8-1971

Galvanic Skin Response as a Function of Evaluative Message Content, Mode of Transmission, and Personality Traits

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GALVANIC SKIN RESPONSE AS A FUNCTION OF EVALUATIVE MESSAGE CONTENT, MODE OF TRANSMISSION, AND PERSONALITY TRAITS

by

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A Thesis
Submitted to the
Faculty of the Graduate College
in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
August 1971

ACKNOWLEDGEMENTS

In writing this thesis, I have greatly benefited from the encouragement, advice, and criticism of Dr. Loren Crane, my major advisor, and Drs. Charles Brown and Ernest Stech, members of my committee. My thanks go to them as well as to the members of the Center for Communication Research who have fostered my interest in research. Special thanks are due the students who graciously participated in the experiment, and Mrs. Connie Applegate who typed the manuscript. The benefits of a Fellowship and the intellectual stimulation from the faculty in the Department of Communication Arts and Sciences at Western Michigan University have made graduate study an exciting and influential experience.

Richard Wayne Robinson

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INTRODUCTION

Verbal performance evaluation, in the form of praise or criticism, is a common practice in our society. The use of evaluation raises an important question: What effect does it have on the person being evaluated? Consider the situation in which an employer evaluates an employee. He must keep in mind the effect on his job performance as well as on their inter-personal relationship. With that in mind, he must choose the proper combination of message and mode of transmission to convey not only his thoughts but to achieve a desired effect. Most evaluative messages are a combination of praise and criticism, therefore, he must decide which should be dominant. His options include a personal conference, a telephone call, or a note or memo. A personal visit may be impractical for time or geographic reasons. His choice then becomes whether to phone or write the individual. The present study is an investigation of the effects of praise and criticism in written and telephone messages.

Praise and criticism are verbal reinforcers which have primarily the connotation of reward and punishment. For many years the effects of reward and punishment were explained according to Thorndike's "law of effect." The

law was attractively simple: Reward and punishment had equal but opposite effects. The results of several experiments, including one of his own with chicks (Thorndike, 1932), forced Thorndike to revise the law of effect. After 1930, the truncated law of effect (Hilgard, 1956) made reward much more important than punishment. Unfortunately, the law was only equipped to consider simple nonverbal stimuli. Verbal reinforcement is complex, and reward and punishment do not consistently produce the same effects.

Investigators have conducted research with a wide variety of subjects attempting to isolate factors which determine the effect of verbal reinforcers. Studies with Veterans' Administration medical patients (Spence, 1966), chronic schizophrenics (Fischer, 1963), male college students (Fischer and Herschberger, 1968), and middle-class children (Rosenhan, 1966) indicate that criticism is superior to praise as a motivator, improved task performance being a result of verbal punishment. These results lead one to conclude that criticism has a psychological advantage over praise for many types of subjects.

Improved task performance, however, has not always been observed to be a result of criticism. Thompson and Hunnicutt (1944) found that subjects' personality types influence the effectiveness of reinforcers. In a study of fifth grade students, they found that an increase in

performance is the result of repeated praise in introverts and repeated criticism in extroverts.

Psychopathology also relates to the effectiveness of verbal reinforcers. Atkinson and Robinson (1961) found that normal subjects learned better when reinforced with praise rather than criticism, whereas, the opposite was true for schizophrenic subjects.

That social class is another factor is shown by Douvan (1956) who found that verbal reinforcement is more effective in shaping the behavior of middle-class than lower-class children. Zigler, Hodgden, and Stevenson (1958) found yet another factor when they discovered that praise improves the performance of lower-class children who are mentally retarded.

Psychologists have been able to demonstrate that reward facilitates learning and improves task performance. The research which shows that punishment does the same sent them looking for a better explanation of behavior than the law of effect.

The Yale group led by Mandler and Sarason hold the position that we live in an achievement oriented society in which great emphasis is placed on successful performance. Not achieving or performing up to a standard is looked upon as being highly undesirable. Criticism, therefore, affects achievement anxiety (Mandler and

Sarason, 1952). Anxiety is seen as being a situation determined reaction. The reaction may be task-irrelevant, tending to disrupt performance and have a debilitating effect on the individual; or it may be task-relevant, or facilitative of performance because it moves the person to reduce anxiety by completing the task successfully. The beneficial effect of punishment on performance can, therefore, be explained if it is seen as producing task-relevant anxiety.

The Iowa group, who have conducted extensive research on anxiety and frustration, take an opposing view of anxiety. They see it as an energizing drive, rather than a reaction. Spence (1960) states that anxiety is an acquired drive which has the capacity to generally energize the organism. If punishment causes anxiety; that anxiety, if not too great, facilitates performance and increases the speed of learning.

On the basis of anxiety research, it now appears that the observable effects of verbal reinforcement are not produced directly by the reinforcement itself, but indirectly through the anxiety it induces. The conflicting viewpoints concerning what anxiety is reveals that anxiety as a psychological construct is not completely understood. Hence, a study such as this is exploratory in nature.

Praise and criticism are considered message content.

Perhaps equally important, however, is the mode in which a message is transmitted. Are there certain modes of communication which are more powerful psychologically? An important purpose of the present study is to determine whether measurable differences exist between the effects of two of the most commonly used modes of evaluation: the telephone and note.

Galvanic skin response (GSR) was chosen to measure the effects of evaluation in this study. GSR, as a physiological response, has been linked experimentally to anxiety and other important aspects of human behavior which are relevant to a study of evaluation effects.

