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A TEST AND EXTENSION OF THE STIMULUS-EFFECT HYPOTHESIS IN PERCEPTUAL DEFENSE

By

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INTRODUCTION

In the twenty-one years since Bruner and Postman (1947) coined the term "perceptual defense" to account for the relationship between stimulus emotionality (the amount of affect or emotionality associated with the stimulus) and the difficulty in recognizing such stimuli, hundreds of studies have been done in an attempt to determine what factors are relevant to the perceptual defense phenomenon. In general, the findings have been that the recognition threshold for emotional stimuli differs from that for neutral stimuli, depending upon the personality of the subject and the degree of emotionality associated with the stimulus—the main idea being that there is some actual change in the perceptual system. Perceptual defense is said to occur when the recognition threshold for emotional stimuli is higher than that for neutral stimuli. The opposite trend is known as "perceptual vigilance" or "perceptual sensitization."

Because there has been a great deal of controversy as to whether there really is a phenomenon of perceptual defense, Eriksen (1954) pointed out three variables that must be controlled in studying perceptual defense: 1) the emotionality associated with the stimulus, 2) stimulus familiarity, and 3) response inhibition. In any study it must be demonstrated that the emotionality associated with the experimental or 'emotional' stimulus actually differs from that associated with the control or 'neutral' stimulus. It must also be demonstrated that any perceptual defense effect is not due
to differential familiarity with the experimental and control stimuli nor due to subjects' tendency to inhibit certain responses. Perceptual defense studies in the past have failed to control these three variables adequately.

A fourth variable which has been ignored by most researchers in the area of perceptual defense was identified by Blum in a series of studies (Blum, 1954, 1955, 1957) and has been discussed briefly in a few review articles (Brown, 1961; Eriksen, 1960; Minard, 1965; Natsoulas, 1965; Nelson, 1955; Smock, 1956). This is the "stimulus effect hypothesis" (Natsoulas, 1965). It suggests that one may recognize neutral and emotional stimuli equally well but respond to them differently--that the perception of some aspect of the emotional stimulus may trigger an avoidance reaction in the subject which results in the inhibition of emotional responses. The purpose of this paper, then, was to determine the most effective ways of controlling the three variables discussed by Eriksen (1954) and to incorporate them in a study which was designed to evaluate the stimulus-effect hypothesis.

**Definitions:**

Emotional Stimuli (ES)...stimuli conveying enough affective meaning to elicit behavior indicating emotional arousal.

Neutral Stimuli (NS)...stimuli which do not convey enough affective meaning to elicit behavior indicating emotional arousal.
Perceptual Defense (PD)...the tendency to perceive a neutral stimulus more easily than an emotional stimulus.

Emotional Response...a response which acknowledges the presence of an emotional stimulus.

Neutral Response...a response which acknowledges the presence of a neutral stimulus.

Ert...the tendency to suppress emotional responses when the stimulus is emotional.

Nrt...the tendency to suppress emotional responses when the stimulus is neutral.

Control of Stimulus Emotionality:

As Eriksen (1954) and Brown (1961) have pointed out, in many PD studies the emotionality associated with the discriminable stimuli has simply been taken for granted. In some cases the experimental design was such as to make it very probable that the emotionality associated with the experimental stimuli was greater than that associated with the control stimuli. Brown & Yandell (1966), for instance, made half of their subjects feel that they had done poorly on a task and the other half feel as though they had done well. They then presented the subjects success, failure and neutral words, assuming that the failure words would be more emotional for the subjects who felt that they had done poorly on the task. Bootzin & Stephens (1967), and Caron & Wallach (1959) assumed the same thing when they induced the feeling of failure in their subjects.
and had specific stimuli related to this failure. In similar studies it was assumed that the failure associated with failed anagram words gave these words negative affect making them suitable ES in the PD study (Eriksen & Browne, 1956; Postman & Solomon, 1950; Spence, 1957).

In a brief pilot study, however, the present writer found that there were no consistent changes in the affect associated with failed anagram words as indicated by changes in semantic differential responses for these words. When questioned about this subjects commonly said that the anagram problems were fun and that they didn't have the feeling of failure associated with them. In these cases mentioned above it seems that Eriksen and Brown's demand for a demonstration of differential emotionality between experimental and control stimuli is appropriate.

In a number of studies stimuli which were generally accepted as emotional were used as the experimental stimuli. Loiselle (1966) and Loiselle & Williamson (1966), for instance, assumed that certain photographs were more emotion provoking than others ie. nudes vs. scenery; and Lazarus, Eriksen, and Fonda (1951) assumed sexual and aggressive material to be emotionally threatening to certain types of subjects. However, no attempt was made to validate these assumptions. Bryant, Turner, and Lair (1967) and Nothman (1962) used "taboo" words as their ES without attempting to validate their emotional value. It may well be that these kinds of stimuli are emotional for the majority of subjects due to the feelings of anxiety
or embarrassment or tension, etc. associated with them; but as Brown and Eriksen pointed out, the emotionality associated with each stimulus should be determined for each individual subject.

When words are used as ES and NS, one of the most common ways of determining stimulus emotionality has been by a word association test as suggested by Bootzin & Natsoulas (1965), Brown (1961), Goldstein (1962, 1964 & 1966), and Mathews & Wertheimer (1958). The procedure is to tell the subject that he is going to be presented a list of words and that he is to respond to each word with the first word that enters his mind. The test words are then read to the subject, one at a time, and the subject's response time for each word is recorded. The list is then repeated with the subject instructed to give the same response to each word. According to Jungian theory, the degree of emotionality associated with each word, as indicated by a number of autonomic changes, is directly correlated with the latency of the response and failure to give the same response on the second presentation. (Jung, 1918). Therefore the emotional words are indicated by longer response latencies and repetition failures while neutral words have shorter response latencies and correctly recalled responses.

E. M. Coles (1965) has denied the validity of studies which use this measure of emotionality on the ground that the word association test has not been demonstrated to be a valid indicator of stimulus emotionality. In his reply to this,
Brown (1965b) had to agree that there is inadequate evidence underlying the assumptions of the word association test and that it is very sensitive to other variables as well as to stimulus emotionality. It has been demonstrated, in fact, that the word association test is a better indicator of stimulus familiarity and of associative strength than an indicator of stimulus emotionality (Brown, 1965a; Freeborg, 1967; Levinger & Clark, 1961).

As psychological events are often reflected in a number of different physiological reactions to stimulation, a more promising approach to the identification of emotional material might employ the measurement of certain physiological activities. According to Runquist & Ross (1959):

> There are a number of so-called physiological responses such as GSR, pulse rate, respiration rate, skin temperature, etc., which frequently have been used to define emotionality. The hypothesis may thus be formulated that the magnitude of these responses is some increasing function of the intensity of the hypothetical emotional response (p.329).

One problem with such a global statement, however, is that the symptoms of emotionality are specific to each individual. That is, not all physiological systems are activated by stress or noxious stimulation, but there are individual differences not only in intensity of the emotional response but also in the particular autonomic channel through which it discharges (Runquist & Spence, 1959, p.417).

This was also concluded from the findings of several other researchers (Jost & Sontag, 1944; Lacey, Bateman & VanLehn, 1953; Wenger, 1941). Another problem, as pointed out by Davis, Buchwald & Frankmann (1955), is that the patterns of different
responses through the autonomic nervous system change with repeated stimulation. That is, some autonomic responses get larger with repeated stimulation while other responses— including the GSR—show an extinction or habituation effect and gradually disappear.

