# ATTITUDE CHANGE BY TACHISTOSCOPIC PAIRINGS OF COMPLEX PICTORIAL STIMULI: WITH EMPHASIS ON THE PREVENTION AND ASSESSMENT OF AWARENESS

by

RONALD S. PENNER
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## ABSTRACT

A review of the literature on attitude conditioning was carried out, with particular attention given to the demand awareness controversy. Supportive evidence was found for both the demand awareness and classical conditioning interpretations of attitude conditioning effects. It was concluded that one theory by itself is not sufficient to account for the data, and that the primary concern should be with the effects per se that are due to conditioning procedures.

Two experiments were done in order to determine whether attitude conditioning can be extended to complex pictorial stimuli presented at tachistoscopic speeds. Experiment 1 employed weak manipulations (pleasant pairings or neutral pairings) and Experiment 2 utilized stronger manipulations (pleasant pairings or a combination of neutral and aversive pairings). There were no significant conditioning effects but the results were stronger for Experiment 2, indicating that a stronger pairings manipulation may have strengthened the results. It was concluded that a third experiment providing a stronger pairings manipulation (pleasant pairings or all aversive pairings) might clearly reveal conditioning effects.

Awareness data were also taken in the two experiments. It was found that subjects were more aware of the contingencies and purpose of the experiment in Experiment 2, and it was suggested that this was a result of the strengthened pairings manipulation. Some bogus alternative explanations of the experiment that were provided in a cover story were believed more often than the correct explanation. This was the case for both experiments. Finally, it was found that subjects can be verbally aware of the purpose and contingencies of the experiment without being able to behaviourally pick out the contingencies when shown the stimuli that were conditioned.

Examining Committee:

[redacted]

Dr. Lorne K. Rosenblood

[redacted]

Dr. L. E. Acker

[redacted]

Dr. P. Murphy

[redacted]

Dr. C. K. Porac

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# BACKGROUND INFORMATION:

# THE CONDITIONING OF ATTITUDES

## *Meaning and Attitudes*

Numerous authors (e.g., Cofer & Foley, 1942; Mowrer, 1954; Osgood, 1953) have come to view "meaning" as an implicit response with cue functions which may mediate other responses. "Attitudes" have also been regarded as implicit mediating responses (Doob, 1947). According to Osgood and Tannenbaum (1955), the distinction between meaning and attitudes is that the meaning of a concept is its location in a semantic space defined by the dimensions of "evaluative," "activity," and "potency," and attitude toward a concept is its projection onto only the evaluative dimension.[1] Attitudes are thus viewed as a subset of meaning. Meaning

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[1]Osgood and Tannenbaum's formulations have been accepted by psychologists for a long time and have not been seriously questioned until recently. The three dimensions of meaning were arrived at through a series of factor analytic studies. In recent years serious problems and limitations of factor analysis have been exposed, and consequently aspects of psychology that are largely based on factor analysis have been under increasing scrutiny. As for Osgood and Tannenbaum's conception of semantic space, the original three dimensions of meaning now appear to be much less stable than when they were first conceived. The evaluative dimension, however, is consistently a major factor which accounts for a substantial portion of the variation in impressions. The vast majority of attitude conditioning studies have utilized evaluative responses on rating scales as dependent measures.

refers to a composite of three dimensions while attitudes reflect one of those dimensions. "Evaluative response," then, could be regarded as a synonym for attitude.

Some psychologists conceptualize attitudes as having three components: affect, cognition, and behaviour (Rosenberg & Hovland, 1960). A physiological response or an evaluative response measured on a rating scale would be regarded as an affective component of attitude, but not as anything more. For some authors, an evaluative response would be synonymous with attitude, and for others it would be synonymous with only the affective component of attitude.

Although it may be a moot issue as to what an attitude really is, the crucial point is that all the aforementioned authors viewed meaning and attitudes as responses that could be measured. This assumption provided the basis for the scores of studies done on the classical conditioning of meaning and attitudes. Staats and Staats (1957) reasoned that if meaning and attitudes are responses, then the learning process should be the same for these kinds of responses as for other responses. The principle of classical conditioning, which reflects the learning process, should therefore apply to attitudes and to meaning. Syllogistically, the reasoning is as follows:

Major premise: Responses are subject to laws of the learning process (e.g., classical conditioning).

Minor premise: Meaning and attitudes are responses.

Conclusion: Meaning and attitudes are therefore subject to the laws of the learning process (e.g., classical conditioning).

This apparently was the logical basis for assuming that meaning and attitudes can be classically conditioned.

In the present investigation, attitude is synonymous with evaluative response, and nothing more. Attitudes are often described as implicit or underlying predispositions or mental readinesses (Zimbardo & Ebbeson, 1969, p. 6). This investigator prefers to make no inferences from a subject's evaluative response on a rating scale to an internal state.

### *The Typical Conditioning of Attitudes Experiment*

Since the late 1950's, much research has been done on the classical conditioning of attitudes. The usual finding is that when a nonsense syllable or neutral word (CS) is repeatedly paired with a highly connotative word (UCS), the neutral word eventually acquires a more connotative meaning. If, for example, the word "sug" is repeatedly paired with unpleasantly connotative words such as "hate," "ugly," "obnoxious," etc., then "sug" would come to acquire a more unpleasant meaning than it originally had. The literature normally refers to attitudes or to some type of meaning as having been established by classical conditioning.

A substantial portion of the attitude conditioning literature consists of the numerous studies by A. W. Staats

and C. K. Staats and their associates. Much of the research done by other investigators closely follows the method employed by Staats and Staats. Since most of the attitude conditioning studies have utilized similar methods, a summary of the usual procedure is given below.

The experiment typically begins by presenting subjects with a cover story. Subjects are told that the experiment is on learning, and that the purpose is to study performance on different types of tasks. Ostensibly, one learning task deals with nonsense syllables and the other with words. The experiment proceeds by pairing a nonsense syllable or neutral word (CS) with a highly connotative word (UCS). The CS is presented visually, and its duration is 5 seconds. One second after the beginning of the CS duration, the UCS is presented auditorily by the experimenter. Subjects then repeat aloud the UCS word that was uttered by the experimenter, and are further instructed to mutter the UCS word to themselves. During the CS duration, the UCS is both presented by the experimenter and repeated by the subjects. UCS auditory presentation by the experimenter and repetition of the UCS by the subject are thus nested within the 5 second CS visual exposure period.

There are usually about 15 repetitions of a CS-UCS pair. For each pairing the CS is the same but the UCS is different. The purpose is not to simply establish a connection between the CS and a particular UCS word, but rather to condition

the evaluative meaning which is common to a variety of UCS words. For example, a nonsense syllable such as "wug" might be paired one time with "good," the next time with "pretty," then with "happy," etc. "Wug" should eventually acquire a more pleasant meaning. The CS-UCS pairings are presented in random order, but never more than twice in succession.

Most of the studies on attitude conditioning have focused on verbal stimuli as CS and UCS, and semantic differential ratings have usually been the dependent measure employed. There have been some exceptions, however. The next section will review the major work that has been done in attitude conditioning.

## *Review of Attitude Conditioning Research*

### *Early Research*

Experiments on attitude conditioning began as early as 1938, when Razran paired ethnic labels of pictures of girls (CS) with food consumption (UCS). Subsequent ratings of the pictures in which the ethnic labels were paired with food consumption were changed in a positive direction. In 1940, Razran demonstrated negative conditioning by pairing socio-political slogans (CS) with unpleasant olfactory stimulation (UCS). Other than Razran's research, little attention was given to systematic investigations of attitude conditioning until the late 1950's.

*Laboratory Experiments on Attitude Conditioning: The Verbal CS, Verbal UCS, Semantic Differential Scale Paradigm*

Most of the experiments on attitude conditioning have employed verbal stimuli (e.g., words, nonsense syllables, proper and national names) as CS and UCS, and have assessed attitudes by an item from the evaluative scale of the Semantic Differential (Osgood, Suci, & Tannenbaum, 1957). Studies of this genre began in 1957, when A. W. Staats and C. K. Staats reported classical conditioning of evaluative meaning to nonsense syllables. They utilized the method described earlier, and paired nonsense syllables with connotative words. When the nonsense syllable "xeh" was paired with pleasant words, and "yof" paired with unpleasant words, "xeh" was subsequently rated more pleasant than "yof." The results were reversed when "xeh" was paired with unpleasant words and "yof" with pleasant words. This type of conditioning effect was also found for the activity and potency components of semantic meaning. If "xeh" was paired with words such as "active," "speedy," and "quick," and "yof" with "sluggish," "slow," and "lethargic," then "xeh" would acquire a more "active" connotation than "yof." Most subsequent investigations have focused on conditioning the evaluative component of semantic meaning which, for Osgood and his associates, was synonymous with attitude.

Staats, Staats, Heard and Nims (1959) replicated the portion of the 1957 Staats and Staats investigation that

conditioned evaluative meaning (attitudes) to nonsense syllables. Staats et al. extended the original findings in regard to how subjects were run and the particular experimenter used. In the initial 1957 investigation subjects were run in groups, and the same experimenter ran all three experiments. In the Staats et al. 1959 study, subjects were run individually by a shortened procedure, and different experimenters varying in age and status were used. (One experimenter was an undergraduate, another was a graduate student, and the third experimenter was a faculty member.) The changes in how the subjects were run and what kind of experimenter was employed in no way affected the results. The conditioning effect was strong in all cases.