Research indicates that when an individual receives and processes information, there is a pronounced and measurable effect on the resistance level of his skin (Brown, 1937; Lacey, 1950; Lacey, Kagan, Lacey, and Moss, 1963; Kleinsmith and Kaplan, 1963; Kleinsmith, Kaplan and Tarte, 1963; Behnke, 1966). Investigators have described manifestations of this phenomenon with such terms as: psycho-galvanic reflex (Veraguth, 1909), galvanic skin reflex (Darrow, 1927), palmar conductance (Lacey, 1950), skin conductance (Berry, 1962), and galvanic skin response (Behnke, 1966). Levonian (1967) uses a more specific term, resistance decrement, to describe a decrease in skin resistance. In the present study, the general term, galvanic skin response, is used to describe the change in

the level of skin resistance which is caused by either a conditioned, or an unconditioned stimulus. The term resistance decrement is used to indicate the direction of the response.

Féré (1888), a French clinician, is credited with the discovery of the decrease in skin resistance caused by pain. Two years later, Tarchanoff (1890), a Russian physiologist, discovered that pain caused a change in the potential (voltage) of the skin. It now appears that both men had been measuring two different manifestations of the same phenomenon. Almost fifty years later, Goadby and Goadby (1936) demonstrated the relationship between the Féré effect and the Tarchanoff effect by taking simultaneous records of the two forms of the reflex from one foot of the same person. To this day, skin <u>resistance</u> is measured as the Féré effect, and <u>potential</u> as the Tarchanoff effect. Most investigators study the Féré effect, in terms of skin resistance or conductance (the reciprocal of resistance).

The work of Féré and Tarchanoff seems to have been forgotten until Mueller (1904), a Swiss electrical engineer, rediscovered the change in skin resistance. Mueller gained the interest of Veraguth, a neurologist, who named the phenomenon, "The psychogalvanic reflex." After four years of investigation, Veraguth (1909) wrote a book entitled, <u>Das psychogalvanischen reflexphenomen</u>.

In the following years, this book and the new name for the phenomenon attracted widespread attention. Physiologists became interested in the physical base of the reflex, and psychologists became interested because the reflex can be conditioned.

Veraguth (1909) found that the response is located in the skin rather than the underlying tissue. His discovery was confirmed by Fauville (1921) who found that a frog ceases to exhibit the response after its skin is removed.

Most investigators agree that GSR is a result of excitations of the sweat glands by the sympathetic division of the autonomic nervous system (Wang, 1957). This view is supported by Wagner (1965) who found an absence of the response in persons with congenital absence of sweat glands. It is also evident that the higher centers of the central nervous system are involved in the response. Studies show that spinal transection of laboratory animals causes a decrease in the intensity of the response (Wang, 1958).

GSR is an autonomic response that can be measured readily and accurately (Wang, 1957). Research indicates that individuals exhibit characteristic and persistent patterns of response to stress (Lacey, 1950; Lacey et al., 1963) and stereotyped patterns of somatic and autonomic activity during quantitatively and qualitatively different

stimulus situations (Schnore, 1959). Research also indicates that, within carefully set parameters, GSR is a better indicator of physiological activity than a verbal report (Walsh, 1966).

The physiological activity manifested as resistance decrement can, in a general sense, be called arousal or emotional response. Studies indicate that GSR is related to anxiety, both manifest and induced. Bitterman and Holtzman (1952) found such a relationship to exist when an over-all index of anxiety, based on several behavioral ratings and test scores, was used. Beam (1955) found that GSR reactivity increases immediately before such anxiety arousing situations as oral examinations.

Tursky, Schwartz, and Crider (1970) found that GSR shows a generalized arousal pattern during both the information intake and processing stages when a subject performs a digit transformation task. Research by Stennett (1957) shows that there is a relationship between the level of arousal in an individual and his performance level, higher arousal being associated with better performance on a task. Even in such a basic task as reading, research shows that arousal, as measured by GSR, increases as reading difficulty increases from independent, to instructional, to frustration levels (Rugel, 1971).

The application of GSR instrumentation to the study of recall and learning has been fruitful in the area of research. As early as 1937, Brown (1937) found a relationship between GSR magnitude, and serial order and efficiency in memorizing nonsense syllables. Recent studies at the University of Michigan report that good short-term and poor long-term recall, of meaningful paired associates, are concomitant with low arousal. Good long-term and poor short-term recall are reported to be associated with high arousal (Kleinsmith and Kaplan, 1963; Kleinsmith et al., 1963). A subsequent study (Kleinsmith and Kaplan, 1964), using paired associates of nonsense syllables and numbers with 0% association values, revealed the same pattern. In addition to the University of Michigan studies, Levonian (1967) observed the same pattern with continuously presented material (traffic safety films); and Luborsky, Blinder, and Mackworth (1963) observed the pattern in the recall of pictures.

Crane, Dieker, and Brown (1970) have found significant differences in the physiological effects of various modes of communication and different classes of stimulus words.

The research cited indicates that verbal reinforcement affects performance and learning, and current

learning theories relate verbal reinforcement to anxiety. GSR has been shown to be a reliable indicant of arousal which has been correlated with anxiety. If evaluation produces anxiety in a subject, it will be reflected in his GSR.

The Present Study

On the basis of learning theories and what is known about the effects of praise and criticism on performance and learning, one might hypothesize that praise and criticism would have different effects on GSR. On the basis of one study (Crane et al., 1970), one could also hypothesize that the effect of a telephone message would be different than the effect of a note. If such relationships could be experimentally established, the impact of particular message and mode combinations could be determined from what is known empirically about GSR.

To investigate the effects of praise and criticism in telephone and written messages, an experiment was designed which attempted to duplicate the evaluative communication situation in the laboratory. To accomplish this, the following was done:

(1) A task was created which required the subject to predict a sequence of colored lights. The task served two purposes, (a) it provided a performance which

could be evaluated, thus adding credibility to an evaluative message, and (b) it disguised the true nature of the experiment.