In spite of the problems of individual differences and the habituation effect, Montague & Coles (1966) still suggest that "the galvanic skin response (GSR) is the most sensitive physiological indicator of psychological events available to the psychologist (p. 261)." It is elicited by a wide variety of motor responses such as coughing, laughing, flexing a muscle, making a quick movement, etc.; and it is easily elicited by sudden changes in external stimuli as when the subject is startled by an electric shock, bright light or loud tone. As emphasized by Flanagan (1967), the GSR is readily elicited by all the "accidental variables that are relevant to attention (i.e. novelty, suddenness, expectancy, etc. (p. 8)." At the same time, however, the GSR is also very responsive to emotional changes and is widely accepted as a measure of emotionality.

Dittes (1957a), for instance, reviewed a case history of psychotherapy with one patient and concluded that as therapy progressed the patient's feelings of fear and embarrassment in the interpersonal relationship gradually extinguished as indicated by a progressive decrease and disappearance of the patient's GSRs. In another review Dittes (1957b) interpreted
the GSR as "a measure of the anxiety of the patient, or his "mobilization" against any cue threatening punishment by the therapist (p. 303)," and showed that the patient's GSR was inversely related to the judged permissiveness of the therapist. This inverse relationship between inferred anxiety and therapist permissiveness was somewhat obscured by the fact that the GSRs were also related to the emotional significance of the patient's speech.

Reyher & Smeltzer (1968) assumed that the GSR measured the emotionality associated with responses when they concluded that visual imagery is accompanied by more anxiety than is verbal association because imagining the stimulus word elicited greater GSRs than associating to it. Similarly, Craig & Weinstein (1965) using the GSR as "a physiological measure of affect arousal," concluded that observing a model get shocked for repeated failures on a perceptual-motor task was more emotional than observing success on the task. This followed from the finding that subjects observing repeated failures gave larger GSRs than subjects observing success.

In a series of studies (Runquist & Ross, 1958, 1959; Runquist & Spence, 1959) the GSR and pulse rate changes were assumed to be indicators of "emotional responsiveness to weak noxious stimulation (Runquist & Ross, 1959, p. 330)." These measures were used to classify subjects as emotional or non-emotional in an attempt to evaluate the relationship of high and low levels of responsiveness to performance in eyelid
conditioning. The writers, however, suggested that these physiological measures may reflect "skeletal startle responses" rather than true emotional responsiveness; and in this case one should perhaps refer to the different levels of physiological responses as indicative of different drive levels which in turn might be interpreted as different levels of emotional responsiveness.

In the studies described above the assumption has been that the GSR is a valid indicator of emotionality. While there is some controversy as to how valid it really is (Flanagan, 1967; Levinger & Clark, 1961; Runquist & Ross, 1959; Runquist & Spence, 1959), there is considerable evidence supporting its use in this way.

In a classical conditioning experiment by Diven (1937), for instance, a word was paired a number of times with shock; and as expected, that word became the CS for the GSR. The affect associated with this critical word generalized to words of related meaning which were then able to elicit a GSR also. In a similar study Peastrel, Wishner & Kaplan (1968) showed essentially the same thing—that the affect associated with the critical word will generalize to synonyms or homophones depending upon the mental set induced by the instructions. In these studies it seems logical to infer that the GSRs are elicited by the negative affect associated with the critical and related words.

Forrest & Dimond (1967) analyzed the GSRs that were elic-
ited by different responses during Rorschach testing for 23 subjects and concluded that the GSR can be thought of as an index of the subject's anxiety level. Panek & Martin (1959) made the same conclusion when they found a significant correlation between speech disturbances and GSRs during psychotherapy. In fact, they suggested: "An index based upon both speech disturbance measures and occurrence of GSR dips should prove to be a fairly reliable and valid indication of momentary changes in anxiety level in psychotherapy interviews (p.405)."

More direct support of the GSR as a measure of emotionality comes from studies in desensitization therapy. Geer (1966), for instance, demonstrated that subjects who reported great fear of spiders gave greater GSRs when shown pictures of spiders than when shown pictures of snakes. They also gave larger GSRs to pictures of spiders than other subjects who reported low fear of spiders. In a similar study Wilson (1967) demonstrated that perfect separation could be made between high-fear and low-fear subjects on the basis of their GSRs to ES and NS. Clark (1963) emphasized the value of the GSR amplifier as a means of detecting changes in emotional states during systematic desensitization of a phobia. In his study the GSR was closely watched for detection of sympathetic activity below the threshold of subjective appreciation. "Resistances tended to show a slight sudden drop when any stimulus was advanced too far and this occurred several times well before the subject actually felt any anxiety (p.66)."
As mentioned earlier, a number of researchers have simply assumed that taboo words are more emotional than neutral words. Dixon (1958) demonstrated that this was true by showing that "all seven S's gave higher average GSRs for emotional items than they did for neutral ones (p.31)." This was especially revealing, for the stimuli were presented at a level of brightness below the absolute threshold, and no subject reported having seen any of them. It seems doubtful, therefore, that the GSRs would have been due to the attention variables of novelty, suddenness, expectancy, etc. referred to by Flanagan (1967). Zajonc (1962) found similar results when he presented taboo and neutral words tachistoscopically and showed that on all trials the GSRs elicited by the taboo words exceeded those elicited by neutral words. McCurdy (1950) reviewed a number of studies which supported the hypothesis that there is a significant correlation between GSRs elicited by taboo and neutral words and the subjective judgments of emotionality for each word. In his own study McCurdy found this correlation to be .76.

In a recent review of a number of such studies and following an evaluation of the factors eliciting GSRs, Flanagan (1967) concluded:

Present results indicate that the concept of attention is a better intervening variable interpretation of GSR than is the concept of emotion. Experienced GSR researchers have repeatedly indicated this conclusion. However, those interested in personality have continued to interpret GSR as an index of emotion or anxiety.....The distinction is also of importance to experimental designs because the
accidental variables that are relevant to attention (i.e. novelty, suddenness, expectancy, etc.) are typically ignored by experimenters who regard the GSR as an index of emotion or anxiety (p.8).

It is not the intention of the present writer to present the GSR as the final and flawless answer to a measure of emotionality for PD research. It is not, however, reasonable to ignore its possible advantages over other methods of measurement simply because it is affected by a number of variables unrelated to emotionality. It is suggested, however, that one can reliably use the GSR as an indicator of emotionality by controlling the extraneous variables which can affect it such as suddenness, novelty, expectancy, muscular movements, etc. Even Flanagan (1967) and Levinger & Clark (1961), who criticized its use in this way, agree that one thing it can and does measure is the emotional response.

Another approach to measuring the emotionality associated with various stimuli is simply to ask each subject how emotional each stimulus is for him. This has been the typical approach in desensitization therapy. A patient identifies his areas of tension, fear, etc., by indicating on a questionnaire the degree of tension associated with various situations and objects. There are a number of studies on the validity of such questionnaires or "fear survey schedules" as they are called (Geer, 1965; Laynor & Manosevitz, 1966; Rubin, Katkin, Weiss & Efran, 1968; Wolpe & Lang, 1964). The general finding has been that patients can and do accurately identify areas of tension. Additional validation of such questionnaires comes
from reports of therapy in which patients indicate reduced anxiety associated with phobic objects following successful desensitization therapy (Garlington & Cotler, 1968; Lang & Lazovik, 1963). And as mentioned earlier, Clark (1963), Geer (1966), and Wilson (1967) all found that items identified as higher in the hierarchy of feared items elicited significantly greater GSRs than those lower in the hierarchy. Depending upon the confidence one has in the GSR as a measure of emotionality in this type of situation, this is additional support for the validity of such introspective measures of feelings.