Lohr and Staats (1973) replicated the studies of Staats and Staats (1957) and Staats, Staats, Heard and Nims (1959), again by pairing nonsense syllables with highly evaluative words. Their unique contribution was that of extending the findings across other languages and cultures. Strong conditioning effects were obtained in English, Cantonese, Japanese and Korean.

Blandford and Sampson (1964) obtained the usual conditioning effects by a slightly different procedure. Instead of using evaluative words as the UCS, they used famous or infamous names of real people.

Denotative words have also been used as UCS. Staats, Staats, and Heard (1961) conditioned "angular" meaning to

some nonsense syllables and "round" meaning to other nonsense syllables. This effect was obtained without concomitant changes in the evaluative, activity, or potency dimensions of semantic meaning. Although this is not really attitude conditioning, the study is important in that it generalizes conditioning findings to denotative meaning.

The aforementioned experiments have used nonsense syllables as CS. More common stimuli have also been used as CS, such as national names (Staats & Staats, 1958), familiar masculine names (Staats & Staats, 1958; Early, 1968; Berkowitz & Knurek, 1959), and frequently used words (Staats, Staats & Biggs, 1958; Staats, Staats & Heard, 1959). Das and Nanda (1963) used unfamiliar names of East Indian tribes as CS, and found that subjects used evaluative adjectives other than the UCS adjectives to later describe the tribes. Staats, Staats and Heard (1959) obtained a conditioning effect by pairing words (e.g., rock, carpet) with evaluative words (UCS). Staats et al. found that the conditioning generalized to synonyms of the CS words (e.g., stone, rug). The Das and Nanda (1963) study suggests that conditioning of a CS may produce generalized conditioned responses to that CS. The Staats, Staats and Heard (1959) experiment provides some evidence for generalization of conditioning to other similar CS.

With the exception of Razran's experiments, all the hitherto mentioned investigations have utilized verbal

stimuli as CS and UCS, and have assessed conditioning by Semantic Differential items. The following section treats studies that have deviated from this paradigm.

*Laboratory Experiments on Attitude Conditioning: Studies Using a Nonverbal CS, UCS, or Dependent Measure*

There are at least two studies in which electric shock was utilized as a UCS. Zanna, Kiesler and Pilkonis (1970) found that ratings of words paired with the onset of shock were changed in an unpleasant direction and words paired with the offset of shock were rated as more pleasant. Staats, Staats and Crawford (1962) paired words with the onset of shock and negatively changed the ratings of those words, as did Zanna et al. Staats et al. also were probably the first attitude researchers to assess effects of attitude conditioning by a nonverbal dependent measure. They found that there was a significantly greater Galvanic Skin Response (GSR) to the words paired with shock compared to words that were not paired with shock.

Physiological measures other than the GSR have also been used to assess attitude conditioning. The Visual Evoked Potential (VEP) and Interflash Interval (IFI) were employed in conjunction with the usual rating scale in the experiments of Begleiter, Gross and Kissin (1967) and Begleiter, Gross, Porjesz and Kissin (1969). They obtained the normal conditioning results with the semantic differential measure, found significant differences between

positively, negatively, and neutrally conditioned CS with the VEP measure, and nothing significant was found with the IFI measure. Geometric figures were used as CS and evaluative words as UCS.

Sachs and Byrnes (1970) used novel stimuli for both the CS and UCS. They used two types of CS: pictures of geometric figures (non-human CS), and pictures of same-sex peers (human CS). For the UCS manipulation, there were auditory presentations of opinions on controversial issues (via tape recorder). These opinions were either similar to those of the subject (+UCS) or dissimilar to the opinions of the subject (-UCS). Both types of CS were rated as more pleasant when paired with similar opinion statements and were rated as less pleasant when paired with dissimilar opinion statements.

To the knowledge of this author, Levey and Martin (1975) are the only investigators who used complex pictorial stimuli as both CS and UCS. They presented scenic pictures at exposure durations of 1 sec. The CS were neutral pictures (as judged by subjects prior to the conditioning) and the UCS were either pleasant, neutral, or unpleasant pictures. Instead of the usual "Pleasant-Unpleasant" rating Levey and Martin employed a rank order procedure. They obtained some conditioning effects, but some of the results were contradictory and unfortunately the experiment was poorly controlled.

To summarize, the majority of laboratory experiments on attitude conditioning have used verbal CS and UCS, almost all those studies have assessed attitudes by a "Pleasant-Unpleasant" Semantic Differential rating, a few investigations have experimented with physiological measures, and probably only one study (Levey & Martin, 1975) has used an entirely nonverbal procedure (CS--picture, UCS--picture, dependent measure--rank order).

All the above studies have focused on the immediate effects of attitude conditioning. Some research has also been directed at determining how long a conditioning effect might last, whether conditioning effects are immediately reversible by the same procedures, and whether a non-neutral stimulus can be conditioned in the opposite direction. In short, how durable are attitude conditioning effects?

*Persistence of Attitude Conditioning Effects*

There are two studies which suggest that attitude conditioning effects may be very persistent over time. Yavuz and Bousfield (1959) used Turkish words (for English subjects) as CS, and evaluative words as UCS. Subjects were tested one week after the conditioning procedures. Even though subjects could not remember which words the Turkish words were paired with, there were strong conditioning effects. Edwards and Acker (1962) provide evidence for durability of conditioning in a natural setting. Men who had served in the US Navy in World War II often heard a

"battle stations" signal that was followed by aversive stimulation (fighting). These men showed conditioning effects on a GSR measure in response to the battle stations signal, 15 to 20 years after the pairings. Although these authors' interest may not have been in attitude conditioning per se, the finding does imply that attitude conditioning could be very durable as well.

Some research has been done on extinction and on counterconditioning in regard to conditioning of attitudes. "Extinction" refers to performing the usual Staats and Staats-type experiment and then following up with neutral pairings. This supposedly would return the ratings of the CS back to neutral. "Counterconditioning" is the procedure of conditioning the CS by Staats's method and then trying to reverse the conditioning by pairings in the opposite direction--that is, pairing a newly conditioned positive stimulus with negative stimuli, or vice versa. The objective here is to change the rating of the stimulus in the opposite direction. The Staats and Staats procedure has been found to be very resistant to both extinction and to counterconditioning (Miller & Barsness, 1969; Miller & Clark, 1969; Miller, Gimpl & McCrimmon, 1969; Miller & Ertle, 1972). The research, then, suggests that attitude conditioning effects are persistent over time and are resistant to short-term efforts at extinction and counterconditioning.

*Attitude Conditioning Outside the Laboratory*

The conditioning model for attitude formation has been extended to interpersonal attitudes by Lott and Lott (1960). They had three-person groups of children play a game in which some members were rewarded and others were not. A later sociometric test outside the game situation revealed that the rewarded children chose more of their fellow group members than did the nonrewarded children.

McDavid and Harari (1966) were interested in the relationship between the social desirability of certain first names and the popularity of children bearing those names. They found a significant positive correlation between the popularity status of elementary school children and the social desirability of their first names. (The names were rated by members of other groups unfamiliar with the individual bearing the given name.)

Early (1958) actually conditioned children's first names in an elementary school setting. This study is a powerful demonstration of attitude conditioning since the effects generalized to affiliative behaviour. Using Staats and Staats's conditioning procedure with fourth- and fifth-grade children, names of particular children were positively conditioned whereas names of a control group of children were not conditioned. The children with the positively conditioned names were subsequently approached more than the control children in a free play situation.

Berkowitz and Knurek (1969) generalized Early's findings to adults and with negative conditioning as well. They conditioned the name "George" or "Ed" and later assessed the subjects' impressions of and overt behaviour towards a real person who ostensibly had one of the conditioned names. Not only were subjects' written impressions affected by the conditioning procedures, but their overt social behaviour was also strongly affected in the direction of the conditioning.

The aforementioned studies represent numerous variations of the original Staats and Staats experiments, yet the conditioning effect has consistently been found. A. W. Staats has claimed that classical conditioning of attitudes has clearly been demonstrated (Staats, 1959). The supportive literature is not minimal, so such a claim does not prima facie appear to be without foundation. In recent years, however, skepticism has grown. The following section treats the arguments and evidence counter to Staats's claim.

### *The Demand Awareness Controversy*

However numerous the studies on attitude conditioning may be, there are critics (Cohen, 1964; Insko & Oakes, 1966; Page, 1969, 1971, 1974) who claim that classical conditioning of attitudes has not been demonstrated unequivocably. The most stringent critic is M. M. Page, who maintains that the results of all the Staats and Staats experiments can be

interpreted in terms of demand characteristics (Orne, 1962) rather than genuine classical conditioning effects. Moreover, he goes so far as to state that it may not even be presently possible to demonstrate attitude conditioning: "Perhaps the demand characteristics problem is such a limiting factor on deception experiments that the kind of hypotheses the Staats were interested in testing simply cannot be tested in the psychological laboratory at the present stage of development" (Page, 1969, p. 185).

