The results of studies have suggested that the levels of therapeutic conditions are significantly related to the degree of patient's self-exploration (Holder & Carkhuff, 1967; Truax & Carkhuff, 1961, 1965), which is in turn significantly related to successful therapeutic outcome (Braaten, 1961; Peres, 1947; Tomlinson & Hart, 1962; Truax & Carkhuff, 1964a).

In the face of all these findings it is only prudent for counselor educators and supervisors to be concerned with these critical process variables in evaluating the counselor trainee's counseling behavior in supervisory sessions. Therefore, the crucial question in this study was whether or not such critical variables of therapeutic process are affected when the counseling tape is time-compressed. Use of compressed tapes may allow counselor educators, supervisors, and trainees to listen to tapes in less time but with as much insight as they could have obtained if they listened to noncompressed tapes. A one-hour tape, for example, can be heard in half the time if the tape is compressed by 50%. Potential contributions that time-compression of counseling tapes might make to counseling research and
counselor education and supervision merit investigation.

Statement of the Problem

The study sought to investigate whether time-compression of a taped counseling interview affects the evaluation of critical variables of the therapeutic process, namely, (1) accurate empathy, (2) nonpossessive warmth, (3) genuineness, and (4) depth of self-exploration, as well as the comprehension of verbal content of the counseling interview. Specific hypotheses in null form are stated in Chapter 4 on pages 74 and 75.

Importance of the Study

The study is important for the following reasons:

1. The applicability of speech compression to counselor education and supervision was explored in this study.

2. Investigation into the effects of speech compression upon counseling dialogue provided insight into the effects which compression has on dialogue in general.

Limitations of the Study

The analyses and discussion of the study were limited to the responses on the Truax Tentative Scale for the Measurement of Accurate Empathy, of Nonpossessive Warmth, of Genuineness, and of Depth of Self-Exploration and on comprehension tests completed by 25 counselors and counselor educators who listened to five different tapes.
with five different degrees of compression.

Twenty-five subjects were selected on the basis of their professional qualifications and experience as counselors and counselor educators. Hence, the extent to which the findings in this study can be generalized to the general population of counselors and counselor educators is limited.

The test of content comprehension for five counseling tapes, consisting of 30 true-false questions of a factual nature, were constructed by the investigator. No measures of validity or reliability were obtained. However, a pool of more than 30 items was first examined by two experienced counselor educators and further administered to groups of counselor trainees, all of whom listened to the tapes. On the basis of their responses and comments concerning the test items, changes in content and phraseology were made and misleading items were eliminated.

Inherent in any man-made measurement instrument are limitations. Therefore, inferences drawn from the study were limited to the extent to which the Truax scales and content comprehension tests were valid and reliable.

No direct control over subjects' listening conditions was exercised. Subjects listened to tapes individually under different conditions, since it was impracticable for subjects engaged in diverse professional activities in different communities to get together on a set date to listen to tapes. The subjects were given specific procedural instructions. They were requested to use the best pos-
sible tape recorder, to listen to all tapes only once, and to rate
tapes and take the content comprehension test immediately after lis­
tening to each tape before proceeding to the next one. On a question­
naire completed by subjects after listening to each tape, a question
was included on the acoustic quality of the recording in order to
detect indirectly the subjects' listening conditions. Judging from
the subjects' responses to the question, it was unlikely that listen­ing
conditions affected the subjects' evaluation of the process vari­
ables or content comprehension to any serious extent.

Assumptions

The following assumptions were made in conducting this study:

1. Speech compression, having been successfully used with mono­
logues, can be profitably applied to counseling dialogue.

2. The five counseling tapes were representative of typical
   counseling sessions in terms of the quality of counseling, the topics
discussed, and the rate of speech.

3. The Truax Tentative Scale for the Measurement of Accurate
   Empathy, of Nonpossessive Warmth, of Genuineness, and of Depth of
   Self-Exploration were considered to be the best instruments available
   for assessing the effects of compression upon the evaluation of taped
   counseling sessions in this study.

4. Content comprehension tests constructed by the investigator
could provide measures of comprehensibility of the compressed counsel­
ing tapes.
Definition of Terms

For the purpose of clarification a definition of terms is being presented.

Time-compression or compression refers to reproducing recorded material in less time than that initially required for its recording. As was mentioned previously, there are several ways to achieve time-compression of recorded material. In the present study, time-compression of counseling tapes was achieved by the Whirling Dervish, which will be described later in detail. The degree of compression is expressed in terms of the percentage of reduction in time from the original to the compressed reproduction. For example, a tape time-compressed by 30% would contain 30% less of the original recording and consequently take 30% less time to hear than the parent tape. A one-hour recorded session time-compressed by 30% would be heard in 42 minutes, resulting in a time saving of 18 minutes.

Counseling supervision is a tutorial process by which advanced practitioners of counseling assist beginners in learning therapeutic skills necessary for the practice of counseling (Ekstein & Wallerstein, 1958).

Accurate empathy is the counselor's (or the therapist's) appreciation and sensitive awareness of the client's obvious and veiled feelings in their true intensity and his verbal facility and precision in communicating this understanding to the client (Truax & Carkhuff, 1969).
Nonpossessive warmth is defined as the counselor's uncondition- 
al acceptance and valuing of the client as a separate person with 
his own feelings and experiences, without any evaluation of his 
thoughts or behavior (Truax & Carkhuff, 1969).

Genuineness refers to the counselor's being freely and deeply 
himself in his relationship to the client, being truly whatever his 
response denotes. It is contrary to being "phony" or presenting a 
professional facade (Truax & Carkhuff, 1969).

Self-exploration refers to the client's intrapersonal explora- 
tion, the client focusing upon himself and exploring his personal 
feelings, his values, his fears, etc. (Truax & Carkhuff, 1969).

Summary

Speech compression is a product of modern scientific and tech- 
nological developments. The usefulness of speech compression both 
as an educational medium and as a tool to investigate the basic nature 
of human information processing has been increasingly recognized. 
However, applicability of speech compression to dialogue, such as 
counseling dialogue, has not yet been investigated. The present study 
explored whether counseling interviews compressed by 20%, 30%, 40%, 
and 50% significantly affect the evaluation of four process variables 
--accurate empathy, nonpossessive warmth, genuineness, and depth of 
self-exploration--found to be critical in bringing about positive 
changes in clients. Also under investigation were the effects of com- 
pression upon comprehension of verbal interaction between the coun-

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selor and client. The importance and limitations of the study were discussed and assumptions and definition of terms were presented.

In Chapter 2 and 3, selected literature relevant to the study will be reviewed and discussed.
Prior to an investigation of the applicability of speech compression to counseling dialogue, it seems desirable to re-evaluate the validity of audio recording as a tool in counselor education and supervision. While the value of audio recording is undeniable, an obvious disadvantage in relying upon audio recordings lies in the fact that nonverbal visual components of communication cannot be preserved on audio tapes. How vital the loss of visual data is to the understanding of the counseling processes is a matter of concern as well as of interest to those who utilize audio recordings routinely in counselor education and supervision.

In this chapter, selected literature on auditory and visual data in communication will be reviewed and discussed under the following headings: (1) Communication through Auditory and Visual Channels, (2) Value of Audio Recording in Counselor Education and Supervision, and (3) Summary and Implications.

A review of selected literature on compressed speech will be presented in Chapter 3.

Communication through Auditory and Visual Channels

The communicative significance of visual data is evident from the fact that the individual's appearance and behavioral mannerisms
greatly influence the forming of opinions and impressions of an individual's personality characteristics. Abundant evidence is also available to support the generally-held belief that feelings and attitudes are communicated not only by verbal content, but also through such nonverbal channels as body movements (Dittmann, 1962; Mahl, Danet, & Norton, 1959; Vetter, 1969), body positions (Dittmann, Parloff, & Boomer, 1965; Ekman, 1964; Schefflen, 1964), facial expressions (Dittmann et al., 1965; Ekman, 1964; Guilford, 1929; Munn, 1940; Thompson & Meltzer, 1964), and tone of voice (Davitz & Davitz, 1959; Fairbanks & Pronovost, 1939; Kramer, 1964; Mehrabian & Wiener, 1967; Ostwald, 1963; Soskin & Kauffman, 1961; Starkweather, 1956b, 1961; Thompson & Bradway, 1950). Such emotions as happiness, love, fear, and determination were found to be significantly easier to communicate by facial expressions than were others such as suffering, disgust, and contempt (Thompson & Meltzer, 1964). Some emotions expressed by voice alone were found to be mistakenly identified beyond chance expectancy, fear being mistaken for nervousness and love for sadness (Davitz & Davitz, 1959; Fairbanks & Pronovost, 1939; Kramer, 1964).

Many of these findings were derived from investigations using emotional expressions deliberately produced by subjects, or from selected samples of communication in which a considerable amount of emotion was expressed. It is not tenable, therefore, to assume that there are definite patterns of nonverbal expressions for various emotions and attitudes or that the same emotional intentions and attitudes are always transmitted simultaneously through verbal and non-
verbal channels to a recognizable degree. Nor does it follow that emotions and attitudes are necessarily detectable through nonverbal cues in the absence of verbal content.

The degree of elaboration and utilization of different communication channels varies considerably in different cultures, by different individuals, and under different conditions of communication (Wiener & Mehrabian, 1968). A number of studies have shown great variability among individuals in their ability to nonverbally convey emotional intentions or to detect emotions expressed nonverbally. Some studies reflected a difference in the kinds of emotions people communicate most successfully through nonverbal channels (Davitz, 1964; Davitz & Davitz, 1959, 1961; Dittmann et al., 1965; Guilford, 1929; Kramer, 1964; Levy, 1962; Shapiro, 1968; Thompson & Meltzer, 1964). In everyday conversations much nonverbal communication flows at a low level of awareness (Harrison, 1965). The individual speaker is dimly aware of his own nonverbal behavior characteristics (Beier, 1966; Wiener & Mehrabian, 1968). When conscious efforts are not made, emotional intentions are often less clearly expressed and subtle nonverbal cues often go unnoticed. For the listener, there is a predominant reliance on verbal content.

Starkweather's study (1956a) presents an example of an indispensable reliance upon verbal content in the absence of discernible nonverbal cues in decoding affective meanings in communication. In his study 12 clinical psychologists were asked to place selections from the 1954 Army-McCarthy hearings into three affective context catego-
ries—matter-of-fact, challenging, and indignant. The verbal content was made unintelligible by electronically filtering out the high frequencies which are believed to convey semantic meanings. It was reported that although the content-free speech was found to carry some affective clues, a general lack of variation in McCarthy's voice resulted in disagreement among judges as to the appropriate context category. The judges' decisions agreed when verbal content was provided. The study by Soskin and Kauffman (1961) similarly suggested the importance of verbal "guide" in discriminating among various emotions.

Nonverbal cues, on the other hand, take on special significance when there is a discrepancy between verbal and nonverbal communication. Studies have revealed that nonverbal cues are primarily used in decoding messages when the verbal content is inconsistent with nonverbal messages (Mehrabian & Wiener, 1967; Wiener & Mehrabian, 1968). For example, given negative vocal tone with positive verbal content at the same time, listeners interpret the speaker's attitude as being negative. There is also evidence to suggest that among nonverbal cues, facial expressions contribute more than vocal or bodily cues in decoding the emotional meaning of the message (Dittmann et al., 1965; Gates, 1927; Levitt, 1964; Mehrabian & Ferris, 1967).

There is no denying the fact that nonverbal cues as well as verbal cues carry important communicative information and that the psychological significance of nonverbal cues deserves special attention (Harrison, 1965; Ruesch & Kees, 1956; Schulman, Kasper, & Barger,
1964). Nonverbal cues, some of which are visually and others auditorily transmitted, often convey more clearly than the verbal content affective meanings of the message.

The interrelationships among various communication channels and their relative communicative values, however, have not yet been clearly demonstrated. Individual and cultural differences in communication patterns, the dynamic nature of human experiences, and the complexities of personal interactive processes make it difficult to study the relationships and the meanings of messages emitted concomitantly from the verbal and from multiple nonverbal channels. Nor has there been a satisfactory answer to the question of the seriousness of the loss of nonverbal visual cues which inevitably results from the recording of interviews on audio tapes. The following three studies represent attempts to answer the question of the adequacy of audio recordings.

In one study (Giedt, 1955), comparisons were made among visual expression, verbal content, and auditory cues in therapeutic interviews in terms of their relative contribution to the accurate diagnosis of patients. Forty-eight psychiatrists, social workers, and psychologists were presented with silent films, written transcripts, sound recordings, or complete sound films of interviews and were asked to assess personality characteristics of the patients interviewed on personality rating scales and predict their verbal behavior on sentence completion test items. When their responses were analyzed against criterion data obtained about the patients, the accuracy of
personality ratings and the prediction of verbal behavior were found to be significantly greater when verbal content was provided to the raters, as compared to an absence of verbal information in the silent films. Accuracy of personality ratings tended to improve as more and more cues were made available, while prediction of verbal behavior was somewhat poorer when all the cues were presented through the complete sound films. It was concluded that none of the three media--written transcripts, sound recordings, and complete sound films--were found superior to others for recording diagnostic-type interviews and that any choice between the three can be made on the basis of practical considerations. Soskin (1959) found that observations of the individuals in role-playing situations did not improve accuracy of diagnosis over what was achieved by their biographical data alone or through studying a battery of objective and projective test results. His finding is consistent with the results cited above.

The effect of audio recording and television on the impressions which clinical psychologists formed of clients were investigated by Taplin (1968). Analyses of the data revealed that the quantity of descriptive elements in the subjects' writings was greater as a result of the television presentation. However, neither the number nor the quality of hypotheses formulated differed significantly whether therapy sessions were presented through audio recording or television. Additional visual cues did not appear to be useful in formulating hypotheses about clients.
Another study dealt with the degree of agreement between judgments of verbal and nonverbal cues of emotion (Shapiro, 1966). Through different modes of communication—audio only, audio-video, video only, and transcript—four groups of judges rated, on a nine-point scale, feelings of pleasantness or unpleasantness expressed by interviewees in brief samples of interviews. The results indicated that ratings of feelings through video, audio, and transcript correlated significantly and positively with ratings made through the audio-video mode of presentation. Thus, the judges who were presented with the "whole" agreed with those presented with "parts" of the whole. Conversely, ratings of feelings based on nonverbal visual cues through video presentation correlated highest with ratings based on audio-video presentation, but showed little agreement with ratings derived from audio tapes or transcripts, suggesting a wide discrepancy between visual and verbal cues of feeling state. The evidence implies the importance of visual cues in forming the impressions of the communicator's feeling state. The visual cues used in this study were restricted, being primarily facial, and the rating was limited solely to the feelings of pleasantness or unpleasantness. It is questionable whether the same result would be obtained when various types of emotions are involved.