Zuckerman & Lubin (1964), in attempting to validate an adjective-check-list type questionnaire to measure temporary changes in moods, warned of subjects' tendencies to falsify the report in order to give the experimenter what he is looking for. This is what Orne (1962) referred to when he wrote about the "demand characteristics" of the experimental situation:

Subjects are concerned about their performance in terms of reinforcing their self-image; nonetheless, they seem even more concerned with the utility of their performances. We might well expect then that as far as the subject is able, he will behave in an experimental context in a manner designed to play the role of a "good subject" or, in other words, to validate the experimental hypothesis (p.778).

Rosenthal (1966) also emphasized the effect of approval seeking behavior when he wrote:

The task the experimenter formally sets for the subject is only one problem the subject must solve. Riecken (1962) called attention also to the subjects' "deutero-problem," the problem of "doping out the experiment" so his performance can be an appropriate one, and one that will lead to favorable evaluation (p.181).
In addition to emphasizing the "demand characteristics" of an experiment, these statements also point out the problem of subjects' need to give a favorable impression. As Azrin, Holz & Goldiamond (1961) demonstrated, subjects enter a situation with preestablished response tendencies which can interfere with the experimental instructions. It may be impossible to eliminate these tendencies altogether, and no doubt in answering any introspective questionnaire there will be some tendency towards social conformity and giving a good impression of oneself. It would seem, however, that these tendencies could be considerably reduced by removing all threat of personal exposure or embarrassment and by stressing the necessity of giving honest, unbiased responses. After all, as Rosenthal and Orne have pointed out, subjects want to be good subjects; they want to cooperate as well as they can.

Control of Stimulus Familiarity:

The second factor that must be controlled in PD studies is the stimulus familiarity, for the subject's familiarity with the stimulus can contribute to differential response tendencies. It has been shown, for instance, that there is a direct relationship between the frequency of the subject's experiences with the stimulus and the tendency to respond with it in an ambiguous situation (Taylor, Rosenfeldt & Shultz, 1961). Goldiamond & Hawkins (1958) demonstrated this by presenting nonsense syllables to subjects a various number of
times to establish different amounts of familiarity with each stimulus. The subjects were then told that these nonsense syllables would be presented tachistoscopically and that they should guess at each presentation. Actually, however, only hash marks were presented in the tachistoscope. Goldiamond found that the responses were directly correlated with the frequency of prior experiences with the stimuli—thus showing that one's responses are directly affected by the familiarity with the stimuli.

A number of approaches have been used to control the factor of familiarity in PD studies. A very common one has employed novel stimuli as the discriminanda. Bootzin & Stephans (1967), for instance, used unique eight-sided figures as their stimuli and made certain that the subjects' familiarity with all of the figures was the same. Blum (1955) used Blacky Pictures as his discriminanda and presented them to advanced graduate students in Psychology who had been working with them for an extended period of time. Thus Blum attempted to control for stimulus familiarity by making sure the subjects were all very familiar with the stimuli. Other approaches have been to use as discriminable stimuli such things as sketches (Lawrence & Coles, 1954), numbers (Loiselle, 1966; Loiselle & Williamson, 1966), and nonsense syllables (Phares, 1962).

Rather than utilizing novel stimuli many PD studies have used emotional and neutral words as the stimuli to be recognized; but as has been pointed out before, most of these studies
have failed to control adequately for stimulus familiarity (Eriksen, 1954; Brown, 1961). One common attempt to control this variable has been to select the experimental words from Thorndike and Lorge's *Teacher's word book of 30,000 words* (Brown & Yandell, 1966; Buck & Scammon, 1966; Eriksen & Browne, 1956; Goldstein, 1962 & 1964; Goldstein, Himmelfarb & Feder, 1962; Mathews & Wertheimer, 1958; Minard, 1965; Minard, Bailey & Wertheimer, 1965; Minard & Mooney, 1969; Nothman, 1962; Postman & Solomon, 1950; Solomon & Howes, 1951; Spence, 1957; Taylor et al., 1961). In such studies the attempt has been to select control words that appear with the same frequency as the experimental words with which they are paired. The criticism directed against this has been that the frequency of occurrence in literature is not as good an indicator of familiarity as the subjects' own evaluation of the familiarity of experimental words. It was found, for instance, that there was a statistically significant relationship between recognition thresholds and the evaluated familiarity—the more familiar words having lower recognition thresholds than the less familiar words. This tendency was similar for the words when familiarity was determined by the Thorndike-Lorge word frequency; but in this case the relationship was not statistically significant, suggesting that the former method of determining familiarity is superior (Bryant et al., 1967).

Controlling for the subject's familiarity with the experimental stimuli can be thought of in another way—as controlling
for mental sets which the subject will form before and during the experiment. When the subject, for instance, has been exposed to the experimental stimuli just before the PD study, this recency of experience with the stimuli will give him an expectancy to see them and thus lower his recognition threshold for them. Postman & Solomon (1950), for instance, demonstrated that experience with words in an anagram study immediately prior to the tachistoscopic presentation of these words and other words of equal length and frequency made it easier to recognize the anagram words. Very similar results were found in a replication of this study by Eriksen & Browne (1956), and it was concluded in each case that a mental set was established which increased the strength of the anagram words as responses.

The controlling of mental sets is necessary in any PD study. They can be manipulated as in the previously mentioned studies in which the recency of experience with certain stimuli created an expectancy to see them; but if the experimenter wishes to avoid mental sets, he has to be very careful in designing his study. In the past, one of the major problems has been that the subject comes into the experimental situation with a number of preestablished mental sets. This has been especially true in studies which have used taboo words and lewd or unpleasant pictures as the ES, for most of the subjects come into the experimental situation with a low expectancy for such stimuli.

It can easily be seen that mental sets are based upon
a number of different factors: frequency of occurrence of the stimuli, familiarity with the stimuli, recency of exposure to the stimuli, social acceptability of the stimuli, internal motivational states, and experimental instructions. Since all of these factors can influence response tendencies, they must be controlled in order to demonstrate the effects of emotionality on the perceptual system.

An alternative explanation for the effect of mental sets has been discussed by Postman (1953), Brown (1961), and Kempler & Wiener (1963). Basically the idea is that mental sets yield hypotheses as to what the stimuli will be; and the stronger the hypothesis is, the less the amount of information that will be needed to confirm it. Consequently a correct mental set would yield a lower recognition threshold while an incorrect mental set would yield a higher one. The claim here is that PD is not due to any actual change in the perceptual system; but rather it is due to a change in the amount of information needed to recognize the stimulus.

Regardless of whether mental sets affect recognition thresholds through changes in the response tendencies or through changes in the amount of information needed to identify the stimulus, it is clear that they must be controlled if PD is to be explained in terms of changes in the perceptual system due to the emotionality associated with the stimuli.

**Control of Response Suppression:**

The third factor that must be controlled in any PD study
is the tendency to inhibit responses. There have been a number of attempts to disprove the existence of PD by demonstrating that the apparent differences in recognition thresholds are due to response suppression rather than to any perceptual process. One approach has been to show that the PD effect drops out when the subject does not have to respond with an emotion arousing response. Nothman (1962), for instance, presented taboo and neutral words tachistoscopically under four different response conditions and found that the PD effect was significantly less when the subject responded in writing rather than orally. He also found that the PD effect disappeared when a subject was required to give only a fragment of the stimulus word instead of all of it.