Page is not critical of the theory of attitude conditioning. His concern is with the methodology used to demonstrate the phenomenon. Page and Staats both agree that subjects must be unaware of the experimental demands for classical conditioning to really take place. An essential feature of classical conditioning, according to Staats, is that it is automatic, occurring without the subject's awareness. Where Page and Staats differ concerns whether subjects who show a conditioning effect are aware or unaware of the experimental demands. Page believes that most of the conditioned subjects in the Staats's experiments were demand aware and therefore the results were spurious, reflecting artifacts of the experiments rather than classical conditioning per se. Staats claims that most of the conditioned subjects were not demand aware and hence the results were not artifactual. Page's criticisms specifically focus on the Staats and Staats studies, but the criticisms are

intended to extend to all experiments done on classical conditioning of attitudes. The strongest evidence regarding both sides of the demand-awareness controversy is presented below.

*Evidence for the Demand Awareness Interpretation*

Page (1969, 1974) has noted that most of the Staats and Staats experiments reveal strikingly bimodal distributions. He reasons that the high end of the distribution consists of demand aware subjects and hence "conditioned" subjects, whereas the low end of the distribution reflects the subjects who were not demand aware and hence not conditioned. Page suspects that the results were a function of demand characteristics since the contingencies are easy to learn in this type of experiment.

A. W. Staats (1969), on the other hand, interprets the bimodality of responses in terms of attentional factors. He believes that the subjects who were not conditioned were distracted by extraneous factors such that they could not possibly be conditioned. Both Page's and Staats's positions are equally logical, but Page has provided specific experimental data, to be discussed shortly, that support his view.

Staats and Staats have not been totally oblivious to the awareness issue. In their studies there were deceptive orienting instructions which purported to disguise the contingencies. Staats and Staats also included an open-ended question at the end of the experiment to assess

awareness of the purpose of the experiment. The question was what the subject thought the purpose of the experiment was while he was participating in it. Subjects who were aware of the purpose of the experiment were routinely discarded from the analysis. Throughout the Staats and Staats experiments, only a small percentage of subjects were "aware" as assessed by that question.

Page, however, asserts that Staats and Staats's single open-ended item technique is grossly inadequate in detecting truly aware subjects. In other words, Page believes that Staats and Staats's method of detecting awareness is plagued by Type II error. Too many subjects who should be scored as aware are not classified as such. Page devised his own method of assessing awareness, and has consistently detected more aware subjects by his method than by Staats and Staats's procedure (Page, 1969, 1971, 1973, 1974; Weber & Riddell, 1975). Staats, on the other hand, accuses Page of devising a postexperimental assessment of awareness procedure that is guilty of Type I error. That is, more subjects are classified as aware than were in fact aware prior to the assessment. Subjects were "suggested" aware *after* the experiment by Page's procedure, according to Staats. The results of Levy (1967) lend some support to Staats's assertion.

Page (1969) ran a typical Staats and Staats experiment and presented subjects with a more probing questionnaire than the usual one in assessing awareness. Subjects were classified as either "unaware," "contingency aware," or

"demand aware." The distinction between contingency and demand awareness was based on the work of Insko and Oakes (1966). A subject was regarded as contingency aware if he realized that a certain nonsense syllable was always paired with a very pleasant word or always paired with a very unpleasant one. A subject was classified as demand aware if he was aware that he "should" have responded or was expected to respond in a positive manner to CS paired with pleasant UCS, or in a negative way to CS paired with unpleasant UCS. Page predicted that if demand aware subjects (by his assessment procedure) were removed from the statistical analysis, a significant treatment effect would not be found. This would suggest that the results were artifacts of demand characteristics. Page's results support his prediction. The conditioning effect did not occur when demand aware subjects were removed from the analysis. Page also found that demand aware subjects showed the conditioning effect more than contingency aware subjects, and contingency aware subjects revealed a greater treatment effect than unaware subjects.

Staats (1969) disputed Page's results on the ground that the postexperimental questionnaire had many demand characteristics in itself. According to Staats, subjects who were not really demand aware responded as if they were when filling out the postexperimental questionnaire. This happened because the questions probing awareness "suggested"

to subjects the experimental demands. So Staats denies the intrusion of demand characteristics in regard to his own procedure, but he upholds such an explanation as it applies to questions that probe the demand characteristics of his experiments. Page's reaction was as follows:

> While the possibility of suggestion on post-experimental questionnaires is a plausible one . . . , which weakens the strength of awareness data taken alone, conditioning theorists really cannot have it both ways. They cannot design studies with apparent disregard for some blatant demand characteristics and claim that subjects do not catch on, and then turn around and say that on postexperimental questionnaires subjects suddenly become sensitive to demands and can be suggested aware. The legitimacy of the suggestion concept within conditioning theory is not apparent. (Page, 1974, p. 476)

In any case Page took Staats's criticism seriously, and attempted to empirically demonstrate the intrusion of demand characteristics by devising a method to assess awareness *during* the experiment rather than postexperimentally. (See Page, 1974, for a description of his procedure.) Page (1974) found that subjects first became demand aware during the experimental trials rather than afterwards, but one could still interpret this by saying that subjects were suggested demand aware during the experiment and they might not have been had Page's procedure not been introduced. However, Page specifically asked subjects whether they became demand aware before or after his probe during the experiment. All subjects who were classified as demand aware said that they became aware during the learning of the

CS-UCS pairs and *before* the probe into awareness. There is also evidence in verbal operant conditioning that awareness occurs during conditioning and before the awareness questionnaire (De Nike, 1964; Page & Lumia, 1968).

A recent study by Weber and Riddell (1975) considerably fortifies Page's position. Staats (1969) had suggested that the length of Page's questionnaire and the funnel order of the items (from general to most specific) causes the questionnaire itself to induce awareness. Weber and Riddell sought to test Staats's hypothesis by varying the length of Page's questionnaire and the funnel order of the items. It was found that neither length nor funnel order had an effect on the frequency of reported demand awareness. Weber and Riddell concluded that their study, in combination with Page's research, "shifts the burden of proof to those who maintain that the use of such a questionnaire in this and similar paradigms induces awareness" (Weber & Riddell, 1975, p. 5).

There are a few other experiments which lend support to Page's demand characteristics hypothesis. Although the results of these experiments do not provide compelling evidence for a demand awareness effect, the studies will be mentioned because they were done without regard to Page's work.

Nonsense syllables were paired with either famous or infamous names in the Blandford and Sampson (1964) experiment,

already mentioned. In their discussion section they acknowledged the possibility of demand characteristics contaminating the results:

> It is possible that subjects were more aware of the relationship between syllables and names than they were able or willing to verbalize at the end of the experiment. (p. 336)

This comment suggests that Staats's single global item approach was not powerful enough to detect all the aware subjects. Unfortunately the authors did not indicate the reasons for their suspicions of there being more aware subjects than were detected.

In a study of verbal operant conditioning, Levin (1961) compared a brief, general postexperimental interview with a detailed interview in assessing awareness. Not only were many more aware subjects detected by the detailed interview, but the conditioning effect disappeared when aware subjects (by the detailed interview) were removed from the analysis.

The Sachs and Byrne (1970) study, described earlier, also provides some support for Page's hypothesis. They found that subjects who were aware of the experimental contingencies showed greater conditioning than those who were not aware ($p < .003$). The authors did not, however, mention whether a treatment effect remained if contingency aware subjects were excluded from the analysis.

There certainly is some support for Page's hypothesis that "conditioning" effects are artifacts of demand characteristics. Supportive evidence for classical conditioning

of attitudes (conditioning without awareness) is presented in the following section.

*Evidence for Classical Conditioning Effects*

In his rebuttal to Page, Staats (1969) not only defends his own paradigm for studying attitude conditioning, but also cites numerous experiments which he believes are particularly difficult to interpret in terms of demand characteristics. Some of the more convincing studies will be mentioned.

In the study of Yavuz and Bousfield (1950), conditioning effects were found one week after the manipulations. Even though subjects could not remember which CS words were paired with pleasant words and which with unpleasant words, ratings of the CS words were nevertheless influenced by the pairings.

Staats, Staats and Crawford (1962) used electric shock to condition negative evaluative meaning to a CS word. They found that in addition to ratings of CS words being changed, there was a higher intensity GSR to the CS words that were previously paired with shock. Staats maintains that an emotional response such as a GSR cannot be considered a voluntary response to demand characteristics. On the other hand, some psychologists believe that the GSR is susceptible to cognitive variables (Kiesler, Collins, & Miller, 1969, pp. 149-150).

The verbal operant conditioning study of Levin (1961) is largely supportive of Page's position, but there was also a finding that could not be accounted for by demand awareness. Levin noted that one group of subjects who were not aware of the reinforcer showed as much conditioning as a group of subjects who were aware.