(2) Two messages were constructed; one to communicate praise and one to communicate criticism. Fischer and Herschberger (1968) have found that to accurately discriminate the differences between praise and criticism, it is necessary to use statements which communicate the same amount of information and to avoid value statements such as, "you did well" and "you didn't do so well." The messages were, therefore, created to communicate a high- and a low-level of performance, respectively, on the task. They consisted of only a statement of a subject's performance relative to a peer group norm. Making the evaluation appear applicable to the subject's performance, rather than being arbitrary, had a secondary effect of further enhancing the credibility of the message.

(3) A telephone circuit was established between the rooms reserved for the experiment and a note delivery system was perfected.

In addition to message content and mode, the investigator wanted to know if personality traits relate to the impact an evaluative message has on the subject. The study, therefore, had a two-fold approach, (1) to determine

the effect, on arousal, of message content and mode of transmission, and (2) to investigate the relationship between arousal, in the communication situation, and personality traits of the message recipient.

The study investigated a particular communication situation, the reception of a task evaluative message. For the study of the effect of message content and mode of transmission, content and mode were varied in a factorial design. The investigation of relationships between arousal and personality traits was undertaken by an analysis of correlations between arousal, in the communication situation (GSR), and scores from the Personal Orientation Inventory (POI). The POI (Shostrom, 1966) measures conceptually relevant aspects of self-actualization and was chosen for its adaptability to the present study.

The following experimental hypotheses were generated:

1. Variation in the content of an evaluative message causes significant variation in a subject's arousal, as measured by GSR.

2. Variation in the mode of transmission of an evaluative message causes significant variation in a subject's arousal, as measured by GSR.

3. Variation in the content and mode of transmission of an evaluative message (interaction effect) causes significant variation in a subject's arousal, as measured by GSR.

4. A significant correlation exists between a subject's arousal (as measued by GSR), in the communication situation, and personality traits (as measured by the POI).

Hypotheses one through three were tested by analysis of variance. Criterion for the acceptance of an hypothesis was an F value significant at the .05 level. Hypothesis four was tested using Pearson product moment correlations. For the purpose of the present study, the criterion for the acceptance of the hypothesis was one or more correlations, between GSR measures and POI scores, significant at the .05 level.

METHOD

Subjects

The subjects used in this study were male and female volunteers from General Speech classes at Western Michigan University. They came from two class sections which were taught on the same days, by the same instructor. The POI had been administered to the classes earlier in the semester as a regular class assignment. As an incentive to the students, the experiment was conducted on class days, and sessions were started approximately twenty minutes prior to the end of their class periods. All measurements were made on the days of two consecutive class meetings, during the same week. On the first day of the experiment, volunteers were requested from each class. On the second, a list was read in each class and a specified number of volunteers was requested from that list. A student's name was on the list if he had not previously participated in the experiment, and if the experimenter had POI scores for him. However, no student who wished to participate was turned down either day of the experiment, and a total of seventeen participated. Measurement and control difficulties invalidated data in nine cases; the result of the experimentation was GSR measures for eight subjects:

five males and three females.

Apparatus

The study was conducted in two adjoining rooms. One was designated as the subjects' room, the other as the experimenters'. The experimenters had access to the subjects' room through a connecting door or through doors located on a common hallway, and could view the entire room through a one-way mirror.

The subjects' room measures approximately 21 x 13 feet. It contained a table and a chair which were positioned to make it possible for the experimenters to deliver a note, through the connecting door, to the subject sitting at the table. Located thirty inches from the front of the table was a box containing three colored lights: green, yellow, and red (see Figure 1). When not attached to a subject, the skin resistance electrode (see Figures 2 and 3, and Appendix C) from the GSR equipment was also placed on the table. During appropriate portions of the experiment; a standard, desk-style telephone with a pick-up coil attached to its base, for monitoring purposes, was placed on the lower, right corner of the table. It was positioned to make the receiver accessible to the subject's right hand. The electrode cable, the cable connecting the light box and its switching unit;

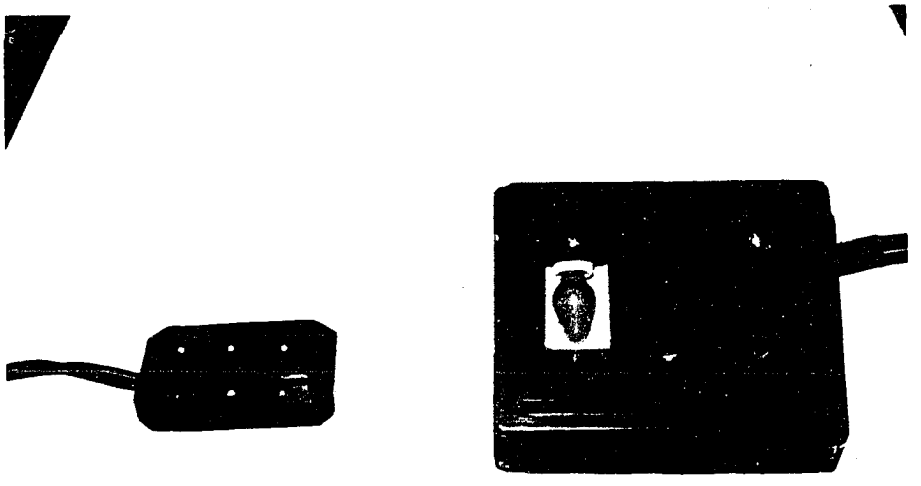

Figure 1. The light box and switching unit.