Zajonc (1962) showed essentially the same thing when he trained his subjects to respond to words with other words which had been paired with the stimuli in a paired-associates learning situation. At one time the stimulus was an emotional word, and the response was either another emotional word or a neutral word which had been learned. At other times the stimulus was a neutral word while the response was either a neutral or an emotional word. He found that the differences in recognition thresholds were due more to the responses that were required than to the stimuli which were presented.

In a different approach to eliminating response suppression Goldstein et al. (1962) presented pairs of words tachistoscopically, one neutral and one emotional, and required
the subject to say which side one of them was on. The subject
was told what the two words were and which one to look for.
This eliminated the necessity of responding with the emotional
or neutral word, and under such circumstances no PD was found.
This seems reasonable, however, for in such a situation recog-
nition of either the neutral or the emotional word would indi-
cate what side the required word was on. The effect of response
bias was demonstrated also, for it was found that there were
significant side preferences depending upon whether the word
to be recognized was emotional or neutral. In a different
experiment the conditions were all the same except that the
stimuli were hash marks instead of the stimulus words. The
subjects didn't know this, and they responded as they had in
the previous experiment demonstrating side preferences depend-
ent upon the word that was to be recognized.

To demonstrate further the relationship between response
suppression and recognition thresholds Goldstein (1962) com-
pared the pseudo-accuracy scores of a stimulus-absent group
to the accuracy scores of a stimulus-present group. By means
of a word association test a list of four emotional and four
neutral words was selected for each subject. Each subject
in the stimulus-present group was then given this list and
told to guess which word was presented each time from the
list. The words were then presented tachistoscopically at
an exposure time of 50 to 100 msec. below the recognition
threshold for neutral words. Each subject's accuracy score
was then determined by subtracting his accuracy score for neutral words from his accuracy score for emotional words. Difference scores for the stimulus-absent group were determined in the same way; but because they received hash marks instead of the words in the tachistoscopic presentations, the accuracy scores were based upon a predetermined random order of word presentation. The mean difference score for the stimulus-absent group was not significantly different from that for the stimulus-present group, indicating that the presence of the stimulus words had no significant effect on the recognition thresholds. In addition to this, the difference scores for the stimulus-absent group were significantly different from zero. This would normally have been interpreted a PD if the stimuli had actually been presented instead of hash marks.

In a later study Goldstein (1964) found similar results when all his subjects were tested under three conditions: stimulus present, stimulus absent, and forced choice. Response bias was determined for each condition, and his hypothesis was confirmed that the magnitude of PD was equal for stimulus-absent and stimulus-present conditions. From Goldstein's data it appears that the most relevant factor in PD studies is the response that is required rather than the emotionality of the stimulus--suggesting that PD, as it is here defined, doesn't really exist.

There have been a number of attempts to determine the effect of PD by measuring and correcting for response suppression.
Mathews & Wertheimer (1958), for instance, told their subjects that one of eight words would be presented tachistoscopically each time. However, two of the four emotional words and two of the four neutral words were never shown. It was hypothesized that in the absence of any response suppression equal numbers of the neutral and emotional words in the never-presented group would be called. A pure measure of response suppression in the form of a Z score was determined by comparing the absent emotional words called to the absent neutral words called. A similar Z score for each subject was determined for his calls of the emotional and neutral words which were presented. This Z score represented both PD and response suppression. After the Z score for response suppression was subtracted, the resulting score represented a "pure measure of PD" uncontaminated by response suppression. PD was found even after the response suppression was taken from it.

Minard (1965) reported a doctoral study in which he replicated and extended the research previously done by Mathews & Wertheimer. In this experiment the subjects were given a card containing the eight stimulus words, but as before only four of these words were ever presented. In addition to this smudged blank slides were presented instead of stimulus words throughout the trials to get pseudoaccuracy scores for each subject. The response suppression was then determined as the difference between the neutral responses which were guesses and the emotional responses which were guesses. Guesses included responses
to the smudged blanks and all inaccurate responses. The PD was then determined as the differences between neutral responses which were accurate and the emotional responses which were accurate. Minard found the response suppression to be insignificant and the PD to be significant even after the response suppression was accounted for.

Sarbin & Chun (1967), recognizing the improvement in Minard's changes of Mathews & Wertheimer's method of eliminating the effects of response suppression, suggested that the Z score for response bias be determined from all the incorrect responses rather than just the incorrect responses from the never presented stimuli. In addition to this they allowed the subjects to respond with a number rather than with the emotional or neutral word which was presented to them tachistoscopically. When these changes were incorporated into their study, Sarbin & Chun found no significant PD effect. This, they concluded, was due to the fact that the subjects' responses were numbers representing their answers rather than the neutral or emotional responses themselves.

Another approach to controlling response suppression has been to eliminate it by using a forced choice technique in which the alternatives for any particular choice have been all emotional or all neutral. Bootzin & Natsoulas (1965) presented to their subjects neutral and emotional words at .01 and .03 seconds as well as hash marks at .01 seconds. Following the presentations of each word or set of hash marks,
the subject was given a choice between two words equal in emotionality, familiarity, and length. There were two blocks of stimulus presentations, each block being comprised of two presentations of each of the eight words at each duration plus presentations of the hash marks for each of the response possibilities, making a total of 96 presentations. At the .03-second exposures on the first block there were significant differences between the recognition thresholds for emotional and neutral words, but this was not true at the .01-second exposures. This suggests that there was PD uncontaminated by response suppression at the .03-second exposure level but not at the .01-second exposure level. At the .01 level the responses to the words as well as those to the hash marks did not differ from chance. From block 1 to block 2 there was a significant improvement in accuracy for emotional words at the .03 level but not for the neutral words. This suggests that one habituates to the emotionality of the words over trials and that with more trials the PD will disappear entirely. This is a significant finding that is supported by other research (Bootzin & Stephens, 1967; Brown, 1961; Goldstein, 1966; Natsoulas, 1965; Zajonc, 1962).

From these studies one can see that there have been a number of attempts to eliminate the response inhibition explanation for the PD phenomenon: manipulating the type of response that is required (Goldstein et al., 1962; Loiselle, 1966; Loiselle & Williamson, 1966; Nothman, 1962; Taylor et al.,

Control of the Stimulus Effect:

In spite of the apparent success that some of these experimenters have had in controlling or eliminating response biases, few of them have even considered the possibility that the tendency to inhibit an emotional response might be instigated by the perception of the stimulus. This is to suggest that response bias might occur only when it is activated. This does not deny the fact that response suppression exists as it is usually thought of—the simple tendency to avoid giving a taboo or emotional response. However, it is suggested here that response suppression might be greater or less depending upon the nature of the stimulus; and in the absence of any method of measuring this "stimulus effect" (Natsoulas, 1965), it is possible that the results of a perceptual study would be interpreted as demonstrating PD when they actually represent differential response tendencies based upon the emotionality associated with the stimuli.

The relevance of this stimulus effect to PD studies was first introduced by Blum (1955) when he tested and supported
the hypothesis:

subjects predisposed to use the mechanism of repression in conjunction with a given conflict will, when confronted subliminally with a conflict-relevant stimulus, show defensive behavior directly traceable to the perceptual process itself (p.25).