Begleiter, Gross, Porjesz and Kissin (1969), in a study not cited by Staats, paired geometric figures with pleasant and unpleasant words. One group of subjects was informed, prior to the manipulations, of which figures were paired with pleasant words and which with unpleasant words (fully aware condition). Another group was told that certain figures were paired with particular types of stimuli, and that this had something to do with the purpose of the experiment (partially aware condition). A third group was not informed of anything (unaware condition). Physiological (VEP) measures were taken as well as evaluative ratings. There were significant differences among the groups on both verbal and physiological measures. The unusual finding was that conditioning was greatest for the unaware subjects, partially aware subjects showed an intermediate effect, and there was no conditioning effect for the fully aware subjects (pleasant-unpleasant ratings). This is a direct contradistinction to the normal findings, and clearly supports Staats's position while undermining Page's. Begleiter et al. did not discuss this aspect of their results, however.

They apparently were not familiar with Page's work, and their primary interest was in physiologically distinguishing between different levels of awareness.

Perhaps the only experiment on attitude conditioning which explicitly tried to eliminate demand characteristics was done by Zanna, Kiesler and Pilkonis (1970), who were well aware of Page's work. They tried to disguise the experimental contingencies by use of an elaborate cover story. The cover story was judged as effective since all the subjects believed the false explanation.[2] Also, the subsequent attitude measure was disguised by being embedded among irrelevant items in an ostensibly unrelated study. No subjects expressed awareness of the experimental demands. Unfortunately awareness was assessed by a global item rather than by Page's procedure. Subjects were asked to describe the experiment (in writing) in their own words.

With the elaborate (and apparently successful) cover story and the disguised attitude measure, Zanna et al. still obtained a significant conditioning effect, although weaker than in most studies. The authors believe that certain

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[2]One of the demands of this experiment was that subjects believe the bogus explanation in the cover story. It is possible that some subjects did not really believe the cover story but nevertheless said they did due to the experimental demands. Also, subjects can still be aware of the experimental contingencies even if they do believe a false hypothesis.

aspects of their data, in addition to the experimental design features, help to rule out a demand awareness effect. The conditioning effect was strongest for subjects with independent physiological evidence of conditioning (GSR), and there was generalization to words similar in meaning to the CS words. Zanna et al. admit that effects due to demand awareness can never completely be ruled out, but they regard their study as supporting the position that attitude conditioning without awareness can occur.

Most of the support for Staats's position derives from studies other than his own, whereas Page backs up his arguments primarily with his own experiments. There is no doubt a considerable body of supportive evidence for both Staats's and Page's positions, which makes it difficult to decide whether one is more plausible than the other. This author's hunch is that attitude formation sometimes occurs with awareness of the contingencies and sometimes occurs without awareness. I do not believe that effects obtained in the aforementioned research can be *completely* accounted for by a demand awareness explanation or by a classical conditioning interpretation.[3] This section and the previous one have presented two sides of a controversy. I now wish to reflect upon the nature of the controversy itself.

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[3]Miller (1972, p. 230) commented that "the same theoretical explanation need not apply to *all* subjects in these experiments--a possibility not stated by Page or Staats."

*Assessment of the Controversy*

All the investigators of attitude conditioning are apparently in agreement that attitudes are responses that can be measured, and there also is some consensus as to how attitudes can be measured. Every experiment has employed an evaluative rating procedure (usually a "Pleasant-Unpleasant" Semantic Differential item), and there evidently is no disagreement that this is an appropriate way to assess attitudes, or at least the affective component of attitudes. The problem with the demand awareness controversy is that there is no consensus as to how to measure awareness. The focal point of Page's argument is that awareness was not properly assessed in attitude conditioning experiments. The controversy will only become more complicated unless the investigators agree on how to objectively measure awareness.

A classical conditioning paradigm, according to Staats and Page, necessitates that subjects must be unaware of experimental demands, and this is why the demand awareness controversy is so important. Perhaps a "classical" conditioning of attitudes model is not necessary, however. Guthrie (1952) espoused a very general interpretation of learning through conditioning. His conception of conditioning was expressed as follows: "A combination of stimuli which has accompanied a movement will on its recurrence tend to be followed by that movement" (Guthrie, 1952, p. 23). Hill (1971, p. 42) elaborates Guthrie's view as follows:

> This principle is more general than the principle of classical conditioning, in that it says nothing about an unconditioned stimulus. It says only that if a response accompanies a given stimulus once, it is likely to follow that stimulus again. In classical conditioning, the response occurs with the (conditioned) stimulus during training because the unconditioned stimulus elicits it. . . . It does not matter to Guthrie whether the response is elicited during training by an unconditioned stimulus or in some other way. As long as the (conditioned) stimulus and the response occur together, learning will occur.

This author prefers to adopt a more general, Guthrian view of conditioning. Conditioning effects are thus open to interpretation. Effects may be due to classical conditioning, demand awareness, operant conditioning, relational learning, etc. Although it is of interest as to what kind of learning occurs, my main concern is simply if a neutral "A" stimulus that is paired with pleasant or unpleasant "B" stimuli will result in different evaluations of "A." Lack of awareness will not be a necessary condition for conditioning. From here on, my use of the word "conditioning" refers to effects due to the pairing procedures and nothing more. Explanations are of interest, but the effect per se is my primary concern.

The experiments by Early (1968) and Berkowitz and Knurek (1969) powerfully demonstrated that the pairing of familiar masculine names with evaluative adjectives can influence subsequent affiliative behaviour towards individuals bearing those names. Whether those effects occurred

as a function of classical conditioning or demand awareness is of secondary importance. Furthermore, conditioning effects that are in fact due to demand characteristics need not be regarded as useless artifacts. Even though a person may be acutely aware of the demand characteristics of television commercials, for example, his attitudes may nevertheless be conditioned via repeated pairings of a product with pastoral scenery, sensitizing words, and beautiful women. Knowing that attitude conditioning occurs in the presence of demand awareness is not trivial information.

In summary, the awareness controversy will only lead to an impasse unless there be agreement on how to measure awareness. Secondly, a "classical" conditioning of attitudes paradigm should be abandoned unless all other explanations can be ruled out, which is unlikely. And finally, the awareness issue should be pursued but should be regarded as of secondary importance. The primary concern should be with the effects per se that are due to the pairing procedures.

## OBJECTIVES

There are three basic objectives that have guided the work on the present thesis. The first concern is with providing a comprehensive review of the literature on attitude conditioning, which was done in the previous section. Although a great many studies have been done on attitude conditioning, there apparently has not been a review article attempting to summarize and assess the research and the recent demand awareness controversy.

The other two objectives are tied to the experimental work of this thesis. The primary goal is to extend attitude conditioning findings (regardless of demand awareness) to complex pictorial stimuli presented at tachistoscopic speeds (less than 250 msecs). The vast majority of attitude conditioning research has employed verbal stimuli and perhaps all studies have utilized exposure durations of more than 1000 msecs. Only one study (Levey & Martin, 1975) has employed complex pictorial stimuli for both the CS and UCS. To the knowledge of this author, no one has utilized exposure durations of less than 1000 msecs. The use of complex pictorial stimuli at exposure durations of only 100 msecs in the present thesis could therefore significantly extend the generality of attitude conditioning findings.

Generalizing attitude conditioning to high-speed pictorial stimuli may open up a new avenue of attitude

conditioning research. Much work has recently been done on bilateral differences between the cerebral hemispheres and it is possible that bilateral differences exist in affective states. It has been suggested that affective reactions might primarily be a right hemisphere function (Sperry, 1968; Bogen, 1969; Schwartz, Davidson, & Maer, 1975). If attitude conditioning is demonstrated for high-speed pictorial stimuli it would be possible to investigate functional asymmetry of attitude condtioning, since stimuli under 250 msecs can be accurately presented to the separate visual half fields.

The third objective in this thesis centers around the awareness issue. Attempts will be made to disguise the experimental contingencies and several methods of assessing awareness will be explored. The postexperimental questionnaires should shed light on how to better assess awareness and to what extent awareness accounts for conditioning effects. The goal here is a general one: to arrive at a better understanding of awareness in attitude conditioning--what awareness is, how to best assess it, and what its effects are.

## OVERVIEW OF EXPERIMENTAL PLAN

The strategy of the research programme is to begin with experiments that employ weak manipulations and to continually strengthen the manipulations throughout successive experiments. If the experiment with the weakest manipulation yields significant results, then research time may be saved. For example, if conditioning is found to occur at 100 msecs, it is not necessary to run several experiments at longer exposure durations. Another advantage of this research strategy is that information is provided as to the impact of the added strength of the manipulations. An experiment can be best compared to the preceding one if only one crucial condition has been changed.

The present thesis covers two experiments. Scenic pictures were paired with either all pleasant or all neutral pictures in Experiment 1, and with all pleasant or a combination of neutral and unpleasant pictures in Experiment 2. Since other conditions were held constant, it is possible to determine inter-experiment differences as a function of the strengthened pairing procedures. Further experiments (e.g., all pleasant or all unpleasant pairings, different exposure durations, various stimulus categories, etc.) may be pursued in future work. The two initial experiments in this research programme are dealt with in the present thesis.

Since a classical conditioning paradigm is not invoked, referring to stimuli as CS or UCS is avoided. Instead, I refer to "A stimuli" and "B stimuli," respectively similar to CS and UCS.

## RATING STUDY

The subjects were 20 male introductory psychology students who had previously expressed interest in participating in psychological research. They were reached by telephone and all subjects participated voluntarily.