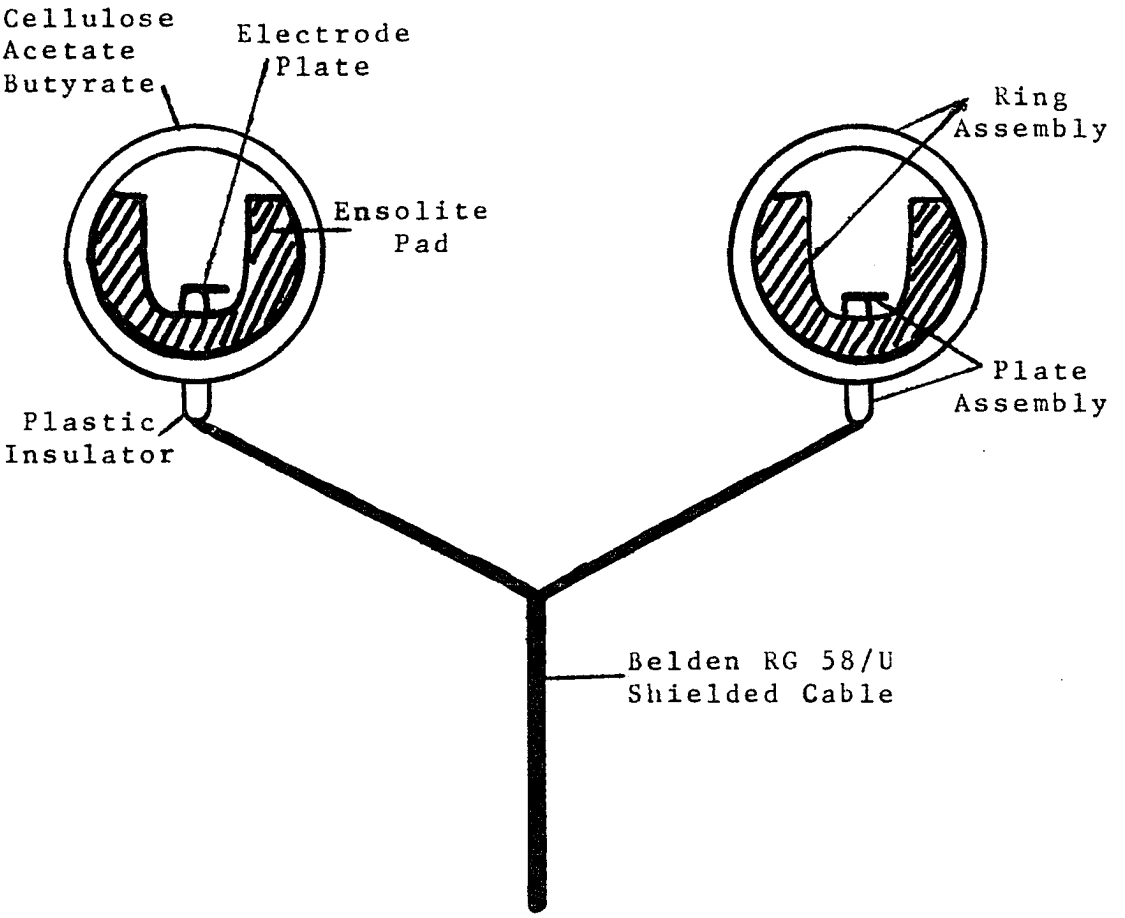

Figure 2. The skin resistance electrode. (See Appendix C for a complete description.)

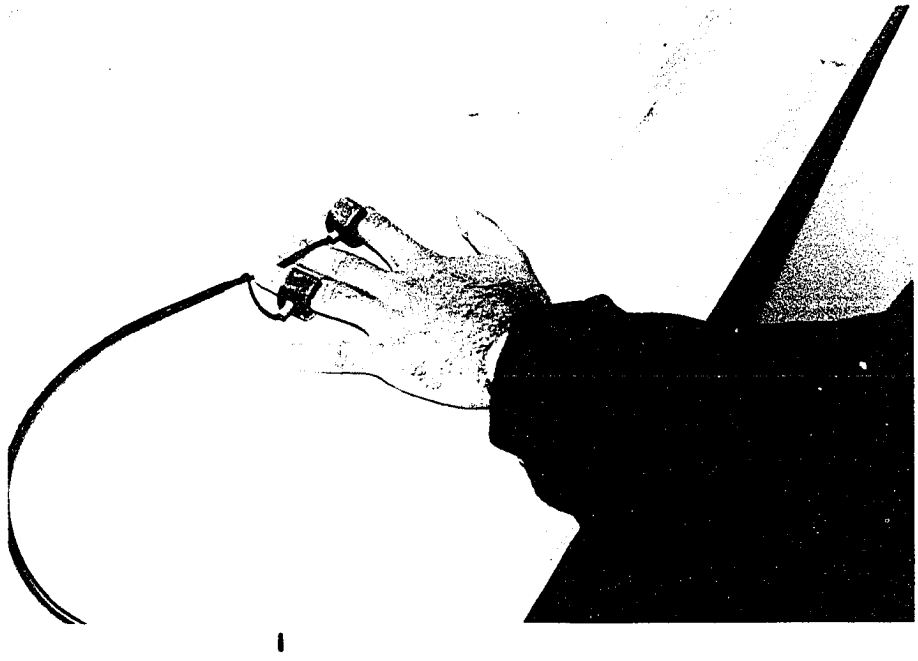

Figure 3. The skin resistance electrode attached to the left hand of a simulated subject.

and when necessary, the cords from the telephone and the pick-up coil were run under the connecting door into the experimenters' room. Figure 4 shows a simulated subject, with the skin resistance electrode attached, sitting at the table.

The experimenters' room measures approximately 20 x 9 feet. A table was located against the wall which separates it from the subjects' room. On the table, were placed a Fels Dermohmeter Model 22A (see Appendix A), and a modified dual channel Galvanometric Rectilinear Recorder No. PDRIM-A16-A (RectiRiter, see Appendix B), and the switching unit for the light box. When the experimental design called for the use of the telephone, the signal from the pick-up coil was fed through a preamplifier into a public address amplifier, which, in turn, was connected to a speaker. This circuit allowed the experimenters to monitor all messages delivered over the telephone.