In this study Blum presented quadrads of Blacky Pictures to graduate students in Psychology at a subliminal level of stimulation and instructed the subjects to identify the picture in each area of the quadrad. The emotionality or degree of conflict associated with each picture for each subject was determined by a number of tests as was the degree to which one exhibited repression on each dimension represented by the Blacky Pictures. Out of the 11 possible pictures, however, the same four were always presented—two neutral and two emotional (the emotional pictures being those that had a significant amount of conflict associated with them as well as the defense mechanism of repression to avoid them). Consequently there were two categories of responses: those that were always presented and those that were never presented. Blum found that for the pictures which were presented there were fewer calls of emotional pictures than neutral pictures: 9.42 to 17.12 with 17.46 being the calls which would be expected for any one picture according to chance. This difference was significant at the .001 level of confidence, but for the absent pictures there were no significant differences: 15.20 to 16.69. This indicated that the emotionality of the stimulus did differentially affect the responses:
An avoidance response to a subliminal stimulus has taken place. Apparently the subject makes an unconscious visual discrimination which somehow cues off an avoidance reaction. The threatening stimulus must actually be provided by the environment in order for this defensive response to be instigated. With respect to antecedent conditions, we now know that it takes a combination of conflict in an area plus a predisposition to repress that conflict to produce the avoidance. Conflict alone has no discernible effect (Blum, 1955, pp.27-28).

In a very similar study Blum (1957) demonstrated that subjects who preferred the avoidance alternative for a Blacky Picture on the DPI (Defense Preference Inquiry for Blacky Pictures) reported perception of that picture less frequently when it was one of the discriminable stimuli than when it was a possible response that had not been used in the stimulus. Blum pointed out that this effect was significant for a low accuracy group of subjects but not for a high accuracy group – thus providing evidence for the differential effects of personality characteristics on perception. Explanation of this phenomenon in terms of selective verbal report (response suppression) is again ruled out by the lack of a significant difference in the absent picture condition. If it were verbal suppression, pictures associated with avoidance defenses would be undercalled even in the absent condition.

In these two studies Blum has demonstrated that stimuli representing some psychosexual conflict for the subject can trigger a defensive reaction in certain (repressive) subjects that leads to response suppression for those stimuli. The implications of this finding for a more thorough understanding of the PD phenomenon are indicated by the following statement:
When we recall that PD is not confined to strictly libidinous stimuli such as Blum used, it is tempting to speculate on the generality of Blum's vigilance effect with other types of emotional stimuli; more experimental work is required on this point (Brown, 1961, p.68).

In spite of this suggestion by Brown and a similar plea by Natsoulas (1965), the present writer finds that very little attempt has been made in PD research to pursue the stimulus-effect findings of Blum. Examples of attempts to control or reduce response inhibition were discussed earlier, but most of these researchers have ignored the possibility that differences in recognition thresholds between ES and NS could be due to the stimulus effect--an inhibitory response activated by the perception of the stimulus.

Blum's research tends to indicate that partial perception of ES activates some defensive mechanism which may act in the same way as response suppression. His results were not analyzed in terms of the specific responses that were elicited by the ES and NS. In fact, the only matter of concern was whether or not subjects were responding differently to them, but the results suggest that the way one responds to stimuli is affected by the amount of emotionality associated with them.

**PROBLEM**

The purpose of this study was to propose a method of evaluating the stimulus-effect hypothesis as well as an effective way of measuring PD at different levels of stimulation. While most researchers in the past have been satisfied with
one general measure of response suppression and have ignored the possible effect that stimuli may have on response tendencies, there was in this study a breakdown of "response suppression" into two parts: the tendency to suppress emotional responses when the stimulus is emotional and the tendency to suppress emotional responses when the stimulus is neutral. The former tendency will hereafter be referred to as Ert (response tendency following ES); and the latter tendency will be referred to as Nrt (response tendency following NS). Any significant differences between the two tendencies as they are here defined would tend to support or refute the stimulus-effect hypothesis: that partial perception of ES activates an avoidance reaction which reduces emotional responses. PD will be defined as the elevation of recognition thresholds for ES when compared with the recognition thresholds for NS. Notice that nothing is said in this definition about response tendencies. This is an essential point, for PD is defined as a perceptual phenomenon which is not affected by response tendencies. The percentage of correct responses will be affected by Ert, Nrt, and PD; but once the effects of response tendencies are accounted for, any remaining differences between correct calls to ES and correct calls to NS will be a function solely of PD.

**HYPOTHESES**

1) Stimulus–effect hypothesis: that across all levels of
stimulation the tendency to inhibit emotional responses will be greater when ES are presented than when NS are presented.

2) Perceptual Defense hypothesis: that across all levels of stimulation the tendency to recognize NS correctly will be greater than the tendency to recognize ES correctly, and that this tendency will be greater for "repressors" than for "intellectualizers". This hypothesized difference between repressors and intellectualizers has been supported by the general finding that repressors tend to avoid contact with emotional material more than do intellectualizers and thus have higher recognition thresholds for ES (Blum, 1955, 1957; Bootzin & Natsoulas, 1965; Brown, 1961; Carlson, 1954; Lazarus et al., 1951; Mathews & Wertheimer, 1958).

**METHOD**

**Subjects:**

Forty female undergraduates volunteered to participate in this experiment to fulfill their experimental requirements for an introductory course in psychology which was given during the spring quarter, 1969, at the University of Montana. A few of the subjects had participated in other experiments, but the majority of them were freshmen who were naive about psychological experiments.

**Apparatus:**

A Hunter GSR amplifier was used to indicate the physiological responses to words which were presented in a Polymetric
Model #V0959T tachistoscope. The same tachistoscope was also used in the perceptual task. In a brief pilot study preceding this study it was determined that single words were easily recognized at the shortest exposure time (.01 seconds) when no attempt was made to obscure them. Therefore, the target which each subject was instructed to focus upon prior to the presentation of the stimulus word was changed so that a series of X's covered the spot upon which the word would be presented instead of a single X to indicate the center of the stimulus word. This increased the difficulty of the perceptual task to such a degree that most subjects were responding within the limits of chance accuracy at the .01-second exposure time while they were responding with better than 70% accuracy at the .03-second exposure time.

Procedure:

The study was conducted in three parts over an eight week period. The first part was designed to select emotional and neutral words which were matched for length and familiarity; the second part to present these words tachistoscopically to determine the amount of PD, Ert, and Nrt that occurred; and the third part to administer Byrne's "Health and Opinion Survey" (Byrne, Barry, & Nelson, 1963) to differentiate intellectualizers and repressors.

During the first part of the study each subject was seen individually and introduced to the study with the following statement:
Before we go ahead with this study I want to tell you a little bit about it so you can decide whether or not you want to participate in it. If you decide not to participate in the study, you can leave right now and get one hour of credit for coming here today. Then you can make up the other hours later on in the quarter. If you decide to go ahead with the study, we'll go ahead with this hour and then make appointments for the other hours later on.

This is a study in perception, and I have a group of words that you will have to see and in some cases say. Now, the only thing that might be somewhat objectionable to you is that some of these words are what you might call socially unacceptable or taboo words, and the situation could be somewhat embarrassing for you. I've explained this to the other subjects, and no one has seemed to mind that much; but if you'd rather not participate in the study because of this, then you're certainly free to say so now. If you want to go ahead with the study, then you can say so and I'll go ahead and explain the rest of it to you.