Value of Audio Recording in Counselor Education and Supervision

Although findings from the studies reviewed above, which differ in their focus, can be generalized only to a limited degree and can-
not be applied directly to a question concerning the relationship between a recorded counseling session and the actual session, the results do provide some evidence that what is captured through audio recording is not far from what is captured using both the visual and auditory channels.

It is apparent that visual cues will be critical in understanding the interpersonal and intrapersonal interactions in extreme cases where verbal and vocal cues are limited or absent. Understanding what has transpired in a counseling session only through audio recording would be rather difficult when verbal communication is extremely limited. Undoubtedly, visual data obtained through direct observation or through video recording would offer valuable insights into the interactional process of the interview as well as into the nature of the client's emotional disturbances.

Aside from such extreme cases in which auditory cues are considerably reduced, the counseling process consists primarily of verbal interactions between the counselor and the client (Schulman, 1964; Taffel, 1955). Although there is much appreciable truth in sayings such as, "Actions speak louder than words" and "One picture is worth a thousand words," audio recording does provide a meaningful framework for reconstructing a counseling session as well as for gathering the data necessary for reviewing and analyzing interpersonal and intrapersonal processes. Recording counseling sessions is a satisfactory means of coding information for supervisory, instructional, and research purposes (Redlich et al., 1950; Rogers, 1942). Moreover, audi-
tory data, such as verbal content, verbalization characteristics (the degree of organization and rationality, blocking, hesitancy, confusion, etc.), as well as pitch, rate, volume, tone and other characteristics of the voice alone when carefully listened to, could offer vital information about the interview and individual participants (Auld, 1961; Auld & Murray, 1955; Barbara, 1958, 1963; Beier, 1966; Boomer, 1963; Cohen, 1961; Dibner, 1956; Dittmann & Wynne, 1961; Fairbanks & Hoaglin, 1941; Kanfer, 1959; Marsden, 1965; Redlich et al., 1950; Ruesch & Prestwood, 1949; Schulman et al., 1964; Spilka, 1953; Starkweather, 1961; Wiener & Mehrabian, 1968).

The contributions which audio recording makes to the growing field of counseling and psychotherapy far outweigh the limitations of audio recording in preserving visual data from interpersonal transactions in the therapeutic interview. In addition to audio-video recording, audio recording will continue to be an indispensable tool in counselor education programs for supervision, instruction and research studies. The use of audio recording in recent years in the field of the mental health professions is also demonstrated in the plethora of lists of tapes provided by commercial and professional sources. Counselor educators and trainees alike will spend many hours listening to counseling tapes. If, therefore, the time spent listening to tapes can be reduced through the successful application of time-compression without a significant loss in qualities vital to the counseling profession, a considerable amount of time will be saved in educators' daily schedules.
Summary and Implications

In this review of selected literature the use of audio recording as a tool in counselor education and supervision was considered. The significance of visual cues in communication as carriers of emotional and attitudinal intent has been shown in the findings of many studies. Recording, the use of which has been prevalent in counselor education and supervision, is limited only to the recording of auditory cues. How vital the loss of visual data is to the understanding of counseling processes is a matter of concern to counselor educators and supervisors. However, findings tend to indicate that the use of audio recording is not as limiting as it may be thought to be. Audio recording appears to be an adequate substitute for direct observation of counseling sessions and audio-visual recording in obtaining data on inter- and intrapersonal interaction which takes place in the counseling session. The utility of audio recording skillfully employed in counselor education, supervision, and research has been re-asserted.
CHAPTER III

REVIEW OF SELECTED LITERATURE ON COMPRESSED SPEECH

In this chapter, a review and discussion of selected literature on compressed speech will be presented under the following headings: (1) A Perspective of Research on Compressed Speech, (2) Review of Relevant Literature, and (3) Summary and Implications.

A Perspective of Research on Compressed Speech

In order to place the research on compressed speech reviewed in this chapter and the present study in historical perspective, the background and current status of research on compressed speech will be briefly discussed.

Current developments in compressed speech were first prompted by the experiment of Miller and Licklider (1950) on speech intelligibility. Their study demonstrated that because of the redundancy, or presence of excessive cues in the English language, speech could be interrupted systematically, without seriously decreasing the intelligibility of monosyllabic words, by turning an electronic switch on and off. For example, when speech was regularly interrupted at a rate of 100 times per second, speech being on 50% of the time, intelligibility remained at about 90%. While Miller and Licklider's electronic switching method did not reduce speech time, since portions which remained were not abutted, Garvey (1953) succeeded in
accelerating speech 2.5 times the original speed by physically removing portions of tape and then splicing the remaining segments of tape together with less than a 10% loss in word intelligibility. At 3.5 times the original speed the intelligibility decreased to approximately 50%. Garvey's "chop-splice" method also eliminated the disturbing effect of the silent spaces in speech caused by Miller and Licklider's method, which made the speech sound as though it had been spoken in a hoarse voice (Garvey, 1953).

In studies on intelligibility, a typical procedure is to present a list of discrete spondaic or monosyllabic words which have been compressed to various degrees. Subjects then write down or repeat the words as they have heard them. The intelligibility is measured in terms of the per cent of words identified correctly or the average number of errors in identification.

Later studies have also shown that intelligibility of words may remain quite high after compression. Fairbanks and Kodman (1957) found intelligibility of monosyllabic words close to 100% up to the time when the words were compressed to 20% of their original durations. Another study (Kurtzrock, 1957) likewise reported that intelligibility was 50% even when words were reduced to about 1/7 of their original durations. Intelligibility of a little more than 71% for high aptitude men, about 62% for medium aptitude men, and about 57% for low aptitude men at the 59% compression level was also found by Sticht (1968).

The reason for the loss of intelligibility in compressed speech
has not yet been clearly determined. Garvey (1953) tentatively concluded that both the rate and the amount of discarded sound were important factors affecting the intelligibility while Gerber (1969) indicated that a decrease in intelligibility was attributable to a loss of information due to compression.

Impetus for experiments on speeded speech came from the development of an electromechanical method by Fairbanks and his associates (1954) at the University of Illinois and by Anton Springer in Germany (Friedman, Orr, & Graae, 1967). Their inventions have enabled speech to be compressed or expanded to any desired degree without distortion of pitch and tonal quality. Studies on the application of Fairbanks' method to the critical educational needs of the blind ensued, along with the studies on the application of compressed speech to higher education.

Rapid retrieval of information through compressed speech is especially valuable for the blind in an age when active participation and survival in a complex and rapidly changing society depends to a great extent upon one's ability to keep abreast of current events. It has been reported that the average rate of braille reading is 90 words per minute (wpm) and the average rate of oral reading for the blind is 175wpm, which are considerably slower as compared to the average rate of reading of high school seniors (251wpm) (Witkin, 1969).

Without access to the benefits of modern technology for speech compression, many blind people are reported to listen to recordings
played back at rates faster than the original recording speed (Foulke, 1966b). However, fast playback referred to as a speed-changing method distorts pitch and tonal quality of the message, which not only irritates listeners but also attenuates intelligibility and comprehensibility of the recorded messages. Electromechanical methods for speech compression have been found to be preferred methods to produce rate changes of oral presentation, albeit in terms of comprehension the new methods have not always been found to be superior to a speed-changing method (Foulke, 1966b; McLain, 1962).

With the advent of commercially available speech compressors, research on the application of compressed speech has seen a steady growth led by such pioneers as Fairbanks, Friedman, Foulke, Orr, and Sticht. Since 1963 the American Institutes for Research has conducted a series of studies on variables related to compressed speech listening. The studies sought to determine the feasibility of applying speech compression to college education under grants of the New Educational Media Branch of the U. S. Office of Education (Friedman et al., 1967). A number of studies have also been performed by the Human Resources Research Organization known as HumRRO. **CRCR Newsletter**, a monthly news bulletin of the Center for Rate Controlled Recordings established in 1963 in the University of Louisville, announces progress and current studies concerned with compressed speech. The number of master's theses and doctoral dissertations on compressed speech reported in the **CRCR Newsletter** and in **Dissertation Abstracts**.
has been increasing. Though still experimental, compressed lecture material has started to appear in college and high school classrooms (CRCR, 1967b, 1971a). The growth and spread of interest in compressed speech particularly in the past several years has been remarkable.

Presentation of information at a speed faster than normal is thought to be advantageous not only from the standpoint of rapid transmission and retrieval of information but also from the standpoint of increased attention on the part of listeners. When the rate of presentation comes closer to the listeners' information processing capacity, mind-wandering is reduced as attention focuses on the compressed material (Woodcock & Clark, 1968). Nichols (1955) proposed that thought proceeds at a rate of 400wpm or faster, which is about three to four times the normal speaking rate. It has been suggested that training in listening to compressed speech might improve concentration, which could be transferred to listening to speech at a normal rate (Witkin, 1969). The notion that thought rate might be limited as a logical consequence of growing up under the influence of a slow rate of auditory input has also been proposed by Orr (1964), who believes that people could be trained to think faster.

Time compressed speech has currently been employed as an aid to improve listening and thinking (CRCR, 1967e, 1969h). Plattor (CRCR, 1969h) mentions that although literacy is generally measured by one's ability to cope with written language in North American countries,
"were literacy to be measured by ability to LISTEN, it might well be
discovered that most schools have produced and are continuing to pro-
duce generations of functional illiterates..." (p. 4).

Training in listening appears logical in a society where the
spoken word is the most frequently used form of communication. Ac-
cording to Rankin (1928), 21 adults observed in his study spent about
70% of their total waking time in some form of communication. Of that
time devoted to communication 42.1% was spent in listening, 31.9% in
talking, 15.0% in reading, and 11.0% in writing. It has also been
reported that while at school, elementary school children spend
approximately 57% of the school day in listening and that high school
students spend 29 minutes of every hour in listening (Lasnik, 1970).

Speech compression or expansion has shown its potential utility
in a number of unique ways. One application is the use of compressed
and expanded speech for the improvement of reading skills. Evidence
is available that reading while simultaneously listening to compressed
recording improves reading rate and comprehension (CRCR, 1969g, 1970c,
1971b, 1971c; Orr, 1964). With slow learners, expanded speech has
been found to facilitate their reading, since reduced rates enable
those with limited capacity to better pace their reading (CRCR, 1968e).
Reading development workbooks to be used in conjunction with com-
pressed speech have been developed and are now available for students
(CRCR, 1970c).

The capability of changing speech rate at will by electromechani-
cal methods has also been found suitable in language instructions
(CRCR, 1967a, 1967c, 1969f; Friedman et al., 1967). Expanded speech serves as an aid to improve speech-sound discrimination, to teach intonation patterns, and to improve speech articulation with individuals having language or speech difficulties or dialect problems (Witkin, 1969).

The usefulness of compressed speech as a diagnostic and therapeutic tool in working with individuals with certain voice disorders has been reported by Levine (CRCR, 1969a). The aged and hard-of-hearing individuals who suffer a reduction in information processing speed and sound discriminations can also be helped by expanded speech (CRCR, 1970d).

In addition to the above-mentioned areas of applied uses for compressed speech, the importance of the technique of speech compression and expansion as a tool to investigate the basic nature of human information processing has particularly been emphasized (Foulke, 1968; Orr, 1968). Studies in this direction are slowly appearing (CRCR, 1969c, 1969d, 1970b).

As is apparent in this brief review, the potential of the technology of compressed and expanded speech as a tool for basic research and as a medium in educational and remedial endeavors promises further development for the future.

Review of Relevant Literature

In this section, review and discussion of studies on compressed speech will be limited to those which are deemed relevant to the pur-
poses of the present study. These studies can be roughly divided into three groups--studies relating to: (1) comprehension, recall, and retention, (2) effects of training, and (3) acceptability of compressed speech as an educational medium.

Prior to reviewing and discussing these studies some problems involved in the studies as well as common characteristics in experimental procedures will be discussed for a more thorough understanding of the findings. First, one characteristic common to many studies is the procedure employed in producing compressed speech material for experimentation. The selected material was typically read by trained and experienced male oral readers, and the well-rehearsed reading was recorded in a sound-proof recording room to insure the production of quality recordings. The recorded material was then compressed to various degrees in many studies through a speech compressor such as the Tempo Regulator, whose design is based upon that of Fairbanks and his associates. Different procedures for compression produce different final products not only in terms of their general acoustic quality but also in terms of the effects of rate changes upon intelligibility. There is a difference, for instance, between speech compressed by the Tempo Regulator, which electronically deletes brief segments of recorded speech signals, and speech compressed by altering only pause time. The latter process does not delete any portion of the recorded speech signal. Second, subjects for most studies were those who had no exposure to compressed speech prior to the experiments. Third, care was taken to provide optimal listening condition for subjects,
sometimes including the provision of earphones.

A serious problem arises when the results of studies on compressed speech are compared, due to the fact that there is no common practice in specifying degree of compression to which recorded material has been subjected (Foulke & Sticht, 1969). Degrees of compression are most frequently specified in terms of words per minute. The problem of measuring the degree of compression by counting words per minute is not only that words vary in length but that different samples of prose vary in the average length of their words (Carroll, 1966). Carroll proposes that words per minute measurements be abolished in favor of using the syllable as the unit of speech output for measuring speech rate.

The amount of compression may also be expressed by the percentage of the original recording time saved by compression, or conversely by the percentage of the original time left after compression. An alternative expression is the amount of acceleration over the original word rate or recording speed, for example, 2.5 times the original speed. The difficulty involved in comparing these two indices is that the relationship between the two is not linear. An increase in speed from 1.1 to 1.2, for instance, corresponds to an increase in compression from 9% to 17%, while an increase in speed from 1.9 to 2.0 corresponds to a change in compression from 47% to 50% (Foulke & Sticht, 1969).

While the percentage of listening time reduction is a useful measure when a major concern lies in the amount of time reduction
for listening, it does not indicate the word rate of compressed speech. Speed of speech at any percentage level of compression depends upon the speech rate of the original, noncompressed speech, which could vary from a conversational word rate of 125 (Foulke & Sticht, 1969) to the maximum of 220wpm for oral reading (CRCR, 1970d). In the studies to be reviewed in this section, a variety of initial word rates as well as a variety of compression levels were used in addition to the varied indices of compression level. Such variation across studies in the rate of input to the listeners makes it difficult to compare their findings.