Stimuli

Two messages were chosen by the investigator to communicate high and low performance, respectively, on an evaluated task:

High message: You did better than 90%.

Low message: 90% did better than you.

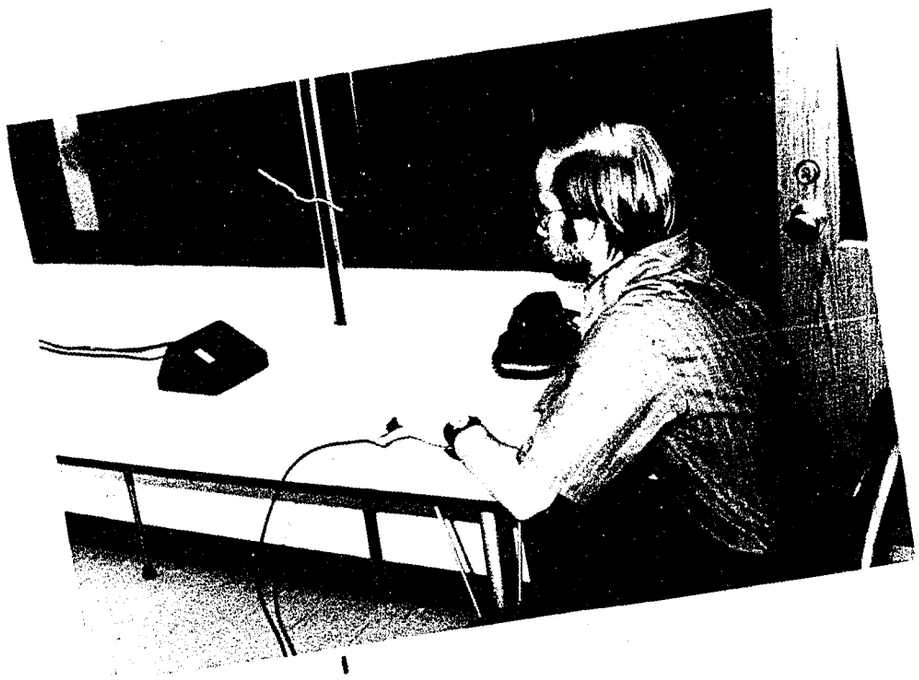

Figure 4. The subjects' room: light box, telephone, and simulated subject with electrode attached.

The messages were used with instructions that explained the subject's performance would be evaluated according to a norm.

Design

The dependent variable under investigation was the arousal, as measured by GSR, elicited by a task evaluative message. Message content and mode of transmission were investigated as independent variables. Two levels were assigned to each. Messages contained either a high or low evaluation and were delivered either over the telephone or in a note. Thus, the design was a standard 2 x 2 factorial. Each subject was exposed to only one of the four treatment conditions, therefore, there were no repeated measures. Subjects were randomly assigned to treatment conditions according to the order in which they volunteered.

In addition to message content and mode of transmission, personality traits, as reflected in subjects' POI scores, were investigated as independent variables. Correlations were computed between subjects' GSR measures and POI scores.

Procedure

When a subject entered the subjects' room, he was asked to sit at the table and make himself comfortable. He came into contact with only one of the experimenters who was referred to as the assistant. He was asked for his name, and to minimize his anxiety over the experimental session, he was given general information concerning the experiment and an offer was made to answer any questions. All subjects were told by the assistant:

> You will be required to perform a task which uses the lights which you see in front of you. Your performance on the task will be evaluated according to a norm developed for persons of your same age and sex. I will, now, attach an instrument to you which will allow us to measure your reaction to the task.

No mention was made of measuring the subject's reaction to the evaluation. The leads from the skin resistance electrode were attached to the index and third fingers of the left hand, between the first and second knuckles (see Figure 3).

After the electrode was attached to the subject, he was asked to read a list of instructions. At the same time, the experimenter in the other room was locating his GSR baseline. Two sets of instructions were used: one for the treatment conditions requiring the telephone (see Appendix D); the other for treatments using a note (see Appendix E). The first sections of both were identical

and explained the task: the subject was told that he would see the first five lights of a continuous sequence and was to predict the next five lights in that sequence. The second section of each instruction set explained the procedure for the subject to follow to make his prediction and also explained how he would receive his evaluation.

After the subject read the instructions and affirmed that he understood what was expected of him, the assistant left the room. The assistant, then, entered the experimenters' room and used the switching unit of the light box to present the five-light sequence to the subject. The sequence was the same for all subjects: yellow, green, red, green, yellow. Each light was flashed on for two seconds and there was a one-second interval between lights. At the conclusion of the light sequence, the assistant returned to the subjects' room for the prediction. He stepped inside the room approximately three feet and was eight to ten feet from the subject; he carried a clipboard and recorded the subject's prediction on a sheet of paper. He did not speak to the subject unless it was necessary to remind him what he was expected to do. After the assistant recorded the prediction, he left the subject alone in the room and sufficient time was allowed for the subject to believe that his

evaluation was being prepared.

If the subject was to be evaluated over the telephone, the assistant dialed the number of the telephone in the subjects' room and waited until the receiver was picked up. He then delivered one of the predetermined, evaluative messages. The assistant had practiced so that messages would not differ significantly in volume, pitch, or stress. Messages were approximately two seconds in duration.

If the subject was to be evaluated by note, the assistant opened the connecting door slightly, handed the subject an envelope, and closed the door. The subject's evaluation had been typed on a 6 x 9 inch sheet of paper, folded twice, and inserted in the 3-5/8 x 6-1/2 inch envelope. The envelope flap had not been tucked in nor sealed.