None of the subjects chose to drop out of the study, and as each agreed to continue, she was told how to sort the words with respect to familiarity. This procedure was similar to the one used by Bryant et al. (1967) who found that subjective evaluation was a more effective way of controlling stimulus familiarity in PD studies than the more common procedure of selecting words with matched frequencies in Thorndike and Lorge's list of 30,000 words (Thorndike & Lorge, 1944). Each subject was given the following instructions:

Here I have 30 cards, and there is a word typed on each card. I want you to look over all 30 words and then sort them into 5 piles from the most familiar word to the least familiar word. Now, familiarity is to be determined by how often or how many times you've seen the word, heard the word, or read the word. And when you're sorting the words into the 5 piles, I want you to try not to think in terms of meaning, of value, of how pleasant or unpleasant the words are, or of anything except familiarity. And remember...by familiarity I mean how often you've seen the word, heard the word, or read the word. OK...

Are there any questions?
As soon as the subject finished this task, she was handed the first pile which she had just sorted (the most familiar words) and told:

    Now I want you to sort the words in this pile with the most familiar word on the bottom up to the least familiar word on the top.

When this was done the experimenter picked up this pile, took off the top three cards and put them on the next pile, and asked the subject to sort that pile in the same way - with the most familiar word on the bottom up to the least familiar word on the top. When the 5 piles had been sorted in this way and collected by the experimenter, the 30 cards were given back to the subject in the order of her judged familiarity. She was then told to look through the words to be sure that they were in the right order and to change the order of any of them if she wanted to.

The words to be sorted were 30 five-letter nouns and 30 six-letter nouns, each of which was typed at the top of a plain 3 X 5 card. Ten of the words in each group of 30 were selected by the experimenter because they were considered to be 'dirty' words and words that would generally elicit embarrassment when spoken in mixed company. The other 20 words in each group differed widely with respect to familiarity as indicated by the Thorndike-Lorge word book. As soon as a subject was satisfied that the words in the first group were in the right order, she was given the second group to sort in the same way. The order of each group of words was then recorded as the subject filled out the questionnaire in Table 1 on page 34.
Table 1  
(Questionnaire for evaluating stimulus emotionality)

Imagine that you are to discuss with me each of the words in the following list. Rate each word in terms of the feelings that you think you would have while using and discussing it according to the following criteria:

1 = relaxed  2 = uneasy  3 = disturbed  4 = very disturbed

This report will be kept confidential, and you will not be asked to explain any of your responses. Try to be as honest in this evaluation of these words as you can.

<table>
<thead>
<tr>
<th>Word</th>
<th>Word</th>
<th>Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIDNEY</td>
<td>LEGEND</td>
<td>RHYME</td>
</tr>
<tr>
<td>CHURCH</td>
<td>NUMBER</td>
<td>ATTIC</td>
</tr>
<tr>
<td>HYMENS</td>
<td>VIRGIN</td>
<td>ALPHA</td>
</tr>
<tr>
<td>JACKET</td>
<td>PELVIS</td>
<td>QUEER</td>
</tr>
<tr>
<td>BREAST</td>
<td>RASCAL</td>
<td>KOTEX</td>
</tr>
<tr>
<td>HEAVEN</td>
<td>ERASER</td>
<td>VALVE</td>
</tr>
<tr>
<td>BEAGLE</td>
<td>ARTIST</td>
<td>TURDS</td>
</tr>
<tr>
<td>TAMPA</td>
<td>RECTUM</td>
<td>IDIOM</td>
</tr>
<tr>
<td>CORNER</td>
<td>MANTEL</td>
<td>SHITS</td>
</tr>
<tr>
<td>IMPACT</td>
<td>AMBUSH</td>
<td>FIELD</td>
</tr>
<tr>
<td>FUCKER</td>
<td>SCARF</td>
<td>BITCH</td>
</tr>
<tr>
<td>MAIDEN</td>
<td>LOVER</td>
<td>KNIFE</td>
</tr>
<tr>
<td>TAILOR</td>
<td>MAGIC</td>
<td>IMAGE</td>
</tr>
<tr>
<td>GALAXY</td>
<td>LATCH</td>
<td>PENIS</td>
</tr>
<tr>
<td>FLAVOR</td>
<td>WHORE</td>
<td>PENNY</td>
</tr>
<tr>
<td>SHRINE</td>
<td>BELLY</td>
<td>JEWEL</td>
</tr>
<tr>
<td>DENIAL</td>
<td>GLAZE</td>
<td>LEASE</td>
</tr>
<tr>
<td>RAPIST</td>
<td>HAREM</td>
<td>ONION</td>
</tr>
<tr>
<td>VAGINA</td>
<td>FARTS</td>
<td>SPERM</td>
</tr>
<tr>
<td>PENCIL</td>
<td>DEPOT</td>
<td>ELBOW</td>
</tr>
</tbody>
</table>
There were no formal instructions during the rest of the experiment, but an attempt was made to impart to each subject the same information and expectations. Upon the completion of the questionnaire each subject was connected to a GSR amplifier and told that these words would be presented to her individually for a duration of about two seconds in the tachistoscope at 15 second intervals. She was asked to look at each word while it was being presented and to say it as soon as it disappeared from the screen. She was then told that it was understandable that she might not want to say some of the words, and in such cases she might remain silent. However, she was encouraged to say each word, as it "would be better for the study."

Each group of 30 words was presented in random order twice to each subject, and the maximum GSR in the 5-second period following the presentation of each word was recorded as the subject's response to that word. The 6-letter words were presented first followed by the 5-letter words, and then the 6-letter words were presented again followed by the 5-letter words. Following the presentation of each group of words there was a short rest period during which the subject was encouraged to get more comfortable, take a deep breath, etc. Immediately before the presentation of each group the subject was asked to remain as still as possible, as any movement would cause readings on the amplifier that could contaminate the data.
In the analysis of these data for the selection of ES the GSRs elicited by each word in blocks of 10 words were considered first. The 5 words with the highest GSRs in each block were marked as 'potentially emotional' words, and the only words which were considered in the final analysis were those which were ranked 'potentially emotional' both times that they were presented. These words were then listed and scored with respect to the subject's rating of each word on the questionnaire. From these words the 8 words with the highest subjective ratings were selected as the ES. No word with a rating of 1 was selected as an emotional word. In 5 cases, however, subjects gave less than 8 of the words ratings higher than 1; and in these cases the subject was given back the questionnaire and asked to differentiate somewhat more between the words.

The neutral words consisted of those 1) that were ranked as not 'potentially emotional' at least one of the two times that they were presented, and 2) that were given a rating of 1 on the questionnaire. Since pairs of emotional and neutral words matched with respect to familiarity were needed in this study, the neutral word which was closest to an emotional word on the familiarity scale was selected as the 'mate' of that emotional word provided that the words were not separated by more than 3 words on the scale. If there were no neutral words close enough to an emotional word for this kind of pairing, that word was not selected as an ES for the second phase of
the study. Eight pairs of words were selected for a subject whenever possible. In a number of cases this many pairs was not available; and when it was not possible to get at least 6 pairs of words, that subject was eliminated from the study. In order to get 40 subjects, 59 subjects were put through this first phase of the experiment. Nineteen of these subjects were disqualified due to the fact that it was not possible to get at least 6 pairs of words by the criteria discussed above.