**Comprehension, recall, and retention**

**Rate of presentation.** The applicability of compressed speech to education depends to a great extent upon its effects on listener comprehension, recall, and retention. Therefore, it is hardly surprising that a majority of studies have focused on listener comprehension or immediate recall of compressed speech with a few studies being devoted to retention. The degree of compression at which comprehension or recall shows a significant decline depends upon various factors such as the type of material, ability of the individual, motivation, and quality of the recording. Most studies have shown that a moderate amount of compression (250-300wpm) does not affect comprehension, recall, or retention significantly and that efficiency, as measured by learning per unit of time, is superior at rates faster than the normal rate.
A typical experimental procedure for studying comprehension (or recall) is for the subjects to first hear a recorded selection compressed by various degrees and then to be tested for their comprehension of the selection. Any kind of test of comprehension may be used, but most researchers have chosen objective tests, mainly multiple-choice questions, whose reliability has been established.

Fairbanks, Guttman, and Miron (1957b), using young male Air Force trainees as subjects, investigated the effects of compression upon the comprehension of two technical messages on meteorology.

Five groups of 36 subjects each listened to the message at 0% compression (141wpm) and at compressed levels of 30%, 50%, 60%, and 70%, respectively. At 50% compression (282wpm), comprehension was slightly less than 90% of that for subjects who listened to noncompressed versions, and efficiency, or learning per unit of time, was at its maximum in this study. Listener aptitude as measured by the Technical Specialist Aptitude Test significantly affected comprehension. The authors concluded that when the message presentation rate was slowed down beyond a certain point the increment in learning seemed to become costly in terms of the time spent listening and that this cost should be weighed in terms of the objectives.

In another study (Foulke, Amster, Nolan, & Bixler, 1962) 291 blind students in the 6th, 7th, and 8th grades were tested for their comprehension of compressed speech of literary and scientific material. The material was compressed to 175, 225, 275, and 325wpm, and for the literary material a 375wpm rate recording was added.
literary material, the mean comprehension score from braille reading was found to be the highest, and scores progressively decreased as listening word rates increased. However, it is significant to note that the mean braille reading rate for the literary material was 70wpm, and comprehension at 175 and 225wpm, although lower, was not significantly different from those scores obtained by braille reading. Between 275 and 325wpm, comprehension showed a marked decline.

Comprehension of scientific material was greatest at 175wpm followed by braille reading. Although comprehension started to decline between 175 and 225wpm, no significant difference was found between comprehension at rates of 175, 225, and 275wpm on one hand and comprehension by braille reading on the other. The rate of braille reading was found to be 57wpm for the scientific material in this study.

In general, comprehension at 275wpm, a rate which is even faster than the median silent reading rate of 215wpm for sighted 7th graders, was almost as good as comprehension through braille reading or listening at 175wpm. In terms of efficiency, subjects learned more at 325 and 375wpm than they did reading the material in braille.

In a study using five different newscasters for recording five different newscasts at rates of 125, 150, 175, 200, and 225wpm, Nelson (1948) found that 250 college freshmen scored highest on 25 multiple-choice questions at 125wpm and poorest at 225wpm, but the difference was not significant. A slight increase in mean scores was
observed between 175 and 200wpm.

Using a narrative passage presented at rates ranging from 78 to 428wpm at increasing increments of 50wpm, Woodcock and Clark (1968) reported that immediate and one-week retention of the material by elementary school children with average and low IQ's was greatest at 78wpm and declined thereafter. However, immediate retention showed an increase at 178wpm for average IQ children and at 228wpm for low IQ children. Similarly, retention after one week was best at 78wpm and declined as the rate increased but improved again at 228wpm. The immediate and one-week retention of children with high IQ's was relatively low at 78wpm and built up to a peak at 128wpm. The performance curve then dropped to a low at a rate of 278wpm but showed an increase at 328wpm and 378wpm. Rates of 228 to 328wpm were the most efficient rates while 178, 128, and 78wpm appeared relatively inefficient.

Similar findings were also reported by others. A report on experimentation at the Ohio State School for the Blind (CRCR, 1969e) indicated that "average" 4th graders were found to read braille and/or large print at 47wpm with 79% comprehension, whereas they could listen to recorded material at both 175 and 192wpm with 74% comprehension, and 210 and 230wpm with 71% comprehension. In his doctoral dissertation study with elementary school children, Wood (CRCR, 1968d) found 90% comprehension at rates up to 350wpm. In Reid's study (1968), listener comprehension increased between 175 and 275wpm and then decreased between 275 and 375wpm. At 325wpm, however, compre-
hension was about the same as it was at 175wpm. No significant difference in 4th graders' comprehension of narrative passages up to 252wpm was reported by another author (CRCR, 1969b). High school students in one study tolerated compression as high as 275 and 325wpm without a significant loss in comprehension (CRCR, 1968a). Another group of high school students performed almost equally well on 15 multiple-choice questions on seven different stories which were presented at progressively faster reading rates--125, 150, 175, and 200wpm (Harwood, 1955). Langford (1968) reported that comprehension did not fall significantly even at 275 and 325wpm. No significant effect upon comprehension attributable to rate increases from 126 to 272wpm was observed in Diehl, White, and Burk's study (1959). George (1970) reported that 88 college freshmen showed the lowest one-day and one-week retention at a normal rate of 175wpm and the greatest retention at 375 wpm. Based on his data from a study on recall and retention of college lecture material presented at compressed (1/3 reduction in time) and noncompressed levels, Barabasz (1968) concluded that college lectures could be presented faster, reducing presentation time, without any significant loss in recall and retention, and that college level courses could be profitably supplemented with compressed lectures.

Nolan and Morris (1969), on the other hand, reported that comprehension of noncompressed material (174wpm) was superior to that of compressed material (225wpm). In Goldhaber's studies (1968, 1970), the subjects' comprehension and factual content recall decreased sig-
nificantly between rates of approximately 170wpm and compressed levels of 325 and 330wpm. It should be noted, however, that in his studies no compression levels of less than 325wpm were included. Recall might not have been significantly affected at lower compression levels.

Staffen (1969) conducted an experiment with emotionally disturbed children using both compressed (228 and 278wpm) and expanded speech (128wpm). Though nonsignificant, trends shown through the performance curve indicated that hyperactive children preferred and learned better at 228wpm, while withdrawn children preferred and learned better at the expanded rate and normal rate (178wpm).

To summarize, despite the differences in the age of subjects and listening selections chosen for these studies, the data clearly indicate that compressed speech is highly comprehensible. Comprehension, immediate recall and retention tend to decline as the degree of compression increases, but a moderate amount of compression can be well tolerated without serious losses. Moreover, when the efficiency, as determined by the amount of learning per unit of time, is taken into consideration, listening at a rate somewhere between 280 and 375wpm appears to be most efficient.

Some of the studies reviewed above and other studies (Orr, Friedman, & Williams, 1965; Orr & Friedman, 1965) showed that performance scores decreased as presentation rates increased, but improved again at higher levels of compression. The improvement shown in comprehension, recall, or retention may be attributable to a better
concentration on the part of listeners as speech rate more closely approximates their thought rates, allowing less chance for the mind to wander.

There is an indication, though very tentative, that hyperactive children prefer and perform better in listening comprehension at a rate faster than usual, while withdrawn children prefer slowed down speech.

**Repeated presentations.** Some investigators studied the effects of repeated presentations of compressed speech upon comprehension with the idea that repeated presentations might improve comprehension. In Fairbanks, Guttman, and Miron's study (1957a), 36 Air Force trainees were presented with technical messages on meteorology two consecutive times. One message was not compressed and the other was compressed by 50% (282wpm). An analysis of data showed that comprehension increased significantly for double presentations, but there was no significant difference in comprehension between double presentations at the noncompressed level and double presentations at the 50% level of compression. Double presentations of 50%-compressed material was found to have only a small advantage as compared to a single presentation of noncompressed material.

Sticht (1970) also compared the listeners' comprehension of a message which was compressed and presented in a paired sequence (36% & 59%, 59% & 36%, 46% & 53%, or 53% & 46% compression) with the comprehension of the same message presented once in either a compressed version (36% or 59%) or a noncompressed version (175wpm). The re-
sults showed that both groups of subjects with high and low aptitude improved their comprehension of the compressed message with double presentations. But none of the double presentations improved comprehension over what was obtained with a single presentation of the noncompressed message.

The effect of presentation patterns upon the comprehension of compressed speech was investigated in a study conducted by Jester and Travers (1967). Eight reading passages were presented to 120 college students under three conditions—a constant rate condition of 263 wpm, an ascending rate condition in the order of 200, 250, 263, 300, and 350 wpm, and a decreasing rate condition in the reverse order of the same rates. Under the ascending rate condition, comprehension showed little gain after the second presentation of the material, while under the decreasing rate condition learning continued to improve and reached a higher level of learning than it did under either of the other conditions. The constant rate condition yielded results roughly between the other two. The final measures of comprehension under the three conditions did not differ significantly from one another. However, it appeared that in terms of time spent in learning, both the decreasing rate and constant rate condition were more profitable than was the ascending rate condition. The learning curves under the decreasing and constant rate conditions did not appear to reach their upper limit even at the last presentation at a rate of 250 wpm, while under the ascending rate condition the 300 and 350 wpm trials were not productive learning experiences.
On the basis of the studies reviewed above, it appears that using the time saved through compression for presenting the same material again is not likely to increase learning over what could be learned by listening to noncompressed versions only once. Sticht (1970) suggests that the time saved be more profitably used for purposes other than to increase the learning of a given group of people per unit of time. One study indicated that the presentations of material at decreasing rates or repeated presentations at a constant level of compression appear to be more productive as compared to presenting material at increasingly faster rates.

**Listening aids.** No aid to listening, such as the use of key words prior to listening or simultaneous presentation of visual material, has been shown to be a significant aid to comprehension. The idea that comprehension and retention of compressed speech might be helped by visual aids was tested by Loper (1967). Visual augmentation did not increase comprehension and aided retention only at high degrees of compression. Orr and Friedman (1967) conducted an experiment in which subjects were given a short time to study a précis of the recorded passage or to examine a list of key words drawn from the passage prior to listening to the compressed passage. Contrary to Orr and Friedman's expectation, the listening aids failed to produce any significant difference in comprehension.

**Other variables affecting comprehension.** In addition to the presentation rate, various factors have been reported to influence
the comprehension of compressed speech, though findings from studies are not always in agreement. It is generally believed that in the aged the rate of information processing is reduced (Sticht & Gray, 1969), and thus the aged are not expected to comprehend compressed speech as well as the young. Luterman, Welsh, and Melrose (1966), however, did not find a significant effect of old age upon response to compressed speech. Evidence was provided by Nolan and Morris (1969) that children in upper elementary grades comprehend compressed speech better than do those in lower elementary grades. A positive relationship between age-grade level of children and comprehension of compressed speech was also reported to have been found by others (Foulke & Sticht, 1969).

Significantly better performance among male students at all compression levels as well as for all difficulty levels of material used was demonstrated in Goldhaber's study (1968). The findings of Langford (CRCR, 1968a) and Friedman et al. (1967) do not support Goldhaber's results. Nor do other studies reviewed by Foulke and Sticht (1969) confirm sex-related differences in the comprehension of compressed speech.

Ability or aptitude has been found to be a variable which affects comprehension of compressed speech (CRCR, 1968a; Fairbanks et al., 1957b; Friedman et al., 1967; Langford, 1968; Nelson, 1948; Sticht, 1968; Woodcock & Clark, 1968). In general, the greater the ability or aptitude, the better the comprehension of compressed speech. Individual differences in the ability to comprehend com-
pressed speech tend to become more pronounced as the rate of compression increases (Friedman & Johnson, 1968). Sticht (1968) suggested that at least a part of the reason for poor performance on the part of subjects with low aptitude might have been due to difficulties in discriminating and/or responding to speech sounds. On the other hand, Ernest (1968) and Wood (CRCR, 1968d) reported intellectual ability was not related significantly to the comprehension of compressed speech.

The extent to which comprehension and recall are affected by compression may also depend upon the difficulty of the listening material. Findings from studies indicate that material does make a difference (CRCR, 1970a; Ernest, 1968; Foulke et al., 1962; Nelson, 1948; Reid, 1968). It is generally considered that technical material is more difficult to comprehend than narrative material. It is not a simple task, however, to estimate the degree of difficulty of a listening selection. Formulas are available to estimate the difficulty level of reading material. They are used to specify the difficulty level of the material for studies on comprehension of compressed speech with the assumption that the difficulty level of material is the same for both visual and auditory receptions. The assumption, however, may not be defensible (Foulke & Sticht, 1969). According to Carroll (1964), comprehension of compressed speech would depend upon the characteristics of the recorded material, such as the grammatical complexity, the difficulty of the vocabulary, and the abstractness or technicality of the content.
Foulke and his associates felt through their experiences in the Rapid Speech Project at the University of Louisville that a reader's voice and style of reading seemed to affect the comprehension of compressed speech (Foulke, 1967). Reading at a fairly even rate and with moderate expression appears to be more intelligible when compressed than reading expressively with considerable variation in rate, pitch and timbre. A clear, crisp voice appears to be better at a compressed level than soft voices. However, in Foulke's study (1967) voice quality and reading style were found to affect comprehension not only at compressed rates but also at a normal rate (175wpm). There is some evidence that a male voice is preferable for compression purposes. It was reported that as the degree of compression increased from 20% to 50%, listening to a female voice became increasingly more difficult as compared to listening to a male voice (CRCR, 1968c).

To summarize, age, sex, ability of the listener, the nature of listening material, and reader's voice and reading style are among the variables which may affect the comprehension of compressed speech. Children seem to increase in their ability to comprehend compressed speech as they grow older. Sex of the listener may not be a significant variable though one study has shown significantly greater comprehension scores among males. Enough evidence is available to suggest that listener ability or aptitude differentially affects comprehension of compressed speech, especially at higher levels of compression. The higher the ability or aptitude, the better the comprehension. Different kinds of listening material exert differential ef-

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fects upon comprehension, but the level of difficulty appears to depend not so much on the topical category of the material, such as technical or narrative, as upon such characteristics of the material as the grammatical complexity, the vocabulary, and abstractness. The reader's voice quality and style of reading seem to affect comprehension both at the noncompressed and compressed levels. A male voice appears to be more suitable for compression.