After a subject had received his evaluation (either over the telephone or in a note), the experimenters waited until they were certain that they had recorded his reaction to the message. This usually took from 30 to 60 seconds from the time the message was delivered, depending upon the subject and the mode in which the message was transmitted. After the subject's reaction was recorded; the assistant re-entered the room, thanked him, and disconnected the electrode. The subject was asked not to

discuss the experiment with anyone until notification was made that it had been concluded.

Recording of GSR

The Dermohmeter continuously measures the level of a subject's skin resistance. The Recti/Riter records that information as a wave form which corresponds to the shifting level of skin resistance. The most common methods of interpreting GSR are based on percentage and absolute measures. Koen (1966) records the amount of resistance at the instant the stimulus appears and the amount of change in resistance resulting from the stimulus. He then calculates the amount of change as a percentage of the base level. Lacey is critical of the percentage method. In a four year study of autonomic responses (Lacey and Lacey, 1962), he concludes that scores based on the autonomic lability technique are more stable.[1] The Lacey technique was used in the present study. Autonomic lability scores (ALS) are based on level to level regressions,

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[1] "The technique of autonomic lability scoring was described and analyzed, and compared with percentage and algebraic measures of response. The 'law' of initial value was found to be unreliably and variably expressed when percentage change or algebraic change was correlated with initial value. . . . The framework for measurement of responses provided by the autonomic lability technique, which deals only with the regression of stress level on initial level, was more stable." (Lacey and Lacey, 1962, p. 1290.)

or the absolute change from one level to another. Two levels, which consisted of the amount of resistance at particular points in the experiment, were recorded for each subject: (a) The initial level was recorded the instant the subject received an alerting stimulus (the telephone rang or a note was handed through the door). (b) The final level was recorded when the subject's GSR reached its maximum level, in its first sweep, after the presentation of the message. The subject's GSR measure was then calculated as the regression of the final level on the initial level.

RESULTS

A two-way analysis of variance from Hartley (1962) and Pearson product moment correlations (Western Michigan University, 1970) were employed for examination of the data.

The summary of the analysis of variance of GSR measures is shown in Table 1. The main effect of the content variable is significant at the .05 level, with low message treatments exhibiting the significantly higher arousal. The main effect of the mode variable is significant at the .01 level, with the note treatments exhibiting the significantly higher arousal. The effect of content x mode interaction is not significant (at the .05 level).

Pearson product moment correlations between subjects' GSR measures and POI scores are shown in Table 2. GSR correlates at the .05 level with Inner-Direction and Self-Acceptance.

TABLE 1

ANALYSIS OF VARIANCE OF GSR MEAN CHANGES
FOR MESSAGE CONTENT AND MODE, AND
CONTENT X MODE INTERACTION
(N = 8)

Content (F = 12.658)	12.5 High Message	<	29.8 Low Message*
Mode (F = 26.322)	8.7 Telephone	<	33.5 Note**
Content x Mode (N.S.) (F = 6.254)			

Two-Way Analysis of Variance

*p < .05

**p < .01

TABLE 2

PEARSON PRODUCT MOMENT CORRELATIONS
BETWEEN GSR MEASURES AND POI SCORES
(N = 8)

POI Scale	r
Time Competence	0.505
Inner-Direction	0.717*
Self-Actualization Value	-0.132
Existentiality	0.630
Feeling Reactivity	0.544
Spontaneity	0.389
Self-Regard	0.290
Self-Acceptance	0.714*
Nature of Man	-0.148
Synergy	0.206
Acceptance of Aggression	0.033
Capacity for Intimate Contact	0.262

*$p < .05$

DISCUSSION

The experimental hypotheses generated were:

1. Variation in the content of an evaluative message causes significant variation in a subject's arousal, as measured by GSR.

2. Variation in the mode of transmission of an evaluative message causes significant variation in a subject's arousal, as measured by GSR.

3. Variation in the content and mode of transmission of an evaluative message (interaction effect) causes significant variation in a subject's arousal, as measured by GSR.

4. A significant correlation exists between a subject's arousal (as measured by GSR), in the communication situation, and personality traits (as measured by the POI).

On the basis of the analysis of variance summarized in Table 1:

The message content hypothesis (1) was accepted.

The mode hypothesis (2) was accepted.

The interaction hypothesis (3) failed to meet the criterion for acceptance (an F value significant at the .05 level) and was, therefore, rejected.

On the basis of the Pearson product moment correlations shown in Table 2, the personality trait hypothesis (4) was accepted.

Message Content

That message content had an effect on arousal is evident from the analysis of variance, summarized in Table 1, which led to the acceptance of the content hypothesis. The mean GSR measures displayed show that treatments containing the low message (criticism) exhibit more arousal than the treatments containing the high message (praise). This effect of message content on arousal is significant at the .05 level.

The data in Table 1 reveal that arousal is a function of message content in the communication situation investigated. The data also support research cited earlier (Spence, 1966; Fischer, 1963; Fischer and Herschberger, 1968; Rosenhan, 1966) which found that criticism generally has a greater effect than praise on a wide variety of subjects.

The data do not explain why criticism produced more arousal than praise. The answer to this question requires additional research. Because a pilot study revealed that persons performing the same task had no idea how well or how poorly they performed, it is doubtful that the subjects' greater reaction to criticism was due to dissonance between their idea of how well they performed the task and the actual evaluation. The

differences revealed in the data, therefore, were more likely caused by actual differences between the effects of praise and criticism.

The data can be interpreted to support the Yale group and its concept of achievement anxiety, and anxiety being a situation determined reaction. The present study indicates that being in the upper ten percent of one's peer group produces less anxiety than being in the lower ten percent.