The second part of the experiment was conducted from one to six weeks after the first part following the selection of 4 groups of 4 words (2 neutral and 2 emotional words) which were matched with respect to length and familiarity as determined by the procedures of the first part of the experiment. (For those cases in which only 6 or 7 pairs of words could be used, one or 2 of the pairs were used twice in order to have 4 groups with 4 words in each group.) These words were presented tachistoscopically one at a time with instructions to select each of her responses from a list of 4 possible responses that were presented immediately following the presentation of the test word. To minimize the effects of response bias a procedure similar to the one employed by Sarbin & Chun (1967) was used, in which the subjects were instructed not to say the word which they chose as their response but to say the number beside the word. The 4 possible responses were the groups selected during the first part of the experiment. They were
made up of the stimulus word, a word of similar emotional content, and 2 matched words from the opposite emotionality category, ie. 2 emotional and 2 neutral words.

At any one exposure level a subject had to make 80 discriminations, for each word in each of the 4 groups was presented randomly 5 times. There were 3 exposure times: .01, .02, and .03 seconds; and the order in which these exposures were used was manipulated so that all possible combinations were used.

In the third part of the experiment each subject was given Byrne's "Health and Opinion Survey" (Byrne, et al., 1963) to differentiate repressors and sensitizers. Normative data were based primarily upon a sample similar to the one used in this study; and as the reported mean for females was 42.68, those who scored lower than 42.68 were classified as repressors while those with higher scores were classified as sensitizers. By this criterion 13 of the 40 subjects were classified as repressors, and 27 were classified as sensitizers.

ANALYSIS AND RESULTS

The data for each individual were summarized in tables similar to the one below to indicate the frequency and type of responses at each exposure time for each of the two types of stimuli.

<table>
<thead>
<tr>
<th>STIMULUS</th>
<th>emotional</th>
<th>neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>correct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>emotional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>incorrect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>emotional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>incorrect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>neutral</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Computations were made on the raw data to determine the amounts of Nrt and Ert that occurred. This provided the information necessary for testing the first hypothesis. It also made it possible to adjust the correct responses to NS and ES to account for and eliminate the effects of Nrt and Ert. This then provided the information necessary for testing the second hypothesis.

As an example of how this procedure worked, consider an hypothetical situation in which the recognition of neutral words is 30% above chance while the recognition of emotional words is only 10% above chance. This is the sort of situation which would exist if PD occurs. Suppose also that response tendencies are such that emotional responses to NS are suppressed 14% of the time (Nrt) while emotional responses to ES are suppressed 23% of the time (Ert).

To facilitate understanding of how this hypothetical example is derived, consider the following steps: Suppose that 40 neutral and 40 emotional words were presented individually and that following the presentations the subject responded by calling one of four possible words (as described earlier in the design of this study). In the absence of any perceptual effect or any response effect, the subject would respond randomly as indicated in the table below:

<table>
<thead>
<tr>
<th>STIMULUS</th>
<th>emotional</th>
<th>neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>correct</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>emotional</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>incorrect</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>neutral</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>
If PD occurred so that the recognition of neutral words was 30% above chance while the recognition of emotional words was only 10% above chance, the following results would occur:

<table>
<thead>
<tr>
<th>STIMULUS</th>
<th>emotional</th>
<th>neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>correct emotional</td>
<td>(a) 13</td>
<td>0</td>
</tr>
<tr>
<td>correct neutral</td>
<td>0</td>
<td>(A) 19</td>
</tr>
<tr>
<td>incorrect emotional</td>
<td>(b) 9</td>
<td>(B) 14</td>
</tr>
<tr>
<td>incorrect neutral</td>
<td>(c) 18</td>
<td>(C) 7</td>
</tr>
</tbody>
</table>

If in addition to this there was Nrt of 14% and Ert of 23% the following results would occur:

<table>
<thead>
<tr>
<th>STIMULUS</th>
<th>emotional</th>
<th>neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>correct emotional</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>correct neutral</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>incorrect emotional</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>incorrect neutral</td>
<td>23</td>
<td>8</td>
</tr>
</tbody>
</table>

This represents the raw data which would result if the recognition of neutral words were 30% above chance, if the recognition of emotional words were 10% above chance, if Nrt amounted to 14%, and if Ert amounted to 23%. These facts, of course, are what we need to determine by the analysis of these raw data.

To do this assume the following equalities:

For responses to neutral stimuli
A = correct neutral responses in the absence of Nrt
B = incorrect emotional responses in the absence of Nrt
C = incorrect neutral responses in the absence of Nrt
x = Nrt
xB = emotional responses suppressed

For responses to emotional stimuli
a = correct emotional responses in the absence of Ert
b = incorrect emotional responses in the absence of Ert
c = incorrect neutral responses in the absence of Ert
y = Ert
ya+yb = emotional responses suppressed
Given:

\[ A + B + C = 40 \]
\[ a + b + c = 40 \]
\[ B = 2C \]
\[ c = 2b \]
\[ \frac{ya}{a - ya} = \frac{yb}{b - yb} \]

**Determination of Nrt**

| A = 20 - xB/2 | a = 10 + ya |
| B = 12 + xB | b = 7 + yb |
| C = 8 - xB/2 | c = 23 - ya - yb |

\[ 40 = A + B + C \]
\[ B = 40 - A - C \]
\[ B = 40 - 20 + xB/2 - 8 + xB/2 \]
\[ 9 = ya + 3yb \]

**Determination of Ert**

| 40 = a + b + c |
| 40 = 10 + ya + 7 + yb + 14 + 2yb |

\[ 9 = ya + 3yb \]
\[ 9 = 1.4 yb + 3yb \]
\[ 9 = 4.4 yb \]
\[ 9 = 7 + 2b \]
\[ b = 9 \]
\[ b = 2 \]
\[ yb = 2 \]

These computations have indicated that for this one subject at this one exposure level Ert is greater than Nrt. To test the stimulus-effect hypothesis in the present study these two tendencies were compared for each subject at each exposure time; and when Ert was greater than Nrt, the subject was given a score of +1. When Nrt was greater than Ert, the subject was given a score of -1. Occasionally Ert and Nrt were equal. In order to include such cases in the analysis without distorting the size of the sample, the subject was given a score of +\( \frac{1}{2} \) and -\( \frac{1}{2} \) at that exposure time when these two tendencies
were equal. Hypothesis 1 was then tested at each exposure time by the Chi square test of goodness of fit - the null hypothesis predicting that there will be the same number of minus scores as plus scores. The hypothesis was also tested over the combined frequencies in the same way except that a subject was given a +1 score when the Ert was greater than Nrt on at least 2 out of the 3 exposure times and a -1 when the tendency was just the opposite. Again, when the tendencies were equal, the subject received a score of +1 and -1. The results are tabulated below in Table 2.