Sources of loss in comprehensibility. The question as to whether the observed decline in comprehension is due to the rate of speech or due to signal distortion which results from the compression process has not been conclusively answered. The comprehension of connected discourse has been shown to deteriorate long before words become unintelligible (Foulke, 1969). For example, when connected discourse of 175wpm is compressed, comprehension starts to fall rapidly at a compression level of approximately 60% or less, whereas discrete words could be compressed to the same degree with little effect upon intelligibility (Foulke, 1969). Foulke (1968) observed that comprehension declines partly because of a reduction in time for processing information. Rocco (1970) conducted a study in which pause time was added at fixed intervals in presenting compressed material at 250, 300, and 350wpm with the idea that pause time might help the listener to process inputs. No profitable effect upon comprehension, however, was found attributable to the addition of pause time.

The effects of signal distortion due to compression might be attenuated by the high redundancy of the English language (Sticht,
1968). In Sticht's study, it was found that the signal distortion became noticeable with low-redundancy material.

Though research evidence is not conclusive, a decline in comprehension appears to be partially due to signal distortion and partially due to the speech rate which reduces the time for processing information.

**Effects of Training**

In exploring the applicability of compressed speech in education, Orr questioned whether people could be trained to better comprehend compressed speech. Evidence indicates that this is possible (Friedman et al., 1967).

Orr et al. (1965) reported a study on the trainability of listening comprehension with two groups of college students. Subjects in the experimental group were given several hours of practice a week for four weeks by listening to novels at a progressively faster speed each week. Though controls showed better comprehension initially at a higher speed, subjects in the experimental group overtook them after the first week of practice and maintained or improved their level of comprehension after that period. Even at 425wpm experimental subjects had better than 75% comprehension while subjects in the control group showed less than a 50% level of comprehension. The authors concluded that where 80% or better of normal speed comprehension was acceptable, only 8-10 hours of training would be necessary for listening to substantially faster speeds.
The findings were further confirmed in other experiments. In one study with college students (Orr & Friedman, 1967), the mean comprehension score at a rate of 375wpm improved with about five hours of practice to the extent that it was not statistically different from the mean comprehension score at 175wpm. In another study (Orr & Friedman, 1968), college students increased comprehension at 425wpm (2½ times the normal speaking rate) from approximately 40% of normal speed comprehension on the first day to 70% comprehension on the fifth day. This substantial increase occurred as a result of concentrated practice by listening to 12 novels played back at 425wpm, 7 hours a day for five consecutive days. The authors compared the results with their previous work in which three groups of students were given a total of 12-14 hours of practice distributed at about 1-2 hours a day, 2-3 days a week, over a period of 4-5 weeks. One group practiced with speeds gradually increasing from 325 to 425wpm; a second group, with gradually increasing speeds from 325 to 425wpm with 3-minute breaks every 10 minutes; the third group, with only high-speed practice at 425wpm. The first group improved comprehension at 425wpm up to 79% of normal speed comprehension, the second group 80%, and the third group 71%.

It appears that practice of 8-10 hours distributed over a period of time at gradually increasing rates of compression produces improvement in comprehension as good or better than intensive practice totaling more than three times as much invested listening time.

Conversely, Voor and Miller (1965) reported that college students
improved their comprehension of compressed material significantly through three trials at 380wpm but remained relatively unchanged after that. Adaptation time was only seven minutes or exposure to 2700 words of time-compressed speech.

These findings support the hypothesis that the comprehension of compressed speech can be improved by training, but they do not indicate optimal procedures for training.

Acceptability of Compressed Speech as an Educational Medium

Reactions expressed by those who have heard compressed speech have been favorable. Only a few studies have focused upon listener acceptance of compressed speech or preferred speed of presentation, and much information about the acceptability of compressed speech was obtained as a secondary outcome of studies. Authors have indicated that a moderate amount of compression is preferred by many to non-compressed speech, which listeners often find rather tedious (Woodcock & Clark, 1968). This is particularly true of the blind, who must obtain a great deal of information, either through braille or through recordings, and have been found most receptive to, and even enthusiastic about, the new technology of speech compression (CRCR, 1969e).

Foulke (1966a) reported that in his survey with a sample of 51 blind subjects between ages 14 and 56, 92% expressed their willingness to utilize time-compressed recordings, to which they were exposed through sample recordings. Twenty-five per cent of the subjects found

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a rate of 225wpm most satisfactory. Although the rate was the smallest amount of compression to which they were exposed through sample recordings, it was 45wpm faster than the original recording. Forty-five per cent of the subjects preferred a rate of 275wpm; 25%, 300wpm; and 8% as high as 350wpm. An examination between the expressed willingness to accept compressed speech and educational level revealed that the subjects with more than one year of college education were somewhat more reluctant to accept compressed speech than those with one year of college education or less. However, subjects with more education chose faster word rates as their preferred rates than did the subjects with less education. Similar rate preference was expressed by another group of 45 blind subjects, who chose 35% to 40% (236 to 245wpm) as their preferred rate (Iverson, 1956).

Given the freedom to determine their own rate of listening, what rate do people choose? Foulke and Sticht's experiment (1966), in which each subject directed the experimenter to adjust the word rate to the subject's most preferred rate, found that the mean preferred rate among the college students studied was 212wpm for males and 204wpm for females. Both word rates were more than one standard deviation above 175wpm, the rate at which the story was originally read. In a similar study (Orr, Friedman, & Graae, 1969), college students chose a mean rate ranging from the lowest of 1.16 times to the highest of 2.05 times that of the normal speed (175wpm) with an overall mean speed of 1.45 times the normal speed.

Nelson (1948), on the other hand, reported that college students
in his study reacted most favorably to 175wpm. Apparently due to the slowness of presentation, about 57% of these students also indicated that a rate of 125wpm would cause them to lose interest in the material being presented while 31.6% mentioned that 225wpm would result in a loss of interest possibly because of the rapidity of presentation. Though their most preferred rate was not high, the findings are consistent with the often-made comments among subjects in other studies that a moderate amount of compression improves their concentration (CRCR, 1967d; Orr & Friedman, 1968).

College students with normal vision appear to prefer speeds ranging somewhere between 175 and 255wpm, speeds a little lower than those preferred by the blind. The tendency for the blind to prefer faster word rates in comparison to the sighted may be accounted for by the fact that the blind must rely on listening much more than the sighted to obtain information and, as a result, are more accomplished listeners.

With respect to the kind of material which can be subjected to compression, 98% of the subjects in Foulke's study (1966a) responded that compression would be most suitable for narrative and nontechnical expositions. A similar opinion was also expressed by subjects in a study by Orr et al. (1965). Novel and technical information are considered unsuitable for compression (Foulke, 1966a). The use of compressed speech for lectures, reviews, and refresher courses was suggested by college students (Friedman et al., 1967).

It appears clear that people not only tolerate a certain amount
of compression for efficient information retrieval, but also prefer at least a moderate amount of acceleration in presentation rate for a variety of informational materials. It should be pointed out that subjects in the studies cited had no previous experience with compressed speech and that with some training, it might be possible for many of them to find even higher rates of presentation preferable than they chose at the time of the studies.

The following excerpt from a letter sent to the CRCR Newsletter editor (1968b) illustrates what hopes compressed speech may hold for some individuals.

For the past 15 years, as a college student, and now as a college teacher, I have been playing back all my records at speeds up to 60% faster than the recorded speed. Granted this distorts the voice, but it is not intolerable if the original recording is clear and is done with a man's voice with reasonable low pitch. I know of other blind students who quite consistently play their tapes back at double speed, since on tape recorders there is no middle ground.

... Many of us are hopeful that materials will be available in compressed form, ... I assure you, many of us have long been speeding up recorded materials and would not remain sane very long if we had to go back to dragging along at 160wpm. But if you can bring us to compressed speech also, more power to you (p. 3).

Summary and Implications

In this chapter a brief discussion of the historical background and current status of speech compression research was presented. Studies deemed relevant to the present study were reviewed and discussed.
Developments in compressed speech were first prompted by the discovery that speech could be interrupted systematically without seriously decreasing its intelligibility. The invention of an electromechanical method for speech compression and expansion further accelerated research on compressed and expanded speech both as a tool for educational and remedial endeavors and as a tool for basic research.

The major findings of the studies reviewed in this chapter are recapitulated below.

1. Comprehension, immediate recall, or retention tends to decline as the degree of compression increases. However, compression of approximately 250 to 300wpm, which is almost double the normal speaking rate, can be tolerated without significant loss in comprehension, recall, or retention.

2. Efficiency, as measured by the amount of learning per unit of time, appears greatest at a rate somewhere between 280 and 375wpm. In comparison, learning through listening at the normal rate appears less efficient.

3. Performance scores, whether they are of comprehension, recall, or retention, decrease as the degree of compression increases, but often improve again at higher levels of compression. A superior concentration on the part of listeners at higher compression levels seems responsible for the improvement.

4. Using the time saved through compression for presenting the same material again is unlikely to increase learning over what could
be learned by listening to a noncompressed version only once.

5. The presentations of material at decreasing rates or repeated presentations at a constant level of compression appear to be more profitable as compared to presenting material at increasingly faster rates.

6. Listening aids, such as the use of key words prior to listening and the simultaneous presentation of visual material, are not likely to improve comprehension significantly.

7. Variables such as the age, sex, ability of the listener, the nature of listening material, and the reader's voice and reading style may affect the comprehension of compressed speech. Findings, however, are not conclusive except for ability, for which enough evidence is available to suggest that the greater the ability, the better the comprehension, especially at higher levels of compression.

8. A decline in the comprehension of compressed speech appears to be partially due to signal distortion and partially due to the speech rate, which reduces the time for processing information.

9. The comprehension of compressed speech can be improved by training, but optimal procedures for training have not yet been determined.

10. People tend to prefer moderately compressed speech as opposed to a presentation at a slow speed, partly because of efficiency and partly because compressed speech helps their concentration.

Since these findings were based upon studies on reading passages to which speech compression was applied, they may not be necessarily
generalizable to dialogue, which differs in nature from oral reading. It must also be remembered that in most of the studies reviewed in this chapter, listening selections chosen for experimentation were read by trained readers under controlled conditions and recordings were assured of good acoustic quality. With spontaneous conversation, no control over the speakers' verbal interaction is possible. Generalizing the findings to a counseling dialogue may be further limited by the fact that a counseling dialogue differs from a casual everyday conversation in purpose, substance, and interactional processes. However, the natural differences among oral reading, everyday conversation, and counseling dialogue may not be as fundamental as they appear to be. It is quite possible that compressed counseling dialogue may be just as comprehensible as compressed oral reading material as long as the acoustic quality of the recording is guaranteed. At the very least, a dialogue should be comprehended as well at moderately compressed levels as it is at normal speed; at best, a dialogue may be grasped even better at compressed levels, as a slight increase in comprehension at higher levels of compression was evidenced in some studies reviewed in this chapter.

Listening to compressed counseling dialogue, thus, might provide both an effective and efficient way to recapture what has happened in the counseling session. Improved efficiency would mean more time for productive professional activities. It could mean improved supervision, since supervisors might be more willing to hear the entire tape, instead of portions of the tape, and thereby have better in-
sight into the total development of the counselor-client interaction. Moreover, it might well be that training in listening to compressed speech would help improve not only the ability to listen to compressed counseling dialogue but also listening skills in general, which are one of the basic skills needed by counselors.

The key question which cannot be answered through the previous studies and which the present study attempted to investigate is the question concerning the impact of compression upon affective qualities expressed in speech. Previous studies dealt only with the intellectual understanding of listening selections and provided no clues as to the possible effects of compression upon affective qualities which are especially prominent in a counseling dialogue. In listening to recorded counseling session, whether it is for the purpose of supervision, learning, review, or research, the import lies not so much in what is being talked about between the counselor and the client as in those elements which are considered therapeutically critical. These elements are manifested both by manner of speech and through words, by which emotional attitudes are inferred and through which the counselor's understanding of the client's problems is implied. If these elements were to be grossly affected by compression, it would be unwise to apply compression to counseling dialogue. The question as to the effects of compression upon affective dimensions as well as upon comprehension in counseling dialogue must first be investigated. The present study was conducted to investigate that question.
CHAPTER IV

DESIGN AND METHODOLOGY

In this chapter design and methodology will be discussed under the following headings: (1) Subjects, (2) Experimental Tapes, (3) the Whirling Dervish, a Speech Compressor, (4) Content Comprehension Tests, (5) Procedures, (6) Instrumentation, (7) Analysis of Data, and (8) Null Hypotheses.

Subjects

A total of 25 counselors and counselor educators, who were engaged in professional activities in southern Michigan, served as subjects for this study. These subjects, 16 males and 9 females, were selected on the basis of their professional qualifications and experiences as counselors and counselor educators and agreed to participate in the experiment. Since the study was concerned with the application of speech compression to counselor education and supervision, counselor educators and those counselors who were taking part in counselor education as supervisors were preferred subjects. Out of the 25 subjects nine held doctoral degrees and 16 held master's degrees, which qualified them as counselors and counselor educators. Nine out of the 16 subjects with a master's degree were completing their doctoral degree programs in counseling or counselor education at the time of the study and most of the remaining seven subjects had
additional training beyond their master's degree.

Subjects' levels of experience as counselors and as counselor educators is shown in Table 1. All the subjects except three were involved in counseling supervision as part of their professional responsibilities. None of the subjects had had previous experience with compressed speech.

Table 1

Levels of Experience of Subjects in Counseling and Counselor Education

<table>
<thead>
<tr>
<th>Levels of Experience Expressed in Years</th>
<th>Number of Subjects at Each Level of Experience in Counseling</th>
<th>Number of Subjects at Each Level of Experience in Counselor Educ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>0.5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1-5</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>6-10</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>11-15</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

Since these subjects represent only a small selected group of the entire population of counselors and counselor educators in the United States, they cannot be referred to as a representative sample of the population of counselors and counselor educators in this country. To what degree the professional characteristics of the subjects
in this study differed from those of a national normative sample of counselors and counselor educators is not known. However, in the light of the subjects' training and involvement in professional activities, it appeared that they represented a group of people whose interests and present professional responsibilities call for the use of audio recording for the purpose of instruction, learning, research, and supervision in the field of counseling and psychotherapy.

Experimental Tapes

Audio tapes prepared for the study consisted of five original noncompressed counseling tapes, 20 compressed versions of the five original tapes, and five duplicates of a sample tape which were used for introducing the subjects to the phenomenon of speech compression.