The 20 subjects were presented with 180 slides. All slides were shown for 100 msecs, the same exposure time used in the two experiments. Subjects rated each slide on a 9-point "Pleasant-Unpleasant" Semantic Differential scale. Two random orders were used. The first 10 subjects saw the slides in one random order, and the second 10 subjects saw the slides in the other random order. All subjects were run individually. This rating study provided the basis on which "pleasant," "neutral," and "aversive" slides were determined for the two experiments.

### *Stimuli: Experiment One*

Slides were chosen from the rating study to fill four categories for use in the first experiment: A stimuli, pleasant B stimuli, neutral B stimuli, and dummy stimuli.

Two neutral scenery slides were chosen as A stimuli. These slides were close to the midpoint of five on the Pleasant-Unpleasant scale ($M = 4.90$, $SD = .02$). Since the two A stimuli were to be differently conditioned, it was important to pick two slides that were fairly neutral and

also similar in their pleasantness ratings. Out of a pool of 33 scenic "neutral" slides, these two slides yeilded the smallest difference score. The two slides were rated the same by 10 of the 20 subjects. There was a difference of 1 for seven subjects, a difference of 2 for two subjects, and a difference of 3 for only one subject. The mean difference between the two slides was .10, and there was no median or mode difference.

The 10 most pleasant scenic slides and the 5 most pleasant slides of nude women were the 15 "pleasant" B stimuli. The mean rating was 2.84 (SD = .41). (Smaller numbers indicate more liking.)

The 15 slides chosen as relatively "neutral" B stimuli were 10 scenic slides between 5.0 and 6.0, and the 5 slides of nude women that were closest to a rating of 5.0. The mean rating was 5.01 (SD = .85). Included as dummy slides were 45 scenic slides and 10 slides of nudes. The ratings of these slides were intermediate between the pleasant and neutral stimuli.

Mean ratings of the stimuli for each category are presented in Table I. The individual slide ratings can be found in Appendix A.

### *Stimuli: Experiment Two*

The stimuli in Experiment 2 were the same as in Experiment 1, except for substitution of 5 aversive slides for

TABLE I

Mean Ratings and Standard Deviations of Slide Categories

| Category | No. of Slides in Category | Mean Rating | Standard Deviation |
|---|---|---|---|
| A Neutral (Experiments 1 & 2) | 2 | 4.90 | 0.02 |
| B Pleasant (Experiments 1 & 2) | 15 | 2.84 | 0.41 |
| B Neutral (Experiment 1) | 15 | 5.01 | 0.85 |
| B Neutral & Aversive (Experiment 2) | 15 | 6.46 | 1.37 |
| B Aversive | 5 | 8.24 | 0.75 |

NOTE: 1 = extremely pleasant, 9 = extremely unpleasant.

the 5 neutral slides of nudes that were in Experiment 1. The 5 aversive slides were rated by 5 volunteer raters in a second rating study similar to the first one. The mean rating of the aversive slides (accident victims) was 8.24 (SD = .75). Individual slide ratings are given in Appendix A.

# METHOD

## *Subjects*

The participants in the two experiments were 40 male undergraduate students at the University of Victoria (20 subjects for each experiment). Subjects were recruited by placing an advertisement in the student newspaper, and they were each apid $3.00 for participating (except for two subjects who refused remuneration). All subjects were run in accordance with the ethical standards of the American Psychological Association.

## *Design: Experiment One*

### *Independent Variable*

The design is a one factor, two level between groups design with two dependent measures. The factor is "Pairings" and Condition 1 and Condition 2 refer to the two levels of the Pairings factor.

There were 2 neutral A stimulus slides, each presented 15 times for every subject. In Condition 1, slide A1 was paired with (closely followed by) 15 different pleasant B slides (10 scenery, 5 nudes). Slide A2 was paired with 15 different neutral B slides (10 scenery, 5 nudes). This condition will be referred to as "$A1^{P}$ - $A2^{N}$." In Condition 2 the pairings were reversed. Slide A1 was paired with the 15 neutral B slides, and slide A2 was paired with the 15

pleasant B slides. Condition 2 is therefore referred to as "$A1^N$ - $A2^P$." Both A stimuli were of scenery. All slides were exposed for 100 msecs.[4]

*Dependent Measures*

The dependent measures were ratings of the two A stimulus slides after the pairings manipulation had occurred. The first measure was a 9-point, "Pleasant-Unpleasant" Semantic Differential rating. The A stimuli were exposed for 100 msecs for this measure, the same exposure duration used during the experimental manipulation.

The second dependent measure was a rank ordering of *pictures* of the two A stimulus slides. The rank order task might be regarded as a generalization test of any pairings effect on the Semantic Differential measure. This is because for the Semantic Differential ratings the A stimuli were presented at the same speed as before, but for the rank order ratings they were shown for an extended time period and in a different form. The scoring for both measures was in the form of difference scores for each subject (the rating of stimulus A1 minus the rating of stimulus A2). Details on how the dependent measures were taken and how the independent variable was manipulated are given in the section on the experiment proper.

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[4]Rosenblood and Pulton (1975) have shown that pictorial stimuli can be recognized at speeds as high as 80 msecs.

*Design: Experiment Two*

Experiment 2 was the same as Experiment 1 except for the neutral pairings procedure in Experiment 1. A combination of neutral and aversive slide pairings replaced the all neutral pairings manipulation of Experiment 1. This was done in order to strengthen the pairings manipulation in Experiment 2. Instead of pairing an A stimulus with 15 neutral slides (10 scenery, 5 nudes), the A stimulus was paired with 10 neutral slides (scenery) and 5 aversive slides (accident victims). Condition 1 is thus referred to as $A1^{P}$ - $A2^{NA}$, and Condition 2 is referred to as $A1^{NA}$ - $A2^{P}$. So the only change in Experiment 2 was that 5 aversive slides of accident victims replace the 5 relatively neutral slides of nudes that were used in Experiment 1. All other slides were the same as in Experiment 1. The design for both experiments is shown in Figure 1.

*Setting*

The experiment was conducted in a quiet laboratory (3.6 m X 3.6 m). Two model B-2 Kodak Ektographic 35 mm slide projectors with high and low illumination levels were used. These projectors were mounted on a wooden enclosure approximately 140 cm tall. The subject sat directly in front of the enclosure. In front of the subject was situated a table and in front of the table was the screen (a

FIGURE 1

Experimental Design

| Code: | | |
|---|---|---|
| | P = Pleasant | Scen = Scenery |
| | N = Neutral | Porn = Pornography |
| | A = Aversive | Acc = Accident Victim |

*EXPERIMENT ONE*

| | Condition 1 | Condition 2 |
|---|---|---|
| Slide A1 | 10 P Scen, 5 P Porn | 10 N Scen, 5 N Porn |
| Slide A2 | 10 N Scen, 5 N Porn | 10 P Scen, 5 P Porn |
| | $(A1^{P} - A2^{N})$ | $(A1^{N} - A2^{P})$ |

*EXPERIMENT TWO*

| | Condition 1 | Condition 2 |
|---|---|---|
| Slide A1 | 10 P Scen, 5 P Porn | 10 N Scen, 5 A Acc |
| Slide A2 | 10 N Scen, 5 A Acc | 10 P Scen, 5 P Porn |
| | $(A1^{P} - A2^{NA})$ | $(A1^{NA} - A2^{P})$ |

sheet of wood covered by white cardboard). Indelible marks were made on the floor which indicated the desired position of the table. This position insured that all subjects' eyes were the same distance from the screen (115 cm) and in the same plane.

A Gerbrands #300 Series Millisecond Timer fired two Gerbrands #G1165 electronic shutters mounted on the two projectors' lenses (5 inch Ektanar, F 3.5). The timer automatically controlled the shutter firing and inter-stimulus and inter-trial intervals. Exposure time during the experiment proper was 100 msecs for all stimuli. The exposure time was switched to 500 msecs for 10 slides in a dummy task. The projectors were run at the low (600 watt) illumination level. Slides were projected on a sheet of wood covered by white cardboard. The maximum luminance of the stimuli was approximately 18.5 cd/$m^2$, and the size of the image produced was 23.5 X 35.0 cm.

## *Procedure*

### *Arrangement of Stimuli for Presentation*

There was a total of 65 pairings in each experiment: 15 pleasant pairings, 15 neutral pairings (Experiment 1) or 15 neutral and aversive pairings (Experiment 2), and 35 dummy pairings.

For the pleasant, neutral, and neutral and aversive pairings the neutral A stimuli were always presented first.

The dummy pairings were determined without regard to order within pairs. Whether a given dummy slide was presented first or second in the pairing was determined randomly. There was a total of 45 scenic and 10 pornographic dummy slides used. One of the scenic dummy slides was presented 8 times and one of the pornographic slides was shown 7 times.

The order of presentation of the 65 pairings was randomly determined and was the same in both experiments and for all subjects. The only manipulation of the pairing arrangement was the interchanging of the two A stimulus slides for half of the subjects. This was done to create the $A1^{P}$ - $A2^{N(NA)}$ and $A1^{N(NA)}$ - $A2^{P}$ conditions. One exception to the randomization scheme was that the same slide never appeared in more than two consecutive pairings. Presentation of stimuli for the dependent measures was also randomized, and the random order was the same for all subjects.