Although the messages used in the study were generalizations of praise and criticism, there is a possibility that they communicated the degree of "correctness" of a subject's performance in the form of feedback of results on the task. If this is true, then it may be more important for subjects to be "correct" than to have their performance called "good." In that case, a replication of the present study using messages such as, "you did well" and "you didn't do so well" could produce different results.

It appears that praise and criticism have differential effects on arousal, just as they do on task performance and learning. The investigator sees the present study as a link between research which has found that verbal reinforcement affects task performance and learning, and GSR research which has found arousal to be related to task performance and learning.

Mode of Transmission

That the mode of transmission had an effect on arousal is also evident from the analysis of variance (Table 1). Mean GSR measures indicate that note treatments exhibit higher arousal than telephone treatments. This effect is significant at the .01 level. This finding supports the finding of Crane, Dieker, and Brown (1970) that various modes of communication produce different effects on GSR. The present study does not clearly identify the cause of the significant variance, only its source. It is the belief of the investigator that the time difference between mode treatments is crucial to an understanding of the mode effect. It took longer for the note to be delivered and read than it took for the subject to pick up the telephone, after one ring, and listen to the message. Therefore, although the higher arousal in the note treatments is a function of mode, it is possible that it is being influenced by the time factor involved. When a subject experiences a longer interval between an alerting stimulus and the time he actually perceives the message, he experiences a longer period of message anticipation. This period of anticipation is characteristically marked by a definite pattern of arousal in the subject. In addition to the

time factor, the permanent nature of the note compared to a telephone message may have been a factor in the higher arousal. Once a telephone message has been delivered it ceases to exist. Once a note is delivered, however, it continues to exist as a physical entity. It not only continues to exist, but there is a possibility that a copy also exists. Therefore, the subjects' reaction to the note could be, in part, due to its permanency. The note also allowed the subjects to read and re-read the message. In a sense, it could have been a multiple message. The same effect might have been produced with the telephone if the message had been repeated several times.

Personality Traits

The purpose of the investigation of possible correlations between the POI and GSR was to discover what relationships, if any, exist between traits measured by a standard personality inventory and a general measure of arousal. The results are encouraging as a relationship, reflected in the significant correlation coefficients (see Table 2), does exist. Inner-Direction and Self-Acceptance correlate with the over-all measures of arousal (GSR measures for the four treatment conditions) at the .05 level.

I scale (Inner-Direction) scores directly influence the I/O (Inner/Other) support ratio which is a measure of one's tendency to be inner- or other-directed. The greater degree to which an individual was inner- as opposed to other-directed, in the experimental situation, the greater was his arousal when evaluated.

The findings that inner-directed subjects were affected more by both praise and criticism than other-directed subjects and that criticism affected all subjects more than praise appears to contradict the findings of Thompson and Hunnicutt (1944) that repeated praise has a greater effect on introverts, whereas, repeated blame has a greater effect on extroverts. It is the view of the investigator that the contradiction is more "apparent" than "real." The contradiction seems apparent because of the similarity between inner-/other-direction and intro-/extroversion. No matter how conceptually similar they may appear, however, Thompson and Hunnicutt did not use the POI as a criterion measure as did the present study; therefore, from a psychometric viewpoint, the results of the studies may be compared, but it is difficult to say that they contradict. It is also important to note, when comparing the studies, that they are concerned with two entirely different experimental situations. Thompson and Hunnicutt were studying the academic achievement of

fifth-grade students as it is affected by personality type and repeated praise and criticism. The present study is concerned with the effects of personality traits, and praise and criticism on a subject's arousal and used college students.

The Self-Acceptance score is a measure of the degree to which one can accept himself in spite of his weaknesses and deficiencies. The greater degree to which a subject could accept himself, the greater was his arousal in the experimental situation.

It is quite possible that the way in which an individual orients himself to the world, and how he views himself in that world have some effect on how he reacts to his world physiologically. In a study cited earlier (Crane et al., 1970), it was found that personal (self-oriented) words evoke more arousal than non-personal words. On the basis of that finding and the promising indication that Inner-Direction and Self-Acceptance correlate with GSR measures, one would desire to investigate the effects of personality traits further.

Implications for Further Research

In response to the question which prompted the study: What effect does an evaluation have on the person being evaluated?, the study shows that the impact an

evaluation has on a person is dependent on both external (message content and mode) and internal (personality traits) factors.

It is difficult to say how much the results of this investigation could be stretched into a practical formula by which to guide evaluation. Although certain combinations of message and mode may produce higher levels of arousal in certain individuals, and this arousal may be related to such desirable effects as improved performance and long-term recall; there may also be harmful effects. If an evaluator were to continually push for effects concomitant with high arousal, he could create a strained interpersonal relationship and could ultimately be alienated from the subject through antagonism and avoidance tendencies. In the final analysis, content and mode decisions are still left to the good judgement of the evaluator. However, studies such as this may help him to make those decisions more intelligently.

The present study indicates that the communication process is a promising field for GSR research. A replication of the study, preferably with a larger number of subjects, would be useful to confirm or disconfirm the results reported here. Beyond that, a more intensive investigation of Inner-Direction and Self-Acceptance would benefit our knowledge of the communication process and the

effects of evaluation. The investigator also sees the need for the investigation of the effects of such meaningful independent variables as message anticipation, the permanent/non-permanent nature of messages, and multiple messages.

SUMMARY

The purpose of the present study was two-fold: (1) to determine the effect, on arousal, of message content and mode of transmission, and (2) to investigate the relationship between arousal, in the communication situation, and personality traits of the message recipient. It was hypothesized that: (1) Variation in the content of an evaluative message causes significant variation in a subject's arousal, as measured by GSR. (2) Variation in the mode of transmission of an evaluative message causes significant variation in a subject's arousal. (3) The interaction effect of content and mode causes significant variation in a subject's arousal. And, (4) A significant correlation exists between a subject's arousal, in the communication situation, and personality traits measured by the POI.