Five original counseling tapes were selected from among many tapes on the basis of several criteria enumerated below. One of the criteria was the sex of the counselor and the client. Only male counselor and male client combinations were chosen in order to control for variance due to sex differences. The quality of the counseling interaction was another criterion which was used in an attempt to introduce variation in the quality of counselor-client verbal exchanges among the experimental tapes. The acoustic quality of the recording was an important criterion imposed for the purpose of minimizing the effects of nuisance variables. Those tapes in which too much background noise was present were avoided since at increased compression levels, noise has a more pronounced distractive effect.
upon the listener. Reasonably good articulation on the part of the counselor and client was also a criterion selected to minimize possible nuisance variable effects. Those tapes containing excessive distracting noise (e.g., coughing and giggling) or characterized by the mumbling of the counselor and the client or by long periods of silence were excluded.

Five tapes which satisfied the criteria were finally selected by the investigator as experimental tapes. Out of five counseling sessions, two were conducted by highly experienced counselors, and three sessions were by counselor trainees at various levels of professional training. Three of the five clients were high school students, one was a graduate student, and another a citizen in the community. Clients' stated problems included social, vocational, and personal concerns.

The counseling sessions were recorded on a Roberts stereo tape recorder model 1721 at a speed of 7½rpm. For this study a segment of each tape lasting 30 minutes was chosen. A selected 30-minute portion of each counseling session was then re-recorded in full track on a Roberts model 192FT at 7½rpm. The quality of recordings was very good with the exception of minor background noise, which did not interfere with the counseling dialogue. The five tapes used in this study were numbered from one to five, at random, for the purpose of identification.

The five original 30-minute tapes were each compressed by 20%, 30%, 40%, and 50%. Each tape was then labeled with a two-digit num-
ber, the first digit designating the degree of compression and the second, the number assigned to the original tape. For example, Tape No. 01 represented the noncompressed tape No. 1. Tape No. 25 signified the original tape No. 5 compressed by 20%.

The approximate speed of each counseling dialogue was estimated by averaging the numbers of words and syllables in five randomly selected one-minute periods of the counseling session. The word rates of five noncompressed counseling dialogues were found to vary from 143wpm to 175wpm and their syllable rates ranged from 175 syllables per minute (spm) to 218spm. Within individual tapes the word rates of five sample periods fluctuated by 40 words above or below the mean. Table 2, p. 63 presents word rates and syllable rates for each one of the five tapes at all compression levels. The word rates made it possible to compare the findings of the present study with previous findings, since most studies reported words per minute as a measure of speed. The syllable rates were included since, as Carroll (1966) suggested, syllables per minute may be a more appropriate measure of speed, especially in comparing findings of studies on compressed speech using material widely differing in vocabulary, subject matter, and the average length of words.

In order to acquaint subjects with the phenomenon of compressed dialogue, a sample tape was made which presented a 3-minute dialogue followed by its 20%, 30%, 40%, and 50% compressed versions. The degree of compression was not indicated in the sample tape.
Table 2

<table>
<thead>
<tr>
<th>Compression</th>
<th>Tape 1</th>
<th>Tape 2</th>
<th>Tape 3</th>
<th>Tape 4</th>
<th>Tape 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>wpm</td>
<td>spm</td>
<td>wpm</td>
<td>spm</td>
<td>wpm</td>
</tr>
<tr>
<td>0%</td>
<td>146</td>
<td>175</td>
<td>152</td>
<td>189</td>
<td>175</td>
</tr>
<tr>
<td>20%</td>
<td>179</td>
<td>212</td>
<td>190</td>
<td>239</td>
<td>208</td>
</tr>
<tr>
<td>30%</td>
<td>204</td>
<td>245</td>
<td>219</td>
<td>274</td>
<td>241</td>
</tr>
<tr>
<td>40%</td>
<td>236</td>
<td>285</td>
<td>251</td>
<td>313</td>
<td>280</td>
</tr>
<tr>
<td>50%</td>
<td>281</td>
<td>338</td>
<td>296</td>
<td>370</td>
<td>340</td>
</tr>
</tbody>
</table>

The Whirling Dervish, A Speech Compressor

The compression of the tapes was accomplished through the use of a speech compressor, the Whirling Dervish, designed and manufactured by Discerned Sound (see Figures 1 and 2, pp. 64-65).

Each 30-minute tape re-recorded on a Roberts tape recorder model 192FT in full track at 7⅞rpm was played on the same tape recorder, the capstan of which was changed for the degree of compression desired. Increasing the outer diameter of the capstan increased the speed at which the tape was played back. It was calculated that capstans with outside diameters of 0.5423, 0.6199, 0.7227, and 0.8676 inches would be needed to compress tapes to 20, 30, 40, and
Fig. 1. Front view of the Whirling Dervish designed and manufactured by Discerned Sound, North Hollywood, California. (1) Knob—engages Pinch Roller which, coupled with rotating capstan, puts tape loop in motion; (2) Capstan; (3) Pinch Roller—comes in contact with capstan when knob is at "on" position; (4), (5), & (6) Tape Guides; (7) Recording Head; (8) Spindle—a mounting for four playback heads; (9) Erasure Head; (10) Tape Loop; (11) Bin for tape loop; (12) Spindle Direction Control—knob is turned to the left for compression and to the right for expansion; (13) Spindle Speed Control; (14) Smoothing Control. (The original photograph was provided through the courtesy of Discerned Sound.)
Fig. 2. Rear view of the Whirling Dervish. (The original photograph was provided through the courtesy of Discerned Sound.)
50% respectively. Capstans were cut from brass roll stock on a Unimat-SL table lathe model No. DB 200. They were within -0.0009 to +0.0003 inches of the required dimensions.

Audio signals transmitted through shielded cable to the Whirling Dervish were recorded on a loop of specially lubricated tape housed in a bin and rotating at a constant rate over a recording head. The message recorded on the tape loop passed over a rotating spindle with four playback heads, precisely placed 90° apart on the circumference of the spindle.

Both the tape loop and the spindle of the Whirling Dervish rotate in a counter-clockwise direction for compression. Playback heads mounted in the spindle relay portions of the recorded signals, and those signals not transmitted are ultimately discarded. The discard sample size is 19 milliseconds at a tape loop speed of 32ips when the tape is played back with no change in speed. As the speed of playback increases, the discard interval size also increases. The speed of the spindle can be regulated by advancing the Spindle Speed Control, which operates to compensate for pitch distortion due to the speeding up of the playback. Undesirable clicking noise which may be present in some material can be partially muted by use of the Smoothing Control.

The output signal from the Whirling Dervish is transmitted to another tape recorder where it is recorded in compressed form. The signal remaining on the tape loop is erased as it passes over an erasure head before the tape loop records a new signal from the
original tape.

In the present study, Roberts tape recorder model 1725 was used to re-record the output of the Whirling Dervish. The re-recorded product was the compressed counseling dialogue used for this experiment.

Content Comprehension Tests

Content comprehension tests used in this study were constructed by the investigator. Originally a pool of 35 true-false items for each tape was made after careful listening to the tapes. The items were intended to be simple statements of a factual nature based on what was actually verbalized in the sessions. For example, items concerning the client such as "It was his mother who disciplined the client when he was a child," and "The client thinks that his father should be a policeman," were derived from the client's clear verbalizations. Items such as "The counselor tried to find out how the client was doing at school," and "The counselor tried to help the client decide on his future vocational goals," were based on distinct verbal activity of the counselor.

These items were examined by two counselor educators who listened to the tapes, and, on the basis of their judgments, minor changes and refinements in content and phraseology were made. The tentative comprehension tests were further administered to five groups of four to six counselor trainees who listened to the tapes in order to determine whether the test items would be responded to
in the way the investigator intended. As a result of the responses
and feedback from these students, additional minor changes in word-
ing were made and some misleading items were eliminated. An ex-
ample of a misleading item which was excluded is the statement,
"The client is angry at his parents." It was meant to be a false
statement since the client never mentioned an angry word about his
parents in the counseling session. However, despite the instruction
that the answers should be based upon what was actually said in the
session, most students marked the item as true, probably because
the client talked about his childhood as a miserable one without
love or warmth, and it was likely that the client was angry. Such
items which had a tendency to invite differing interpretations and
inferences and were considered to reduce the reliability of the
tests were eliminated.

The 30 items (15 true and 15 false) included in the final con-
tent comprehension test for each tape were factual in nature and
required minimal interpretation and inference. Although no reli-
ability and validity measures were sought, it appeared reasonable
to assume that the tests would provide measures of comprehensibility
of five tapes used in this study. It was expected that, upon care-
ful listening at the original speed, most subjects would respond to
the items with better than 90% accuracy. The sample items from the
five comprehension tests are presented in Appendix B.
Procedures

Twenty-five subjects were randomly assigned to five groups with five subjects each--Group A, B, C, D, and E. The random assignment of the subjects was accomplished by drawing each subject's name and assigning the individual to one of the groups. The group to which the individual was assigned was simultaneously randomly selected by drawing from a pool of 25 slips of paper designated with alphabet letters from A through E.

Tapes had been assigned to five groups previous to the assignment of subjects to groups. Thus the random assignments of subjects to groups and groups to treatments (five sets of tapes) were accomplished. Tapes were grouped in such a way that each group of subjects listened to one noncompressed tape followed by four different tapes with differing degrees of compression (see Table 3). All sub-

Table 3
Assignment of Tapes to Groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Tapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>01</td>
</tr>
<tr>
<td>B</td>
<td>02</td>
</tr>
<tr>
<td>C</td>
<td>03</td>
</tr>
<tr>
<td>D</td>
<td>04</td>
</tr>
<tr>
<td>E</td>
<td>05</td>
</tr>
</tbody>
</table>

Note.--The first digit indicates the degree of compression and the second digit, the number assigned to the original tapes for the purpose of identification.
jects always heard tapes in an order of increasing degrees of compression. No subject listened to the same tape twice, which eliminated possible contamination from previous exposure to the tape. All the subjects, however, listened to all the tapes at some level of compression.

For the purpose of establishing a baseline for each tape and providing a measure of validation for the subjects' evaluation of the tapes, three judges selected for the study also listened to the five counseling tapes at the original noncompressed speed and evaluated them according to the four Truax scales. The qualifications for the judges were defined in terms of their professional training at the doctoral level, experience, and active engagement in counselor education or the practice of counseling. The three judges selected all had doctoral degrees, averaged 16 years of experience in counseling, averaged 10 years of experience in counselor education, and were professionally involved in counseling and counselor education at the time of the study.

On the basis of the judges' composite ascribed value for each tape (the sum of the value for each one of the four process variables), the experimental tapes were rank-ordered from one through five, one being the tape with the highest ascribed value and five, the lowest value. The rank-order thus obtained from the judges was later correlated with the rank-order obtained by combining the subjects' four process variable values for each tape at the original speed. The results of the rank-order correlation reflected the
degree of agreement between the evaluation by the judges, who were chosen for their knowledge and experience in the field, and the evaluation by the subjects.

Tapes were distributed to the subjects during the months of April, May, and June of 1971. A form letter, step-by-step directions, a set of four Truax scales, and five envelopes, each containing a set of four Truax scales, a content comprehension test, and a questionnaire for each tape, were also given to the subjects. Each one of the five envelopes carried a number corresponding to one of the five tape numbers and was to be opened by the subjects after having listened to the tape.

Before listening to the experimental tapes, the subjects were requested to familiarize themselves with the Truax scales. Each subject was asked to listen to the sample tape once and then to listen to each one of the five experimental tapes only once in the order shown in Table 3, p. 69. The degrees of compression of the tapes were not disclosed to the subjects in order to prevent possible biased responses. Listening to tapes only once on the best tape recorder available was particularly emphasized in the communication with each subject.

After listening to each experimental tape, the subjects evaluated the tape according to the four Truax scales (see Appendix A) and took a comprehension test which consisted of 30 true-false questions. The one possible value which a subject could assign to a tape on the scale for accurate empathy ranged from one to nine; on
the scales for nonpossessive warmth and genuineness, from one to five; on the scale for depth of self-exploration, from zero to nine. On the content comprehension tests, the minimum obtainable score was zero and 30 was the maximum.

The subjects were also requested to complete a questionnaire, prepared for each tape, which provided information concerning the subjects' professional experiences, highest degree held, subjective opinion on the quality of the recording to which he had just listened, personal reactions to the speed at which the counseling session was presented, previous experience with speech compression, and any other comments about the experience with compressed counseling tapes (see Appendix C).

Since it was expected that subjects might find it difficult to understand counseling dialogue at higher degrees of compression, the subjects were asked to complete all the items even if their responses were little more than a guess.

The design of the study was a 5 X 5 factorial analysis. Five levels of compression and five different counseling tapes were the independent variables. The dependent variables were scores obtained through the four Truax scales and a test of comprehension of the verbal content of each counseling session.

Instrumentation

Counselor's accurate empathy, nonpossessive warmth, genuineness, and client's depth of self-exploration were operationally de-
fined as the values on the Truax Tentative Scale for the Measurement of Accurate Empathy, of Nonpossessive Warmth, of Genuineness, and of Depth of Self-Exploration, which the subjects marked after listening to each tape.

Inter-rater reliabilities of the Truax scales for accurate empathy, nonpossessive warmth, and genuineness from 28 studies and those of the scale for depth of self-exploration from 12 studies have been reported by Truax and Carkhuff (1969, pp. 45 & 195). Reliabilities of scale for accurate empathy range from .43 to .95 with a mean of .75; those of scale for nonpossessive warmth, from .48 to .95 with a mean of .71; those of scale for genuineness, from .25 to .95 with a mean of .62; and those of scale for depth of self-exploration, from .59 to .88 with a mean of .72.

Aside from face validity, other types of validity for the Truax scales are not available. However, a number of studies have been conducted using these scales, and the results indicated that what was measured on these scales was significantly related to the therapeutic outcome of a variety of clients. Thus research findings provide some evidence that the scales measure some therapeutically important elements, whatever they may be called (Truax & Carkhuff, 1969).

The comprehension of each counseling dialogue was defined by the scores obtained by the subjects on a test of 30 true-false items of a factual nature which required minimal interpretation and inferences.
Analysis of Data

The data were analyzed by a two-way analysis of variance. The main effects of varying degrees of compression and five tapes of five different counseling sessions upon four process variables and content comprehension were statistically determined. Also tested was the interaction effect between the degree of compression and differing tapes upon four process variables as well as upon comprehension.

Spearman rank-order correlation was applied to determine the degree of agreement between the rank-ordering of the five tapes derived from the subjects' evaluation of the tapes and the rank-ordering obtained through the judges' evaluation of the same tapes.

Null Hypotheses

The following null hypotheses were tested in this study.

H1: Time-compression of counseling dialogue does not significantly affect the evaluation of accurate empathy.

H2: Time-compression of counseling dialogue does not significantly affect the evaluation of nonpossessive warmth.