*Disguising the Contingencies*

There were six different procedures employed throughout each experiment that were designed to disguise the contingencies and thus reduce the occurrence of demand awareness. One attempt to eliminate demand awareness was in a cover story, two efforts were included in the arrangement of the stimuli presented, and three attempts to disguise the contingencies were made while taking the dependent measures.

The cover story was designed to dissuade subjects from learning the true purpose of the experiment by providing plausible alternative explanations. The justification for presenting pairs of pictures was made by telling subjects that a variable of interest was the grouping of pictures, such as presenting either 2, 3, or 4 pictures closely together. Each subject was informed that different subjects were exposed to different conditions, and that he was in the condition in which a grouping of two pictures was presented. Subjects were also told that the investigator was interested in visual perception and the effects of repetition, exposure duration, and the categories of various stimuli. It was expected that the cover story would be plausible since many repetitions of certain stimuli, short exposure durations, and different categories of stimuli were in fact used.

Providing different stimulus categories within each pairing condition, and presenting dummy pairings, constituted two more attempts to disguise the contingencies. In most attitude conditioning experiments the B stimuli (UCS) are composed of stimuli of the same kind, such as all positive words or all negative words. In the present research several different kinds of stimuli were presented within each of the pleasant, neutral (Experiment 1) and neutral and aversive (Experiment 2) sets of B stimuli. Scenery and pornography constituted different categories of pleasant B stimuli and also of neutral B stimuli. Scenery and

accident victims were the categories in the neutral and aversive set of B stimuli. Also, there was a variety of stimuli within the scenery category (e.g., mountains, prairie, ocean, lakes, sunsets, hot weather, cold weather, desert, etc.) and within the pornographic category (female nudes, heterosexual scenes). This author reasoned that the use of different categories of stimuli within the same evaluative component would help disguise the common evaluative nature of the pairings for a given A stimulus.

In Experiment 1 there were 15 pleasant pairings and 15 neutral pairings for each subject, and in Experiment 2 there were 15 pleasant pairings and 15 neutral and aversive pairings (10 neutral, 5 aversive). It was expected that the experimental contingencies would be further disguised by including dummy pairings. The dummy stimuli included scenery and pornography of moderate evaluative ratings. The pairing arrangement was determined randomly, as there was no systematic connection between stimuli within the dummy pairs. One of the scenery slides was repeated 8 times and one of the pornographic slides was repeated 7 times. This was done to avoid subjects correctly determining why there were repetitions of the two A stimuli. If the two A stimuli had been the only slides repeated, it might have been easier for subjects to determine the contingencies.

Efforts to disguise the experimental contingencies were also made during presentation of the dependent measures.

For the Semantic Differential measure, subjects made 5 ratings on each of 10 slides. Only one of the 5 ratings ("Pleasant-Unpleasant") and 2 of the 10 slides (the two A stimuli) were of interest to the investigator. For the rank order task the 2 A stimuli were embedded within a total of 5 stimuli, 3 of them irrelevant.

A dummy test of recognition memory was also included in the experiments in order to further disguise the contingencies. The presentation of ten dummy slides at different exposure durations than before was designed to reinforce subjects' beliefs of bogus explanations. It was hoped that the dummy task would cause subjects to believe that memory or exposure duration of the stimuli were principle topics of interest.

In summary, the six attempts to disguise the experimental contingencies were as follows: (a) the cover story, (2) presenting a variety of kinds of slides within the same evaluative component, (c) embedding the experimental pairings among dummy pairings, (d) embedding the Semantic Differential measure among irrelevant scales and slides, (e) embedding the rank order measure among irrelevant slides, and (f) the dummy recognition task.

*Experiment Proper*

Prior to entering the laboratory, subjects were assigned to one of the two experimental pairings conditions. The

first 5 subjects were in Condition 1 ($A1^{P}$ - $A2^{N(NA)}$), the second 5 subjects were in Condition 2 ($A1^{N(NA)}$ - $A2^{P}$), the third 5 subjects in Condition 1, and the fourth group of 5 subjects was in Condition 2. This insured that the two between groups' conditions would be filled equally.

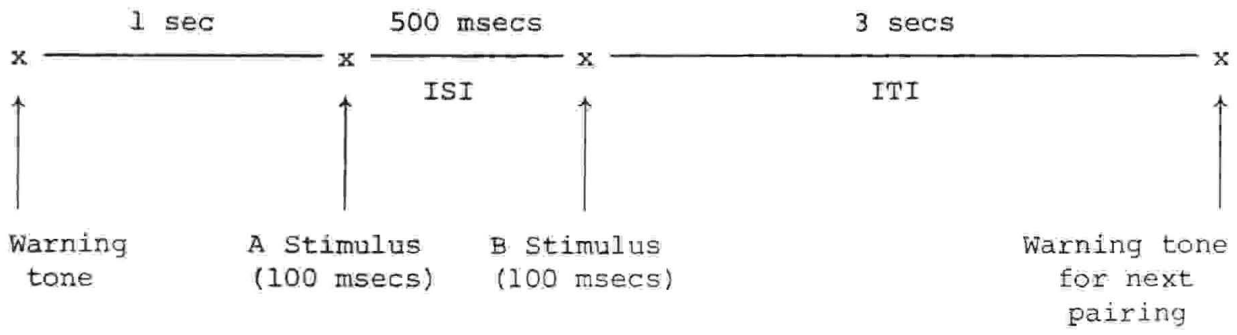
Upon entering the laboratory the subject was seated and given the instructions for the experiment. In addition to preparing the subject for the picture presentations, the instructions contained the cover story and consent form. Rights of subjects in experimental research were posted on the door of the room. The instructions are presented in Appendix B.

After the subject had read the instructions and signed the consent form he was asked if there were any questions, and then the pictures were presented. None of the 40 subjects throughout the two experiments refused to sign the consent form.

The pairing procedure is depicted in Figure 2. Each pairing began by a warning tone. There was a 1 sec interval between the offset of the warning tone and the onset of the A stimulus. All A and B stimuli were exposed for 100 msecs. The interstimulus interval (ISI) between the A stimulus and the B stimulus was 500 msecs in order to avoid visual masking. The intertrial interval (ITI) of 3 secs was the time between the offset of the B stimulus and the onset of the warning tone for the next pairing. The long intertrial

FIGURE 2

Pairing Procedure



interval was included in order to avoid a close association between the B stimulus and the A stimulus of the following pairing (for example, between the B stimulus of pair #3 and the A stimulus of pair #4). This pairing procedure was done 65 times and took about 6 minutes to complete.

After presentation of the pairings the subject was given a booklet containing instructions and rating forms for the Semantic Differential measure. The 2 A stimuli were presented at the same speed as before (100 msecs) and were interspersed among 8 other dummy slides. The order of the 2 A stimuli within the 10 slide presentations was randomly determined and was the same for all subjects. The subject saw one slide, made 5 ratings (only one being of interest), and then saw the next slide. The warning tone was still presented before the onset of each stimulus. This was also done for the dummy recognition measure. The instructions for the Semantic Differential measure are presented in Appendix C.

Following the Semantic Differential measure was the dummy recognition measure. Instructions for this measure can be found in Appendix D. In fact, 5 of the 10 slides presented had been seen once before and 5 had not previously been seen.

For the second dependent measure of interest, the subject rank ordered five pictures from most pleasant (1) to least pleasant (5). Two of the pictures represented the

A stimuli. The pictures were rank ordered along pieces of tape numbered 1 through 5 on the table in front of the subject. The table was covered until this measure was taken. The procedure for the rank order measure is given in Appendix E.

After the dependent measures were completed, questionnaires probing awareness were given to the subject. The first questionnaire consisted of two tests of awareness: a multiple choice test of general awareness, and a short answer test of general awareness.

For the multiple choice test (Appendix F), the subject was asked to indicate which explanation(s) he thought truly represented the investigator's hypothesis. The subject could mark as many or few explanations as he wanted. Confidence ratings (1 = guessing, 7 = certain) were given for any explanation marked. An explanation was regarded as chosen if the confidence rating was 5 or greater. "B" was the explanation that accurately reflected the crucial aspect of the experiment.

In the short answer awareness test (also Appendix F) the subject was asked to specifically guess the investigator's hypothesis, to write out the purpose of the experiment in his own words. Three scorers were obtained for reliability of scoring the protocols. What two scorers agreed on was the final decision as to whether a subject was aware or unaware of the crucial experimental contingencies or the

general purpose of the research.

Awareness Test 3 was a forced choice test of contingency and demand awareness (Appendix G). The five items were modeled after Page's type of postexperimental questionnaire (Page, 1974). The items were designed to test the following kinds of awareness:

Item #1: General contingency awareness,

Item #2: Contingency awareness on the Semantic Differential measure,

Item #3: Demand awareness on the Semantic Differential measure,

Item #4: Contingency awareness on the rank order measure,

Item #5: Demand awareness on the rank order measure.