Eight subjects were given a task to perform and were evaluated on that task. GSR was measured as a function of content and mode in a 2 x 2 factorial experiment. Pearson product moment correlations were computed between GSR measures and POI scores. The results supported the first, second, and fourth hypotheses. Message content (praise and criticism) and mode of transmission (telephone and note), and personality traits (Inner-Direction

and Self-Acceptance) were shown to affect the subjects' arousal in the experimental situation.

Suggestions were offered for the design of future experiments. Also, meaningful independent variables were suggested for investigation in future research.

APPENDIX A

Specifications: Fels Dermohmeter Model 22A

Range: 0-500,000 ohms

Sensitivity: 6,000 ohms full scale maximum
120,000 ohms minimum

Accuracy: Plus or minus one percent or one meter division (whichever is larger) for both total resistance and resistance changes.

Subject Current:

1. Current Change vs. Subject Resistance Change: 70 microamperes plus or minus 0.1 microamperes from zero to 500,000 ohms.

2. Current vs. line voltage: 70 microamperes plus or minus 0.2 microamperes from 108 to 122 line volts.

Range Set:

1. Manual, knobs on front panel.

2. Automatic, stepping switches change ranges, knobs on panel act as range indicators.

Automatic Range Rate: More than 3 steps per second.

Calibration: Six check points throughout operating range selected by knob on front panel, accuracy plus or minus one percent.

Output: Plus or minus one volt across 1,500 ohms.

Power Requirement: 117 volts, 60cps, 100 watts.

Marker Pens: The instrument is provided with an amplifier to drive a one milliampere recorder.

APPENDIX B

Specifications: RectiRiter No. PDRIM-A16-A (Basic Recorder with 1-ma. Movement and 105- to 125-volt ac, 60-cps Drive)

Power Requirement: 12 watts

Full-Scale Readings: 1-ma. across 4-1/2 inch grid (basic galvanometer).

Response Time: 0.35 sec. to 90% full scale for 2-cps galvanometer with critical damping.

DC Recording Accuracy: Plus or minus one percent of full (4-1/2-in. or 12-cm) scale.

Full-scale Rise Time at Critical Damping: 250 milleseconds.

Source Resistance for Critical Damping: 23,500 ohms for basic galvanometer.

Nominal DC Resistance: 1,500 ohms

Current Sensitivity: 0.22 ma. per inch.

APPENDIX C

Description: The Skin Resistance Electrode

The electrode shown in Figures 2 and 3 was used in the study. It is similar in design to the electrode used by Levonian (1963). Its basic components are: two ring assemblies, two plate assemblies, and one cable.

The ring assembly consists of ring and pad. The ring is a 3/4 inch segment cut from 1/16 inch x 1 inch i.d. cellulose acetate butyrate tubing. The pad is made of Ensolite (Type M), measures 1/4 inch x 3/4 inch x 1-1/2 inch, and is attached to the inside of the ring with epoxy cement. A 1/4 inch hole was drilled in the base of the ring assembly (through both the ring and the pad) to accept the plate assembly.

The plate assembly consists of electrode plate, spade lug connector, and plastic insulator. Stainless steel (22 ga.) measuring 5/8 inch x 1/4 inch was used for the electrode plates. A spade lug with its point bent 90 degrees to its shaft was soldered to the bottom of each electrode plate. Tubular plastic insulators, 7/16 inch x 1/4 inch o.d., were used to insulate the shafts of the spade lugs.

Belden RG 58/U shielded cable was used. The solid conductor and the shield were individually drawn through the hole in the base of a ring assembly and crimped into the shaft of the spade lug of a plate assembly. Plastic insulators were slid over the shafts and inserted in the holes in the ring assemblies. This particular design allows the experimenter to move the electrode plate to compensate for variations in finger sizes. The final step in the preparation of the electrode was to insulate all exposed cable leads with shrink tubing.

The electrode conforms well to the physiology of the first and third fingers. The electrode plates may be adjusted for firm contact with the sides of the fingers, between the first and second knuckle.

APPENDIX D

Sample Instruction Set: Telephone Treatments

INSTRUCTIONS

After you have read the instructions and we have answered any questions you may have, you will be left alone in the room. At that time, you will be presented with the task.

In This Task:

1. You will see three separate lights: green, yellow, and red.

2. You will see one light at a time flash on and off, until you have seen a total of five.

3. The five lights are the first five lights of a continuous sequence.

4. Your task is to predict the next five lights in the sequence.

After You Have Seen the Five Lights:

1. The assistant will enter the room; make your prediction to him.

2. The assistant will then leave the room.

3. After your score has been computed, you will receive your evaluation over the telephone.

4. When the telephone rings; without talking, pick up the receiver with your free hand and place it to your ear.

5. Please listen to the evaluation carefully and do not talk until you are notified that the experiment has been completed.

APPENDIX E

Sample Instruction Set: Note Treatments

INSTRUCTIONS

After you have read the instructions and we have answered any questions you may have, you will be left alone in the room. At that time, you will be presented with the task.

In This Task:

1. You will see three separate lights: green, yellow, and red.

2. You will see one light at a time flash on and off, until you have seen a total of five.

3. The five lights are the first five lights of a continuous sequence.

4. Your task is to predict the next five lights in the sequence.

After You Have Seen the Five Lights:

1. The assistant will enter the room; make your prediction to him.

2. The assistant will then leave the room.

3. After your score has been computed, your evaluation will be placed in an envelope which will be handed to you through the door on your right.

4. Take the envelope, open it, and read the note inside carefully. Do not talk until you are notified that the experiment has been completed.

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