H3: Time-compression of counseling dialogue does not significantly affect the evaluation of genuineness.

H4: Time-compression of counseling dialogue does not significantly affect the evaluation of depth of self-exploration.

H5: There is no significant difference in the accurate empathy
value among five different counseling tapes.

H6: There is no significant difference in the nonpossessive warmth value among five different counseling tapes.

H7: There is no significant difference in the genuineness value among five different counseling tapes.

H8: There is no significant difference in the depth of self-exploration value among five different counseling tapes.

H9: Time-compression of counseling dialogue does not significantly affect the comprehension of counseling dialogue.

H10: There is no significant difference in comprehensibility among five different counseling tapes.

H11: The tape-by-compression interaction does not significantly affect the evaluation of accurate empathy.

H12: The tape-by-compression interaction does not significantly affect the evaluation of nonpossessive warmth.

H13: The tape-by-compression interaction does not significantly affect the evaluation of genuineness.

H14: The tape-by-compression interaction does not significantly affect the evaluation of depth of self-exploration.

H15: The tape-by-compression interaction does not significantly affect the comprehensibility of counseling dialogue.
CHAPTER V

RESULTS AND DISCUSSION

Results

The data analyzed by a two-way analysis of variance, revealed a significant effect of compression, at the .05 level of significance, upon the subjects' evaluation of accurate empathy, but compression did not significantly affect the subjects' evaluation of nonpossessive warmth, genuineness, or depth of self-exploration (see Tables 6, 7, 8, & 9, pp. 79-80). Therefore, null hypothesis 1, stating that time-compression of counseling dialogue does not significantly affect the evaluation of accurate empathy, was rejected. The findings did not provide evidence to reject null hypotheses 2, 3, and 4, which stated that time-compression of counseling dialogue does not significantly affect the evaluation of nonpossessive warmth, genuineness, or depth of self-exploration.

The F ratios obtained for the main effect of tapes upon the evaluation of the four process variables were significant at the .001 level (see Tables 6, 7, 8, & 9, pp. 79-80). Stated another way, the five counseling tapes showed significant difference in the values of the four process variables tested. Thus null hypotheses 5, 6, 7, and 8, stating that there is no significant difference in the values of accurate empathy, nonpossessive warmth, genuineness, and self-exploration among five different counseling tapes, were
rejected.

Compression was found to affect content comprehension at the .001 level of significance (see Table 10, p. 80). Therefore, null hypothesis 9, stating that time-compression of counseling dialogue does not significantly affect the comprehension of counseling dialogue, was rejected.

A nonsignificant F ratio was obtained for the main effect of tapes upon content comprehension, which means that the five tapes were not significantly different in their comprehensibility (see Table 10, p. 80). Thus null hypothesis 10, asserting that there is no significant difference in comprehensibility among five tapes, was not rejected.

No significant tape-by-compression interaction effects were found to operate upon any one of the four process variables tested or upon content comprehension (see Tables 6, 7, 8, 9, & 10, pp. 79-80). Therefore, there was no reason to reject null hypotheses 11, 12, 13, 14, and 15, which stated that the tape-by-compression interaction does not significantly affect the evaluation of accurate empathy, nonpossessive warmth, genuineness, and depth of self-exploration or comprehensibility of counseling dialogue.

Means and standard deviations of values obtained for each process variable and of content comprehension scores at differing levels of compression, as well as for five different counseling tapes, are shown in Tables 4 and 5, p. 78.
### Table 4

Means and Standard Deviations
of Process Variable Values and Comprehension Scores
Obtained for Five Tapes

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tape 1</th>
<th></th>
<th>Tape 2</th>
<th></th>
<th>Tape 3</th>
<th></th>
<th>Tape 4</th>
<th></th>
<th>Tape 5</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Empathy</td>
<td>3.00</td>
<td>1.96</td>
<td>7.36</td>
<td>1.87</td>
<td>4.08</td>
<td>2.33</td>
<td>5.24</td>
<td>2.17</td>
<td>3.48</td>
<td>2.33</td>
</tr>
<tr>
<td>Warmth</td>
<td>3.20</td>
<td>0.71</td>
<td>4.24</td>
<td>0.97</td>
<td>2.36</td>
<td>1.32</td>
<td>3.76</td>
<td>1.05</td>
<td>2.52</td>
<td>1.23</td>
</tr>
<tr>
<td>Genuineness</td>
<td>3.32</td>
<td>1.07</td>
<td>4.32</td>
<td>0.94</td>
<td>2.76</td>
<td>1.20</td>
<td>3.88</td>
<td>1.13</td>
<td>2.84</td>
<td>1.14</td>
</tr>
<tr>
<td>Self-Exploration</td>
<td>2.60</td>
<td>1.94</td>
<td>6.64</td>
<td>1.32</td>
<td>4.04</td>
<td>1.77</td>
<td>4.08</td>
<td>1.58</td>
<td>3.88</td>
<td>2.05</td>
</tr>
<tr>
<td>Comprehension</td>
<td>24.00</td>
<td>5.09</td>
<td>25.44</td>
<td>2.80</td>
<td>23.96</td>
<td>3.10</td>
<td>23.68</td>
<td>3.55</td>
<td>24.24</td>
<td>3.61</td>
</tr>
</tbody>
</table>

### Table 5

Means and Standard Deviations
of Process Variable Values and Comprehension Scores
Obtained for Five Compression Levels

<table>
<thead>
<tr>
<th>Variables</th>
<th>0%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Empathy</td>
<td>4.20</td>
<td>2.41</td>
<td>4.92</td>
<td>2.43</td>
<td>4.16</td>
</tr>
<tr>
<td>Warmth</td>
<td>3.08</td>
<td>1.19</td>
<td>3.20</td>
<td>1.56</td>
<td>3.00</td>
</tr>
<tr>
<td>Genuineness</td>
<td>3.28</td>
<td>1.31</td>
<td>3.52</td>
<td>1.36</td>
<td>3.16</td>
</tr>
<tr>
<td>Self-Exploration</td>
<td>4.48</td>
<td>1.83</td>
<td>4.52</td>
<td>2.52</td>
<td>3.44</td>
</tr>
<tr>
<td>Comprehension</td>
<td>26.04</td>
<td>2.26</td>
<td>26.00</td>
<td>2.40</td>
<td>25.52</td>
</tr>
</tbody>
</table>
Table 6

Analysis of Variance for Compression Effects upon Accurate Empathy Values

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>24</td>
<td>413.47</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tapes (T)</td>
<td>4</td>
<td>302.67</td>
<td>75.67</td>
<td>17.28*</td>
</tr>
<tr>
<td>Compression Levels (CL)</td>
<td>4</td>
<td>47.47</td>
<td>11.87</td>
<td>2.71**</td>
</tr>
<tr>
<td>T X CL</td>
<td>16</td>
<td>63.33</td>
<td>3.96</td>
<td>0.90</td>
</tr>
<tr>
<td>Within</td>
<td>100</td>
<td>437.60</td>
<td>4.38</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>851.07</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the .001 level.
**Significant at the .05 level.

Table 7

Analysis of Variance for Compression Effects upon Nonpossessive Warmth Values

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>24</td>
<td>90.37</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tapes (T)</td>
<td>4</td>
<td>64.05</td>
<td>16.01</td>
<td>14.17*</td>
</tr>
<tr>
<td>Compression Levels (CL)</td>
<td>4</td>
<td>4.61</td>
<td>1.15</td>
<td>1.02</td>
</tr>
<tr>
<td>T X CL</td>
<td>16</td>
<td>21.71</td>
<td>1.36</td>
<td>1.20</td>
</tr>
<tr>
<td>Within</td>
<td>100</td>
<td>112.80</td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>203.17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8

Analysis of Variance for Compression Effects upon Genuineness Values

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>24</td>
<td>69.33</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tapes (T)</td>
<td>4</td>
<td>45.09</td>
<td>11.27</td>
<td>9.31*</td>
</tr>
<tr>
<td>Compression Levels (CL)</td>
<td>4</td>
<td>6.13</td>
<td>1.53</td>
<td>1.26</td>
</tr>
<tr>
<td>T X CL</td>
<td>16</td>
<td>18.11</td>
<td>1.13</td>
<td>0.93</td>
</tr>
<tr>
<td>Within</td>
<td>100</td>
<td>121.20</td>
<td>1.21</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>190.53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the .001 level.
**Significant at the .05 level.
Table 9

Analysis of Variance for Compression Effects upon Self-Exploration Values

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>24</td>
<td>292.91</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tapes (T)</td>
<td>4</td>
<td>216.11</td>
<td>54.03</td>
<td>18.63*</td>
</tr>
<tr>
<td>Compression Levels (CL)</td>
<td>4</td>
<td>27.15</td>
<td>6.79</td>
<td>2.34</td>
</tr>
<tr>
<td>T X CL</td>
<td>16</td>
<td>49.65</td>
<td>3.10</td>
<td>1.07</td>
</tr>
<tr>
<td>Within</td>
<td>100</td>
<td>290.40</td>
<td>2.90</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>583.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10

Analysis of Variance for Compression Effects upon Content Comprehension Scores

<table>
<thead>
<tr>
<th>Source</th>
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<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>24</td>
<td>877.49</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tapes (T)</td>
<td>4</td>
<td>47.17</td>
<td>11.79</td>
<td>1.43</td>
</tr>
<tr>
<td>Compression Levels (CL)</td>
<td>4</td>
<td>639.81</td>
<td>159.95</td>
<td>19.34*</td>
</tr>
<tr>
<td>T X CL</td>
<td>16</td>
<td>190.51</td>
<td>11.91</td>
<td>1.44</td>
</tr>
<tr>
<td>Within</td>
<td>100</td>
<td>826.80</td>
<td>8.27</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>1704.29</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the .001 level.

Mean values obtained for four process variables and mean comprehension scores at five levels of compression are presented in tabular form in Figure 3, p. 81.
Fig. 3. Mean empathy, warmth, genuineness, and self-exploration values and mean comprehension scores at five compression levels for the five tapes. (N=25. Means were calculated by combining all the scores at each compression level, across tapes, and averaging them.)
Discussion

Analyses of the data obtained in this study indicated that compressions up to 50% could be applied to counseling tapes without significant effects upon the evaluation of three of the four selected critical process variables. Accurate empathy was the only process variable that was found to be significantly affected by compression. The mean accurate empathy value was conspicuously higher at 40% compression, which contributed to the significant $F$ ratio. Why empathy was the only variable affected by compression was not answered in this study. The significant $F$ ratio may well be an artifact and may not be obtained in replications of this study.

It is possible that the evaluation scales used to measure process variables were not sensitive enough to detect the effects of compression upon these variables. It may also be speculated that the outcomes obtained could have been due to random ratings by the subjects at increased levels of compression. However, such doubts seem to be unwarranted when the following facts and evidence are taken into consideration. Admitting the difficulty of accurately assessing the quality of such process variables as were measured in this study, it is important to note that most subjects were those with considerable training and experience and their judgments of the tapes could be respected. Subjects' idiosyncratic tendency to rate tapes high or low, and personal bias factors in assessing tapes which could have been operating were, by virtue of the experimental design, even-

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ly distributed between levels of compression and between tapes. As the reader may recall, subjects were randomly assigned to the groups and the groups were also randomly assigned to treatments. While no subject listened to the same tape twice, all the subjects listened to all five tapes at some level of compression. Furthermore, and more importantly, the highly significant F ratios obtained for the effects of five tapes upon process variables provide evidence that the subjects did indeed differentiate the quality of process variables of five different tapes, despite the increasing rate of presentation.

Means, computed on the basis of the values assigned by subjects to the four process variables of the five tapes at the noncompressed levels, were for the most part similar to the means calculated on the values assigned by the three judges. The rank-ordering of the five counseling tapes based on the sum of the four process variable values which subjects assigned to each tape was correlated with the rank-order of the tapes derived from the judges' evaluations. Spearman rank-order correlation coefficient \( r \) was 0.70. The correlation coefficient indicated a substantial agreement between the judges and the subjects in their evaluation of the experimental tapes.

An interesting observation was the consistent trend among mean values of the process variables obtained at five compression levels. They were always found ordered in the same sequence, although the differences between means were, for the most part, small. The mean values were highest at 40% compression, followed by 20%, then 0%, and the last and lowest was at 30% compression. Mean values at 50% compression did
not fit into this general trend. Although the study does not pro-
vide a definitive explanation of the observed phenomenon, the trend
is consistent enough not to be simply dismissed as the result of ran-
dom fluctuations of ascribed values. Some speculation would seem to
be in order.

Most striking is the fact that on all the four process variables
the highest mean values obtained were invariably at the 40% level of
compression, and, in the case of empathy, a considerably higher value
at the 40% level contributed to the significant \( F \) ratio. Is it pos-
sible that process variables such as empathy, warmth, genuineness,
and self-exploration are better sensed at moderately compressed levels
with listeners attending to the counseling dialogue ever so intently
and carefully? Does compression make the listener more alert to the
ongoing interaction without his mind wandering elsewhere from time
to time? The questions present a challenge to the current practice
of evaluating counseling tapes at the noncompressed original speed
as well as to the implicit assumption that the evaluation of noncom-
pressed dialogue is "true" to the "real" values of the dialogue.

Alternatively, it may be that the relatively slow pace of non-
compressed dialogue tends to make the listener more critical than
when he listens to faster moving dialogue. A quick glance upon an
object often leaves a favorable global impression upon a viewer's eye,
but a careful, thorough inspection of the same object leads the viewer
to find faults with it. Since the values of process variables, as
they were defined in the Truax scales, were primarily based on verbal
interactions between the counselor and the client, the dialogue had to be understood for the subjects to evaluate it. At the 40% level of compression, comprehension was still fairly good, with 12 subjects obtaining comprehension scores of 80% or better. It might be that the speed of presentation of counseling dialogue at 40% compression was slow enough to leave the verbal content intelligible for the listeners but not so slow as to allow the listeners to become overly critical. However, questions still need to be answered as to why the process variable values for the four compression levels were always ordered in the same way.

The subjects' reactions to the speeds of presentation of the taped counseling sessions were varied. As is shown in Table 11, p. 86, ten subjects stated that the speed of presentation was a little too fast for them at the 20% level of compression (175-208wpm) while the same level of compression was judged by 12 subjects as being "just about right." Two subjects indicated the speed could have been a little faster for them. In freely expressed comments on their experience with compressed counseling tapes, several subjects indicated that noncompressed tapes were too slow and that 20% and 30% (204-241wpm) were suitable speeds of presentation. These subjects were favorably disposed to the efficiency gained through the use of compression and found their heightened attention at 20% and 30% levels of compression to be advantageous for listening. The same speeds were experienced, however, by some subjects as being too fast, and the demand on their attention was felt as an unnecessary and unpleas-
sant psychological strain.