Confidence ratings were made on a 9-point scale (1 = guessing, 9 = certain). A subject was scored "aware" for a given item if he marked 6 or greater on the certainty scale. He was scored "aware" on the questionnaire if he was aware on any one of the five items.

Awareness Test 4 was a behavioural test of contingency awareness. The subject was shown the two pictures of the A stimulus that had also been seen in the rank order task. The subject was asked to indicate which picture was of the slide that had been paired with pleasant slides and which picture was of the slide that had been paired with neutral (Experiment 1) or neutral and aversive slides (Experiment 2).

Following the awareness tests the subject was debriefed. He was given a written description of the true purpose of the experiment and the reason for the deception was explained (Appendix H). The experimenter openly discussed any aspect of the experiment that was of interest to the subject. None of the subjects expressed unpleasant feelings about the deception. The experiment ended by paying the subject and asking for a vow of secrecy.

## *Hypotheses*

There were four hypotheses in all. The first two hypotheses were concerned with conditioning effects and the other two hypotheses involved assessment of awareness.

### *Hypothesis One*

Ratings of the two A stimulus slides should be significantly affected by the pairings factor in both experiments. It was expected that the A stimulus slides would be rated in the direction of the evaluative content of the pairings. The difference scores (A1 minus A2) for Condition 1 ($A1^{P}$ - $A2^{N(NA)}$) should be in a more negative direction than in Condition 2 ($A1^{N(NA)}$ - $A2^{P}$). This would reflect more liking for slide A1 than A2 in Condition 1, and less liking for slide A1 than A2 in Condition 2.

*Hypothesis Two*

The pairings effect predicted in Hypothesis #1 should be stronger in Experiment 2 than in Experiment 1. This is because the experimental manipulations in Experiment 2 were strengthened by introduction of aversive pairings. It was expected that for Condition 1, the difference scores would be more negative in Experiment 2 than in Experiment 1. For Condition 2, the difference scores should be more positive in Experiment 2 than in Experiment 1. Such findings would indicate a greater pairings effect in the second experiment.

*Hypothesis Three*

Since numerous efforts were made to disguise awareness, it was expected that no more than 10% of the subjects across both experiments (4 subjects out of 40) would be aware on all four awareness measures.

*Hypothesis Four*

Due to the stronger pairings manipulation in Experiment 2, there should be more awareness of the purpose and contingencies of the experiment in Experiment 2 than in Experiment 1.

# RESULTS

## *Effect of Pairings*

### *Hypothesis One*

The prediction for Hypothesis #1 was that difference scores between the two A stimuli would be a function of the evaluative content of the pairings. A Multivariate Analysis of Variance was done for each experiment. The program by Clyde (1969) was used. There was 1 between factor (pairings) and there were 2 levels of the pairings factor (Condition 1: $A1^{P} - A2^{N(NA)}$; Condition 2: $A1^{N(NA)} - A2^{P}$). There were two dependent variables: Semantic Differential pleasantness rating and rank order rating.

The results of the MANOVA for Experiment 1 are presented in Appendix I. There was no significant pairings effect, and the means of the difference scores (Table II) were not in the expected direction.

The MANOVA results for Experiment 2 can be found in Appendix J. Again there was not a significant pairings effect, but the univariate test for the Semantic Differential measure approached significance ($F = 3.072$; $df$ 1, 18; $p < .097$). The means of the difference scores (Table III) were in the predicted direction for both dependent variables. The difference scores tended to be more negative in Condition 1 than in Condition 2, indicating more liking for slide A1 than A2 in Condition 1 as compared to Condition 2.

TABLE II

Means of Difference Scores for Experiment One

| | Semantic Differential | Rank Order |
|---|---|---|
| Condition 1 ($A1^{P}$ - $A2^{N}$) | -2.40 | 0.10 |
| Condition 2 ($A1^{N}$ - $A2^{P}$) | -2.40 | -0.60 |

TABLE III

Means of Difference Scores for Experiment Two

| | Semantic Differential | Rank Order |
|---|---|---|
| Condition 1 ($A1^{P}$ - $A2^{NA}$) | -1.90 | -0.70 |
| Condition 2 ($A1^{NA}$ - $A2^{P}$) | -0.30 | 0.40 |

The results for Experiment 1 clearly do not support Hypothesis #1, and there is some weak support in Experiment 2 for the hypothesis. Overall, the results cannot be regarded as supporting Hypothesis #1, which predicted a conditioning effect.

*Hypothesis Two*

Hypothesis #2 was that the pairings effect would be stronger in Experiment 2 than in Experiment 1, due to the introduction of aversive pairings in Experiment 2. Pairings effect differences between the two experiments were assessed by MANOVAs for Condition 1 and Condition 2.

The MANOVA for Condition 1 yielded no significant effects (Appendix K). Only the means for the rank order rating were in the expected direction (Table IV).

For Condition 2, the multivariate $F$ approached significance ($F = 2.667$; $df = 2, 17$; $p < .098$) and the Semantic Differential rating was the more powerful measure ($F = 5.630$; $df = 1, 18$; $p < .029$). The MANOVA results for Condition 2 are presented in Appendix L. The means for both dependent measures were in the predicted direction (Table V). The difference scores for Condition 2 were more positive in Experiment 2 than in Experiment 1. This indicates less liking for slide A1 than A2 in Experiment 2 (stronger manipulation) as compared to Experiment 1.

TABLE IV

Means of Difference Scores for Condition 1:

Experiment 1 vs. Experiment 2

| | Semantic Differential | Rank Order |
|---|---|---|
| Experiment 1 ($A1^{P}$ - $A2^{N}$) | -2.40 | 0.10 |
| Experiment 2 ($A1^{P}$ - $A2^{NA}$) | -1.90 | -0.70 |

TABLE V

Means of Difference Scores for Condition 2:

Experiment 1 vs. Experiment 2

| | Semantic Differential | Rank Order |
|---|---|---|
| Experiment 1 ($A1^{N}$ - $A2^{P}$) | -2.40 | -0.60 |
| Experiment 2 ($A1^{NA}$ - $A2^{P}$) | -0.30 | 0.40 |

There was suggestive support for Hypothesis #2. The findings for Condition 1 did not support the hypothesis but there was moderate support from the results for Condition 2. It is likely that the tendency for a stronger pairings effect for Experiment 2 was a function of stronger manipulations (aversive pairings).[5]

### *Assessment of Awareness*

#### *Hypothesis Three*

Hypothesis #3 was that no more than 10% of the 40 subjects across both experiments would be scored "aware" on all four awareness measures. The hypothesis was not supported, since 22.5% of the subjects (9 out of 40) were aware on all the measures. But when the results are looked at separately

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[5]It is possible that the stronger pairings effect for Experiment 2 was due to factors other than the introduction of aversive pairings. Campbell and Stanley (1963, p. 5) have pointed out that any number of events occurring between two measurements separated in time could affect the results. In the present investigation the two experiments were about one week apart and different subjects were used. It is possible that subjects in Experiment 2 knew more about the research than subjects in Experiment 1, since there was the possibility of communication among used subjects and potential subjects. Less naivety among subjects rather than stronger manipulations could possibly account for a stronger pairings effect and more awareness (to be discussed later) in Experiment 2. This author believes that the stronger results in Experiment 2 are due to the strengthened manipulations and not to subject naivety. All subjects were asked at the end of the session to not talk to any potential subjects about the experiment. Subjects were informally asked at the beginning of the session whether they had heard anything about the experiment from others, and no one indicated knowledge of the experiment.

for each experiment, it appears that the hypothesis was supported for Experiment 1 but not for Experiment 2. In Experiment 1, 10% of the subjects (2 out of 20) were aware on all the measures, and 35% of the subjects (7 out of 20) were aware in Experiment 2. It is concluded that the purpose and contingencies of the experiment were not effectively disguised in regard to the subjects across both experiments. The efforts at preventing awareness did seem to be effective for Experiment 1.

*Hypothesis Four*

The prediction for Hypothesis #4 was that there would be more awareness of the purpose and contingencies of the experiment in Experiment 2 than in Experiment 1. The numbers and percentages of subjects who were aware on the measures in each experiment are indicated in Table VI. The number of awareness tests on which subjects were aware in each experiment is presented in Table VII.

*z* tests for differences between proportions were done for each awareness measure. The difference between experiments for Awareness Test #1, a multiple choice test of general awareness (Appendix F), was significant ($z = -1.90$; $p < .029$). In other words, significantly more subjects were aware on Awareness Test #1 in Experiment 2 than in Experiment 1.

TABLE VI

Number and Percentage of Subjects Aware on Each Measure

| | Experiment 1 | | Experiment 2 | |
|---|---|---|---|---|
| Awareness Test 1 (Multiple Choice) | 7 | (35%) | 13 | (65%) |
| Awareness Test 2 (Short Answer) | 4 | (20%) | 9 | (45%) |
| Awareness Test 3 (Forced Choice) | 7 | (35%) | 13 | (65%) |
| Awareness Test 4 (Behavioural Forced Choice) | 9 | (45%) | 10 | (50%) |

TABLE VII

Number of Awareness Tests on Which Subjects Expressed Awareness

| | No. & Percentage of *Ss* Aware | | | |
|---|---|---|---|---|
| | Experiment 1 | | Experiment 2 | |
| On 0 Tests | 7 | (35%) | 4 | (20%) |
| On 1 Test Only | 6 | (30%) | 2 | (10%) |
| On 2 Tests Only | 3 | (15%) | 6 | (30%) |
| On 3 Tests Only | 2 | (10%) | 1 | ( 5%) |
| On All 4 Tests | 2 | (10%) | 7 | (35%) |

Awareness Test #2 was a short answer test of general awareness (Appendix F). Significantly more subjects were aware on this measure in Experiment 2 than in Experiment 1 ($z = -1.74$; $p < .041$).