The perceptual defense hypothesis was tested in a similar way for all 40 subjects, as well as for the repressors as one group and the sensitizers as another group. At each exposure time a subject was given a +1 score when the number of correct responses to neutral stimuli after the correction for Nrt (value identified in the example as A) was greater than the number of correct responses to emotional stimuli after the correction for Ert (value identified in the example as a). When these correct neutral responses were less than the correct emotional responses, the subject was given a -1 for that exposure time; and if the responses were equal in number, the subject received a score of +1 and -1. The results are tabulated below in Table 3.
Table 2
(Chi Square Analysis of Hypothesis 1)

<table>
<thead>
<tr>
<th>Exposure time</th>
<th>Ert - Nrt</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>.03</td>
<td>-13</td>
<td>4.25*</td>
</tr>
<tr>
<td>.02</td>
<td>-8</td>
<td>1.60</td>
</tr>
<tr>
<td>.01</td>
<td>-8</td>
<td>1.60</td>
</tr>
<tr>
<td>combined</td>
<td>-12</td>
<td>3.60</td>
</tr>
</tbody>
</table>

*p < .05

Table 3
(Chi Square Analysis of Hypothesis 2)

<table>
<thead>
<tr>
<th>Exposure time</th>
<th>13 Repressors</th>
<th>27 Sensitizers</th>
<th>Repressors - Sensitizers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CN - CE</td>
<td>$\chi^2$</td>
<td>CN - CE</td>
</tr>
<tr>
<td>.03</td>
<td>-6</td>
<td>2.77</td>
<td>-6</td>
</tr>
<tr>
<td>.02</td>
<td>-3</td>
<td>&lt;1</td>
<td>-1</td>
</tr>
<tr>
<td>.01</td>
<td>3</td>
<td>&lt;1</td>
<td>-6</td>
</tr>
<tr>
<td>combined</td>
<td>-4</td>
<td>1.23</td>
<td>-6</td>
</tr>
</tbody>
</table>

It is apparent from these results that neither hypothesis was confirmed. The only difference which was significant at the .05 level of significance occurred in the test of the first hypothesis at the .03-second exposure time, and this difference was in the opposite direction to that predicted.

DISCUSSION

Both of the hypotheses implied that a subject's behavior is affected by some aspect of ES which is perceived below the level of awareness. The first hypothesis predicted that partial perception of ES would result in an increased tendency to inhibit emotional responses, and the second hypothesis predicted that partial perception of the same ES would result in elevated
recognition thresholds for these stimuli. The failure to confirm either of the hypotheses leaves unsupported the contention that subjects are affected by the emotionality associated with stimuli which are presented subliminally. The significant difference between Ert and Nrt at the .03-second exposure did not support the stimulus effect hypothesis, but it suggests the possibility that there might be a more complex relationship between response tendency and stimulus emotionality than hypothesized. Further research is needed to determine this.

As discussed earlier a number of researchers have accounted for PD in terms of response suppression, a generalized tendency to inhibit certain responses and to prefer others. Such a tendency is relevant to PD studies, so that most researchers who support the PD phenomenon have attempted to eliminate or account for response tendencies in their analysis of the relationship between perception and stimulus emotionality. In the present study a t test, carried out on the raw data, showed that there were significantly more correct neutral responses than correct emotional responses; and when response tendencies were measured by a Chi Square analysis of the deviation from randomness in the incorrect responses to ES and NS, it was found that there was a significant tendency to suppress emotional responses. The failure to find significant differences between correct neutral and correct emotional responses after correcting for response tendencies (Table 3, p.43) suggests
that the data in the present study can be adequately accounted for by a response bias explanation.

In the present study there were a number of relatively new approaches to measuring different variables. Familiarity, for instance, was determined by a ranking technique rather than by selection of words from the Thorndike-Lorge word book. Research tends to indicate that ranking is the more effective procedure, as it takes into consideration each individual's experience with words rather than assuming that all subjects are equally familiar with them. More research is needed, however, to develop a set of instructions and procedures that gives all of the subjects the same mental set regarding the task.

The measurement of emotionality by GSRs and subjective evaluation is also a new approach in PD studies. Common approaches in the past have been to select stimulus words by a word association test or to pair words with aversive stimuli to make them emotional. Such different procedures, however, may result in the utilization of ES that differ with respect to the 'kind of emotionality' which is associated with them. This, in turn, could result in conflicting findings from one study to the next; for a subject might not respond to a word associated with fear, for instance, in the same way that he would respond to a word associated with excitement or happiness or failure, etc. The formulation of a generally acceptable definition of 'emotionality' and the development of a standard
way of measuring it might resolve some of the conflicting results of PD studies.

A similar matter of concern for PD studies is that ES may lose their emotional quality with continued use. Research has shown that subjects tend to habituate to the emotionality of words over trials and that with more trials PD tends to disappear (Bootzin & Natsoulas, 1965; Bootzin & Stephens, 1967; Brown, 1961; Goldstein, 1966; Natsoulas, 1965; Zajonc, 1962). In the present study no PD was found, but this was after the subjects had sorted the words with respect to familiarity, scored them on the emotionality questionnaire, and responded to them in the tachistoscope. It is possible that the ES were no longer emotional by the time they were presented in the second phase of the experiment. An improvement in the present study might therefore have been the use of a second measurement of emotionality after the tachistoscopic presentation of the stimuli.

Another new aspect of the present study was the model utilized in the analysis of the data. As indicated in the example on pages 39 & 40 it was assumed in this model that Nrt would reduce the incorrect emotional responses by a certain amount and increase both the correct and incorrect neutral responses by equal parts of that amount. It was also assumed that Ert would reduce correct and incorrect emotional responses by proportionate amounts and increase the incorrect neutral responses by that amount. These are logical assumptions that
provide the means by which one can measure and compare the variables in question. However, it is nonetheless true that they are assumptions, the core of an hypothetical model, and as such they are based on logic rather than fact. An extension of the present research by utilizing different statistical models might lead to a more thorough understanding of the PD phenomenon. One might well question, for instance, the additive relationship which is typically assumed to exist between perceptual tendencies and response tendencies. If, in fact, these tendencies are not additive in their effect upon behavior, current approaches to analyzing perceptual data could be overcorrecting or undercorrecting for response bias.

In the present study neither hypothesis was confirmed. The presentation of ES was not found to disrupt perception nor to increase a subject's tendency to suppress emotional responses. As pointed out in the introduction, past PD studies have failed to control adequately all of the confounding variables that affect subject's behavior. It is therefore likely that when the present controls are employed to select ES and NS and to eliminate the confounding effects of familiarity and response tendencies, neither PD nor the stimulus effect will be found. Better controls, the utilization of different types of ES, and continued research into the relationship between perceptual tendencies and response tendencies might resolve some of the conflicting findings in PD research.
A perceptual defense study was conducted in which recognition thresholds for taboo and neutral words were determined while controlling for familiarity and response bias. It was hypothesized: 1) that the tendency to inhibit emotional responses would be greater when the stimulus was emotional than when it was neutral, and 2) that perceptual defense would occur across all subjects but to a greater degree for repressors than for sensitizers.

The experiment was conducted in three parts: 1) selection of the stimuli for each subject individually, 2) tachistoscopic presentation of the words, 3) group administration of a personality inventory. Neither hypothesis was supported. There were significantly more correct neutral responses than correct emotional responses across all of the subjects; but when response tendencies were accounted for, there was no significant difference in the perception of neutral and emotional words either within or between the two groups of subjects. There was a significant difference between the response tendencies following emotional and neutral stimuli at the .03-second exposure time, but this difference was in the opposite direction to that predicted. This leaves open the question of whether or not there is some relationship between stimulus emotionality and response bias.
REFERENCES


Blum, G. S. An investigation of perceptual defense in Italy. Psychological Reports, 1957, 3, 169-175.


Dittes, J. E. Galvanic skin response as a measure of patient's reaction to therapist's permissiveness. Journal of Abnormal and Social Psychology, 1957, 295-303. (b)


Jost, H., & Sontag, L. W. The genetic factor in autonomic nervous functioning. Psychosomatic Medicine, 1944, 6, 308-310.