### Table 11

**Frequency of Different Reactions to Speeds of Presentation of Taped Counseling Sessions**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Com pression 0%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just about right</td>
<td>16</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Could've been faster</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>A little too fast</td>
<td>0</td>
<td>10</td>
<td>14</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Other (difficulties expressed by subjects):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Hard to hear due to noise, overlapping conversation, some indistinct voice qualities, speech masked by nervous laughter of the client</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>b) Hard to keep &quot;tuned in&quot;</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>c) Much too fast</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>d) Unintelligible</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>25</strong></td>
<td><strong>25</strong></td>
<td><strong>25</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

Note.--Numbers represent subjects choosing various categories. Columns total 25--the number of subjects.

Subjects expressed both negative and positive opinions regarding the effects of compression upon affective dimensions of counseling dialogue. Some subjects indicated that the faster the speed, the less obvious the feeling became and the harder to identify affect-laden responses, especially affect expressed nonverbally in the voice. Some other subjects held the opinion that tapes could be compressed to a considerable degree and still be useful in detecting and assessing the quality of affective dimensions.

Regardless of subjective reactions to the experience with com-
pressed counseling dialogue, it appears that subjects grasped the quality of counseling dialogues even when they felt frustrated at not being able to understand a particular portion of the dialogue to their satisfaction. The investigator's request to listen to tapes only once, even if they felt tempted to go back and listen to them again, added to their frustration. Under ordinary circumstances they would have listened to the same portion of a tape repeatedly in an effort to better understand particular segments of the counseling dialogue. It must also be noted that subjects in this study had had no previous experience with compressed speech, except a brief introduction given through the sample tape prior to listening to the experimental tapes. Had they had experience in listening to compressed dialogue, their reactions might have been different. It is possible that while some subjects found compressed counseling tapes intriguing and fascinating, the newness of the experience caused psychological resistance among other subjects.

Compression was observed to significantly affect content comprehension of counseling dialogue at the .001 level of significance. Comprehension declined gradually as the rate of presentation increased and showed a sharp decline at 50% compression (278-340wpm). The Scheffé method (Hays, 1963) applied to post-hoc pair-wise comparisons revealed that the decline at 50% was responsible for the significant F ratio. Two subjects at 40% compression (235-280wpm) and three subjects at 50% compression obtained a comprehension score below 15, a chance score on a 30-true-false item test. However, even at 50% com-
compression, five subjects showed better than 80% comprehension and seven subjects scored 70% to 79%. Though most subjects found 50% compression much too fast and difficult to understand, the comprehension scores suggested that many subjects heard counseling dialogues and comprehended them fairly well. Comprehension scores between tapes did not differ significantly, which suggested that all five tapes were equally comprehensible.

With respect to comprehension, the results of the present study cannot readily be compared with previous findings on compressed speech. The problem lies, in part, in the fact that the present study dealt with dialogues as opposed to oral reading, with which previous studies have been concerned. Possible nuisance variables such as the speaker's voice, enunciation, and the delivery of material were well controlled in studies with oral reading material, so that a decline in comprehension might be more clearly interpreted as the effects of the degree of compression. However, such controls were not possible in this study beyond what was done in the process of choosing five experimental tapes as discussed in Chapter 4. Factors foreign to oral reading, such as the overlapping of conversations, speech accompanied by nervous laughter, and careless enunciation, tended to interfere with listening more at compressed levels than at the original speed. To what extent these unique characteristics of dialogue adversely affected comprehensibility, and in turn the evaluation of the process variables, could not be assessed in this study. On the other hand, the words and sentence structure used by counselors and clients were
rather simple as compared to those of reading materials used in other studies on compressed speech, which in all likelihood operated favorably in aiding comprehension.

Nevertheless, the results of this study showed that subjects' comprehension was similar to previous findings with oral reading material, which indicated that the increased speed of presentation up to 250-300wpm did not affect comprehension significantly. In this study, the speed of presentation at which a significant decline in comprehension occurred was at 50% compression, the word rate for which ranged from 278wpm for Tape 4 to 340wpm for Tape 3.

It appears that dialogue is just as amenable to speech compression as is oral reading material. As the data indicate, not only is moderately compressed dialogue comprehensible but a moderate degree of compression does not seem to distort or diminish affective qualities expressed in a dialogue. A major difficulty is one of making recordings of good acoustic quality. Although good acoustic quality is desirable for any recording, it becomes an especially important requirement for compression purposes. With dialogue the chances for obtaining good recordings are reduced unless careful planning and preparation are employed.

Effects of interaction between tapes and compression levels upon four process variables were not found to be statistically significant, nor was the interaction effect upon content comprehension significant. However, the data suggested that tapes could have been somewhat different in their comprehensibility at higher levels of compression.
For instance, Tapes 1 and 4 appeared the least comprehensible among the five tapes at 50% compression. Tonal quality of the counselor and the client and speech masked by nervous laughter might have been partially responsible for the low comprehension. A clear, crisp voice appeared easier to listen to at compressed levels than a less articulate, somewhat blurred voice. In fact, several subjects indicated that the speakers' voice, not the speed, caused some difficulty in listening to Tapes 1 and 4 at compressed levels. Tape 2, in which both the counselor and the client were articulate and talked forcefully, was comprehended the best of all five tapes at the 40% and 50% compression levels and the standard deviation of comprehension scores obtained for this tape was the smallest of all. The fact that Tapes 2 and 3 had relatively higher word rates and were comprehended somewhat better at 50% compression than were Tapes 1 and 4, whose word rates were lower, implies that the degree of compression alone did not account for the decline in comprehension.

The subjects' responses to the question about the quality of recording indicated that subjects found the acoustic quality of the experimental tapes satisfactory for the most part. As was indicated in the section on the limitations of the study in Chapter 1, conditions for listening to experimental tapes were not directly controlled except for the request to the subjects that they use the best tape recorder available to them. The main purpose for the question on the quality of the recordings was to detect possible confounding effects due to the quality of tape recorder used by the subjects for listent-
ing to the tapes. The quality of recording of the 25 experimental tapes used in the study was assessed on the Roberts tape recorder model 192FT by the investigator prior to their distribution to subjects and was found to be very good and highly intelligible. However, any malfunctioning due to poor mechanical conditions or a lack of proper care (e.g., keeping recorder heads clean and degaussing) of the tape recorder used by subjects could have caused difficulty for subjects in listening to tapes. This difficulty would be especially noticeable at higher compression levels, which in turn could have affected the evaluation of the process variables and comprehension scores. Fortunately, most subjects rated the quality of recording as being very good or clear enough at both the 0% and 20% compression levels. At 30%, ten subjects, and at 40%, nine subjects noticed some noise but indicated that it did not interfere with their listening. Four subjects found that the 40% compressed tape contained a lot of noise which interfered with their listening. At 50% compression, 13 subjects rated the tape unintelligible, probably because of the rapidity of presentation rather than because of the poor acoustic quality of playback. Therefore, it is reasonable to assume that the subjects' listening conditions, though not controlled directly, did not affect their responses to any serious extent, and significant effects obtained in the evaluation of accurate empathy and comprehension were not likely due to unfavorable listening conditions.

Taken together, the results of the study suggest that moderate degrees of compression can be applied to counseling dialogue with no
significant effects upon either the evaluation of selected process variables or the comprehension of the counseling dialogue. The association between warm, empathic understanding and slowness of speech might be a stereotypic notion to be dispelled. For subjects in this study, the maximum compression level appeared to be 30%, because up to this compression level no mean process variable values or comprehension scores reflected great variation. Though individual differences in tolerating speeded auditory input can be expected, some training in listening to compressed tapes on the part of the subjects might change the apparent limit discovered in this study to even higher levels of compression.

The results obtained from the study, however, must be generalized with due caution to groups dissimilar in the professional training and experience which characterized subjects in this study. Further investigations are necessary to ascertain and elucidate the findings of the study.

In the following chapter the summary of the study including its findings, conclusions, and recommendations will be presented.
Summary and Conclusions

The purpose of the study was to explore the applicability of speech compression to counseling dialogue. Specifically, the study investigated the effects of compression upon the evaluation of selected critical variables in the therapeutic process—empathy, warmth, genuineness, and self-exploration, and upon the comprehension of dialogue between counselor and client.

The subjects were 25 counselors and counselor educators engaged in professional activities in southern Michigan. Audio tapes used for the study consisted of five 30-minute original noncompressed tapes, 20 compressed versions of the five original tapes, and five duplicates of a sample tape which served to introduce the subjects to the phenomenon of speech compression. Compression of the original tapes by 20%, 30%, 40%, and 50% was achieved through the use of a speech compressor, the Whirling Dervish.

A random assignment of subjects was made to five groups with five subjects each, and the groups were randomly assigned to a treatment, or one set of five tapes. Experimental tapes were grouped into sets in such a way that each group of subjects listened to one non-compressed tape followed by four different tapes with differing degrees of compression. All subjects heard tapes in an order of in-
creasing degrees of compression. No subject listened to the same
tape twice, but all the subjects listened to five different tapes
at varying levels of compression.

After listening to the sample tape and each one of the five ex­
perimen­tal tapes once, the subjects evaluated the tapes according to
the Truax Tentative Scale for the Measurement of Accurate Empathy,
of Nonpossession Warmth, of Genuineness, and of Depth of Self-Explo­
ration, and completed content comprehension tests. Questionnaires
were also administered to the subjects in order to secure informa­
tion concerning their professional background, subjective opinion on
the acoustic qualities of the tapes and on the speed of presentation,
previous experience with speech compression and free-response per­
sonal comments.

The process variable values obtained through Truax's instru­
ments and content comprehension scores were analyzed by a two-way
analysis of variance. Analyses of the data revealed a significant
effect of compression at the .05 level upon the subjects' evaluation
of accurate empathy, but compression did not affect the subjects'
evaluation of nonpossession warmth, genuineness, and self-explora­
tion. The effects of five different tapes upon the evaluation of
four process variables were found to be significant at the .001 level.

A consistent trend was observed among the mean values of all
process variables obtained for the differing levels of compression.
Though the differences among mean values were, for the most part,
small, the constant occurrence of the observed trend for all vari­
ables investigated calls for continued exploration. The mean values were always highest at 40% compression, followed by 20%, then 0%, and the lowest was at 30% compression. Mean values at 50% compression did not parallel this trend. No definitive explanation of the observed trend could be derived from this study.

The $F$ ratio obtained for the compression effect upon comprehension was found to be significant at the .001 level. Comprehension declined gradually as the degree of compression increased and showed a sharp decline at the 50% compression level, which accounted for the significant $F$ ratio. Comprehension scores of the five different tapes did not show a significant difference. No significant tape-by-compression interaction effects were found to operate upon the process variables tested nor upon content comprehension.

The subjects' reactions to compressed counseling dialogues were varied, some being positive and others negative. A moderate amount of compression was welcomed by some subjects as a "time-saver" as well as an aid to better concentration. On the other hand, the extra demand placed upon their attention by the compression was experienced by some other subjects as an unpleasant psychological strain. Some subjects expressed an opinion that affective dimensions could be assessed even at a considerable degree of compression. Others felt their awareness of affective dimensions diminished as compression increased; however, these feelings were not supported by the data obtained. Affective dimensions did not diminish as compression increased. No subjects in this study had previous experience
with compressed speech. Had they had some training in listening to compressed counseling dialogue, their reactions might have been different.

There was some indication, through subjective report, that the manner of speaking on the part of the counselor and client, rather than the speed, sometimes affected the comprehensibility of compressed tapes, but to what extent it affected comprehension and, in turn, the evaluation of process variables, was unknown.

Despite the expressed frustrations at not having been able to understand the dialogue to their full satisfaction, subjects, for the most part, appeared to have heard the dialogues well enough to evaluate the compressed counseling dialogues. They responded to questions on comprehension tests with surprising accuracy, given their lack of familiarity with speeded speech. This outcome is a possible testimony to their acquired listening ability as professional counselors and counselor educators.

The results of the study suggest that moderate degrees of compression can be applied, in general, to a dialogue without significantly affecting its comprehensibility. Applied to counseling dialogues, moderate compression does not significantly influence either the comprehension or evaluation of counseling interaction. In this study, 30% compression appeared to be maximal, but training in listening to compressed tapes might prove to push the apparent limit discovered in this study to even higher compression levels for some individuals.
Time saved through the use of compressed tapes could be more profitably devoted by counselors and counselor educators to other professional activities which demand their attention, such as increased individualized assistance to counselor trainees, research, and reading for professional growth. Counseling supervision could also be improved as a result of supervisors' willingness to hear the entire counseling tape rather than portions of the taped session, in order to have a clearer idea of the development of the counselor-client interaction. Moreover, listening skills, which are so crucial in counseling and psychotherapy, might be improved through listening to compressed tapes and developing a habit of better concentration. The last statement is conjecture and needs to be explored in future studies.

At present, the time and technical knowledge necessary to produce acoustically satisfactory compressed tapes, let alone the limited availability of expensive speech compressors, make the application of compressed speech to counselor education and supervision somewhat impracticable. However, the time will come, in the investigator's opinion, when a speech compressor can be built into tape recording units, and each portable tape recorder will be equipped with distortion-free rate-control features. It would then be possible for an individual counselor, counselor educator, or trainee to listen to tapes at his own preferred compression level or at a level which is appropriate for the characteristics of individual tapes and to adjust the speed whenever he needs or desires to do so. He would be at lib-
erty to listen to the beginning of a tape at the original speed to gain a flavor of the natural flow of dialogue and to speed up or slow down thereafter to suit his interests and listening ability. Within much shorter periods of time than are currently necessary, he would hear the entire dialogue, possibly with better comprehension and insight, instead of skipping here and there in an effort to save time and avoid boredom.

It must be emphasized that the pursuit of speed or efficiency per se, which speech compression can provide, is not the primary concern or goal to be sought. Efficiency for its own sake is like leisure time without enjoyable activities to fill the void. However, if, as has been suggested, thinking rates exceed the ordinary speaking rate, and if faster speeds aid comprehension through better concentration, speech compression has a valuable contribution to make in education.

Technology is a two-edged sword. Useful and enriching though it can be to human life, it may be detrimental when it is not properly employed. Technology can help free individuals from tedious chores, increase efficiency, or make what was once impossible now possible. At the same time, it creates new problems, many of which stem from human failure to cope with its rapid advancement. Fear of technology, which is linked with the sense of loss of control over oneself and one's environment, is not totally ungrounded, nor is it necessarily a sign of paranoia. Anger is spurred when technology is viewed as running counter to human nature and an encroachment or imposition
from outside.

The fact remains, however, that technology is here to stay, whether one likes it or not. Educational processes can be greatly enriched with the aid of technology when technology is wisely employed, based on sound assumptions about human behavior. What is needed is an awareness of the impact which technology has upon the learner and the educational environment as well as of the role and responsibilities which educators must assume in changing educational settings. Without such awareness and responsible behavior on the part of the educator, potential benefits obtainable through technology will be lost and possibly harm will be done.

The application of speech compression to counselor education, with which this study was concerned, will be meaningful only when it serves to enhance educational processes through a provision for more efficient use of the talents and time of educators and students.

Recommendations

Along with replications of the present study, questions and conjecture generated by this study need to be investigated in future studies. The following recommendations are formulated on the basis of the completed study:

1. Applicability of speech compression to counseling dialogue must be studied further using varying groups of subjects.

2. In future studies consideration may be given to the adoption of different approaches and devices to evaluate counseling tapes, bet-
ter control over listening conditions, a wider selection of experimental tapes, possibly including both male and female counselors and clients, and the introduction of other independent variables such as subjects' listening ability and subjects who have been trained and not trained in listening to compressed dialogue.

3. The consistent trend among mean values of the process variables obtained at four compression levels was discussed in the discussion section of Chapter 5. The same trend may or may not be observed in replications of this study. If it is observed, an investigation as to what might be responsible for the trend may lead to important discoveries concerning human information processing and the presentation of material through the auditory sense.

4. The effects of training in listening to compressed dialogues upon the listener's auditory skills and ability to evaluate and comprehend counseling interaction deserve further exploration.
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APPENDIX A

TRUAX TENTATIVE SCALE FOR THE MEASUREMENT OF ACCURATE EMPATHY, OF NONPOSSESSIVE WARMTH, OF GENUINENESS, AND OF DEPTH OF SELF-EXPLORATION

A Tentative Scale for the Measurement of Accurate Empathy

Stage 1: Therapist seems completely unaware of even the most conspicuous of the client's feelings; his responses are not appropriate to the mood and content of the client's statements. The therapist may be bored and disinterested or actively offering advice, but he is not communicating an awareness of the client's current feelings.

Stage 2: Therapist shows an almost negligible degree of accuracy in his responses, and that only toward the client's most obvious feelings. Any emotions which are not clearly defined he tends to ignore altogether. He may be correctly sensitive to obvious feelings and yet misunderstand much of what the client is really trying to say. By his response he may block off or may misdirect the patient.

Stage 3: Therapist often responds accurately to client's more exposed feelings. He also displays concern for the deeper, more hidden feelings, which he seems to sense must be present, though he does not understand their nature or sense their meaning to the patient.

Stage 4: Therapist usually responds accurately to the client's more obvious feelings and occasionally recognizes some that are less apparent. In the process of this tentative probing, however, he may misinterpret some present feelings and anticipate some which are not current. Sensitivity and awareness do exist in the therapist, but he is not entirely "with" the patient in the current situation or experience. The desire and effort to understand are both present, but his accuracy is low. He also may seem to have a theory about the patient and may even know how or why the patient feels a particular way, but he is definitely not "with" the patient. In short, the therapist may be diagnostically accurate, but not empathically accurate in his sensitivity to the patient's current feelings.

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Stage 5: Therapist accurately responds to all of the client's more readily discernible feelings. He also shows awareness of many less evident feelings and experiences, but he tends to be somewhat inaccurate in his understanding of these. However, when he does not understand completely, this lack of complete understanding is communicated without an anticipatory or jarring note. His misunderstandings are not disruptive by their tentative nature.

Stage 6: Therapist recognizes most of the client's present feelings, including those which are not readily apparent. Although he understands their content, he sometimes tends to misjudge the intensity of these veiled feelings, so that his responses are not always accurately suited to the exact mood of the client. The therapist does deal directly with feelings the patient is currently experiencing although he may misjudge the intensity of those less apparent. Although sensing the feelings, he often is unable to communicate meaning to them. In contrast to Stage 7, the therapist's statements contain an almost static quality in the sense that he handles those feelings that the patient offers but does not bring new elements to life. He is "with" the client but doesn't encourage exploration. His manner of communicating his understanding is such that he makes of it a finished thing.

Stage 7: Therapist responds accurately to most of the client's present feelings and shows awareness of the precise intensity of most of the underlying emotions. However, his responses move only slightly beyond the client's own awareness, so that feelings may be present which neither the client nor therapist recognizes. The therapist initiates moves toward more emotionally laden material, and may communicate simply that he and the patient are moving towards more emotionally significant material.

Stage 8: Therapist accurately interprets all the client's present, acknowledged feelings. He also uncovers the most deeply shrouded of the client's feelings, voicing meanings in the client's experience of which the client is scarcely aware. Since the therapist must necessarily utilize a method of trial and error in the new uncharted areas, there are minor flaws in the accuracy of his understanding, but these inaccuracies are held tentatively. With sensitivity and accuracy he moves into feelings and experiences that the client has only hinted at. The therapist offers specific explanations of additions to the patient's understanding so that underlying emotions are both pointed out and specifically talked about. The content that comes to life may be new.
but it is not alien.

Although the therapist in Stage 8 makes mistakes, these mistakes are not jarring, because they are covered by the tentative character of the response. Also, this therapist is sensitive to his mistakes and quickly changes his response in midstream, indicating that he has recognized what is being talked about and what the patient is seeking in his own explorations. The therapist reflects a togetherness with the patient in tentative trial and error exploration. His voice tone reflects the seriousness and depth of his empathic grasp.

**Stage 9:** The therapist in this stage unerringly responds to the client's full range of feelings in their exact intensity. Without hesitation, he recognizes each emotional nuance and communicates an understanding of every deepest feeling. He is completely attuned to the client's shifting emotional content; he senses each of the client's feelings and reflects them in his words and voice. With sensitive accuracy, he expands the client's hints into a full-scale (though tentative) elaboration of feeling or experience. He shows precision both in understanding and in communication of this understanding, and expresses and experiences them without hesitancy.

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A Tentative Scale for the Measurement of Nonpossessive Warmth

**Stage 1:** The therapist is actively offering advice or giving clear negative regard. He may be telling the patient what would be "best for him," or in other ways actively approving or disapproving of his behavior. The therapist's actions make himself the locus of evaluation; he sees himself as responsible for the patient.

**Stage 2:** The therapist responds mechanically to the client, indicating little positive regard and hence little nonpossessive warmth. He may ignore the patient or his feelings or display a lack of concern or interest. The therapist ignores the client at times when a nonpossessively warm response would be expected; he shows a complete passivity that communicates almost unconditional lack of regard.

**Stage 3:** The therapist indicates a positive caring for the patient or client, but it is a semipossessive caring in the sense that he communicates to the client that his behavior matters to him. That is, the therapist communicates such things as
"It is not all right if you act immorally," "I want you to get along at work," or "It's important to me that you get along with the ward staff." The therapist sees himself as responsible for the client.

Stage 4: The therapist clearly communicates a very deep interest and concern for the welfare of the patient, showing a nonevaluative and unconditional warmth in almost all areas of his functioning. Although there remains some conditionality in the more personal and private areas, the patient is given freedom to be himself and to be liked as himself. There is little evaluation of thoughts and behaviors. In deeply personal areas, however, the therapist may be conditional and communicate the idea that the client may act in any way he wishes—except that it is important to the therapist that he be more mature or not regress in therapy or accept and like the therapist. In all other areas, however, nonpossessive warmth is communicated. The therapist sees himself as responsible for the client.

Stage 5: At stage 5, the therapist communicates warmth without restriction. There is a deep respect for the patient's worth as a person and his rights as a free individual. At this level the patient is free to be himself even if this means that he is regressing, being defensive, or even disliking or rejecting the therapist himself. At this stage the therapist cares deeply for the patient as a person, but it does not matter to him how the patient chooses to behave. He genuinely cares for and deeply prizes the patient for his human potentials, apart from evaluations of his behavior or his thoughts. He is willing to share equally the patient's joys and aspirations or depressions and failures. The only channeling by the therapist may be the demand that the patient communicates personally relevant material.

A Tentative Scale for the Measurement of Genuineness or Self-Congruence

Stage 1: The therapist is clearly defensive in the interaction, and there is explicit evidence of a very considerable discrepancy between what he says and what he experiences. There may be striking contradictions in the therapist's statements, the content of his verbalization may contradict the voice qualities or nonverbal cues . . . .

Stage 2: The therapist responds appropriately but in a professional rather than a personal manner, giving the impression that his responses are said because they sound good from a dis-
Stage 3: The therapist is implicitly either defensive or professional, although there is no explicit evidence.

Stage 4: There is neither implicit nor explicit evidence of defensiveness or the presence of a facade. The therapist shows no self-incongruence.

Stage 5: The therapist is freely and deeply himself in the relationship. He is open to experiences and feelings of all types—both pleasant and hurtful—without traces of defensiveness or retreat into professionalism. Although there may be contradictory feelings, these are accepted or recognized. The therapist is clearly being himself in all of his responses, whether they are personally meaningful or trite. At stage 5 the therapist need not express personal feelings, but whether he is giving advice, reflecting, interpreting, or sharing experiences, it is clear that he is being very much himself, so that his verbalizations match his inner experiences.

A Tentative Scale for the Measurement of Depth of Self-Exploration

Stage 0: No personally relevant material and no opportunity for it to be discussed. Personally relevant material refers to emotionally tinged experiences or feelings, or to feelings or experiences of significance to the self. This would include self-descriptions that are intended to reveal the self to the therapist, and communications of personal values, perceptions of one's relationships to others, one's personal role and self-worth in life, as well as communications indicating upsetness, emotional turmoil, or expressions of more specific feelings of anger, affection, etc.

Stage 1: The patient actively evades personally relevant material (by changing the subject, for instance, refusing to respond at all, etc.). Thus, personally relevant material is not discussed. The patient does not respond to personally relevant material even when the therapist speaks of it.

Stage 2: The patient does not volunteer personally relevant material but he does not actually evade responding to it when the therapist introduces it to the interpersonal situation.
Stage 3: The patient does not himself volunteer to share personally relevant material with the therapist, but he responds to personally relevant material introduced by the therapist. He may agree or disagree with the therapist's remarks and may freely make brief remarks, but he does not add significant new material.

Stage 4: Personally relevant material is discussed (volunteered in part or in whole). Such volunteer discussion is done (1) in a mechanical manner (noticeably lacking in spontaneity or as a "reporter" or "observer"); and (2) without demonstration of emotional feeling. In addition, there is simply discussion without movement by the patient toward further exploring the significance of meaning of the material or feeling in an effort to uncover related feelings or material. Both the emotional remoteness and the mechanical manner of the patient make his discussion often sound rehearsed.

Stage 5: This stage is similar to Stage 4 except that the material is discussed either with feeling indicating emotional proximity or with spontaneity, but not both. (Voice quality is the main cue.)

Stage 6: In Stage 6 the level of Stage 4 is achieved again, with the additional fact that the personally relevant material is discussed with both spontaneity and feeling. There is clear indication that the patient is speaking with feeling, and his communication is laden with emotion.

Stage 7: Tentative probing toward intrapersonal exploration. There is an inward probing to discover feelings or experiences anew. The patient is searching for discovery of new feelings which he struggles to reach and hold on to. The individual may speak with many private distinctions or with "personal" meanings to common words. He may recognize the value of this self-exploration but it must be clear that he is trying to explore himself and his world actively even though at the moment he does so perhaps fearfully and tentatively.

Stage 8: Active intrapersonal exploration. The patient is following a "connected" chain of thoughts in focusing upon himself and actively exploring himself. He may be discovering new feelings, new aspects of himself. He is actively exploring his feelings, his values, his perceptions of others, his relationships, his fears, his turmoil, and his life-choices.

Stage 9: Stage 9 is an extension of the scale to be used in those rare moments when the patient is deeply exploring and being himself, or in those rare moments when he achieves a significant
new perceptual base for his view of himself or the world. A rating at this stage is to be used at the judge's discretion.
APPENDIX B

CONTENT COMPREHENSION TESTS

Test instructions and sample items from five content comprehension tests administered to the subjects in this study are presented below. Two items from each of the five separate content comprehension tests have been chosen as representative questions.

Please read each true-false item carefully. Based on what you have just heard on the tape, circle either T (true) or F (false) in front of each item. Please base your judgment, as much as possible, upon what was actually stated in the counseling session and use only a minimal amount of interpretation in responding to the items.

T  F  The client has never felt close to anyone.

T  F  The counselor helped the client explore his tendency to over­load himself.

T  F  The client believes his parents do not care about him.

T  F  The client does not know why he was referred to the Child Guidance Clinic.

T  F  The counselor pointed out that people are disturbed by their thoughts about reality rather than reality itself.

T  F  The client finds it difficult to meet his parents' expectations.

T  F  The client feels that something in him prevents him from lis­tening to others.

T  F  The client blames others for his problems.

T  F  The client thinks that all he needs is some occupational in­formation.

T  F  The client feels that he is a failure and nothing is going for him.

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APPENDIX C

QUESTIONNAIRE

Please provide me with the following data about yourself.*

Years of experience as a counselor: _______________
Years of experience as a counselor educator: _______________
The highest degree held: _______________
Do you supervise counselors and/or counselor trainees? Please circle one of the following.
(1) No.
(2) Yes, sometimes.
(3) Yes, quite often.
(4) Other. Explain. ________________________________

How did you find the quality of the recording you have just listened to? Please circle one of the following.**

(1) Very good recording.
(2) Clear enough.
(3) Some background noise but it did not interfere with listening.
(4) A lot of background noise, which interfered with listening.
(5) Unintelligible recording.

How did you feel about the speed at which the session has been presented to you? Please circle one of the following.**

(1) The speed of the presentation was just about right.
(2) The speed was a little too fast for me.
(3) The speed could have been a bit faster for me.
(4) Other. Explain. ________________________________

Have you had previous experience with time-compressed speech? Please circle one of the following.*

(1) Yes. (2) No.
If you have circled "Yes," please briefly explain.

______________________________

*These items were included in the questionnaire for the first tape that the subject listened to.
**These questions were asked about each tape.
I would appreciate it if you give me some personal reactions to the experience you have just had with time-compressed counseling tapes. Thank you.*

*The request was included in the questionnaire accompanying the last tape that the subject heard.