Contingency and demand awareness specifically were assessed by a forced choice method in Awareness Test #3 (Appendix G). As for the first two awareness tests, significantly more subjects were aware in Experiment 2 than in Experiment 1 ($z = -1.90$; $p < .029$). The percentages of aware subjects on the individual items in each experiment are shown in Table VIII.

Awareness Test #4, a behavioural test of contingency awareness, was the only measure on which there was not a significant difference between experiments. Subjects had a 50% chance of correctly guessing which of two pictures was of the slide paired with pleasant slides, and which picture was of the slide paired with neutral or neutral and aversive slides. In neither experiment was responding above chance on this measure.

The results clearly provide support for Hypothesis #4. On three different types of awareness measures, significantly more subjects were aware in Experiment 2 than in Experiment 1. Only one of the four measures failed to yield a significant difference. Further support is that results for all five items in Awareness Test #3 were in the expected direction. Also, Table VII depicts the trend for subjects being

TABLE VIII

Awareness Test #3: Percentage of Subjects Aware on the Five Items in Each Experiment

| Item | Experiment 1 | Experiment 2 |
|---|---|---|
| #1 General Contingency Awareness | 25% | 55% |
| #2 Contingency Aware on Semantic Differential Measure | 15% | 30% |
| #3 Demand Aware on Semantic Differential Measure | 0% | 35% |
| #4 Contingency Aware on Rank Order Measure | 20% | 40% |
| #5 Demand Aware on Rank Order Measure | 0% | 40% |

aware on a greater number of awareness tests in Experiment 2 than in Experiment 1.

*Additional Analyses*

Page (1969, 1974) has found that results in attitude conditioning experiments may be different for aware subjects than for unaware subjects. Page normally obtains a conditioning effect when all subjects are included in the analysis. He reanalyzes the data after having excluded aware subjects from the analysis, and he usually finds that the conditioning effect disappears.[6] Staats also excludes aware subjects from the analysis, but Page's postexperimental questionnaire is far more powerful than is Staats's.

In the present investigation the predicted conditioning effect (Hypothesis #1) was not found. The analyses for Hypothesis #1 included all subjects. Additional analyses were done to determine whether a conditioning effect would appear if unaware subjects were excluded. Subjects who were aware on Awareness Test #3, the Page-style postexperimental questionnaire, were the only subjects included in the analyses. A MANOVA for aware-only subjects was done for each experiment. There were no significant findings. MANOVAs were also done for unaware-only subjects in each experiment.

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[6]Perhaps the disappearance of the conditioning effect is due to simply reducing the number of subjects in the analysis.

Again there were no significant results. In the present study there do not appear to be differences in conditioning as a function of subject awareness.

One of the points of contention between Staats and Page has been whether subjects become aware *during* the pairing procedures (Page) or *after* the pairing procedures as a result of suggestive postexperimental questionnaires (Staats). In the present study, all subjects reported on awareness *during* the conditioning procedures (Appendix G--question under Item #1).

Although the results for Hypothesis #3 suggest that the purpose and contingencies of the experiment were not effectively disguised, particularly for Experiment 2, there is some information counter to this. In the multiple choice test of awareness (Awareness Test #1--Appendix F), subjects could mark as many or few explanations as they believed were true. Explanation "B" was the only one that accurately described the real variable of interest in the research. In Experiment 1, three explanations were chosen more often than B (C, F, H), and one was chosen as often (J). In Experiment 2, one explanation was chosen more often than B (C), and one was chosen as often (F). The cover story apparently was effective for both experiments. Subjects believed some of the rationales given in the cover story as much or even more than the true explanation. Appendix M

indicates the number of subjects who believed the explanations.

One other concern about the results is the interrelatedness of the four awareness measures. The highest percentage of agreement across the 40 subjects was between the multiple choice test (Awareness Test #1) and forced choice test (Awareness Test #3). For 85% of the 40 subjects there was agreement on these two measures as to whether subjects were aware or unaware. The behavioural forced choice test (Awareness Test #4) correlated the least with other awareness measures. These results are presented in Appendix N.

# DISCUSSION

## *Conditioning*

One of the objectives of this research was to extend the attitude conditioning phenomenon to pictorial stimuli presented at tachistoscopic speeds. The results offer only minimal support for that objective, but the data suggest that strong conditioning effects may occur if an all aversive pairings condition is introduced. In Experiment 1 (pleasant vs. neutral pairings), there was no significant pairings effect and the means were not in the predicted direction. In Experiment 2 (pleasant vs. neutral and aversive pairings), one of the univariate tests approached significance ($p < .097$) and the means for both dependent measures were clearly in the direction of a conditioning effect. For Condition 2 ($A1^{N(NA)} - A2^{P}$), the stronger pairings effect in Experiment 2 as compared to Experiment 1 approached significance on the multivariate test ($p < .098$), and was significant for one of the univariate tests ($p < .029$). The next logical experiment would be to do the same procedures as for Experiments 1 and 2, but to change the neutral and aversive condition of Experiment 2 to an all aversive condition. It seems reasonable to assume that such a strengthening of the experimental manipulations would increase the pairings effect (and also awareness). It therefore seems likely that conditioning of attitudes can

occur for pictorial stimuli presented at only 100 msecs, but one or two additional experiments will be needed in order to provide unequivocal evidence.

### *Awareness*

A second objective was to learn more about the role of awareness in attitude conditioning. The inclusion of different types of awareness measures did indeed provide some interesting findings.

Awareness Test #3, the forced choice multiple item measure, was modelled after Page's postexperimental questionnaire. Awareness Test #2, a single open-ended item measure, was similar to Staats's method of assessing awareness. Consistent with previous research, the Page-style questionnaire was a much more powerful detector of awareness than the single global item technique (see Table VI). Awareness Test #2 was the least powerful measure in both experiments.

The results for Hypothesis #3 and the data in Table VI suggest that subjects were far from oblivious to the experimental contingencies and demands. Considering that extensive efforts were made to disguise the contingencies, and that the stimuli were only exposed for 100 msecs, it makes one wonder what the extent of awareness really was in the Staats experiments.

The results for Hypothesis #4 indicate more awareness in Experiment 2 than in Experiment 1. It was suggested that awareness may partly be a function of the strength of the experimental manipulations. If the neutral and aversive pairings condition of Experiment 2 were changed into an all aversive pairings condition, one would expect to see more awareness in such an experiment.

Among the most illuminating aspects of the present thesis is data which draw attention to limitations of Page's work. Page (1969) views demand awareness as a dichotomy--either the subject knows the purpose of the experiment or he does not. As was pointed out earlier, subjects believed some of the bogus alternative rationales for the experiment just as often and more often than the correct explanation (see Appendix M). This was the case in both experiments. So what this suggests is that a subject can guess the correct hypothesis but still believe that other hypotheses are possibilities too. As psychologists, are we not naive in assuming that all subjects think of one and only one explanation of what the experiment might be about? Perhaps there are subjects who have several ideas about the nature of the experiment without being certain of any one of their notions. Many subjects in the present two experiments were quite creative and elaborate in their explanations. Not infrequently would a subject guess the correct explanation, also believe alternative ones as valid, and furthermore make up

his own hypothesis. This author believes that demand awareness should not be considered a simple dichotomy.

The importance of demand awareness to Page is that it could contaminate the results such that the findings are due to awareness and not to the experimental manipulations. There is evidence in the present investigation that demand awareness does not necessarily contaminate the results. There were two subjects who were aware on each of the first three awareness measures but could not behaviourally pick out the contingencies on the fourth measure. In other words, these two subjects were well aware of the purpose and contingencies of the experiment on three different paper and pencil tests, but they failed to pick out the contingencies when shown the two particular A stimuli that were conditioned. There were six subjects who were aware of two of the three paper and pencil tests but unaware on the behavioural measure. In short, the subjects mentioned above may have been demand aware without being contingency aware. One may be aware of the purpose of the experiment but not of the particular stimuli conditioned. If one is not aware of the contingencies, responses on the dependent measures might not be contaminated, even if the subject is aware of the purpose of the experiment.

It is apparent that awareness is a very complex issue, and that consensus and clarification is needed in many areas.

## SUMMARY

There were three major objectives in this thesis. The first was to provide a comprehensive review of the literature on attitude conditioning, giving considerable attention to the demand awareness controversy. There was supportive evidence for both Page's demand awareness and Staats's classical conditioning interpretations. It was suggested that any one theory is not sufficient to account for attitude conditioning effects. The conclusion was that the effects per se in attitude conditioning research should be the primary focus, and the awareness issue should be of secondary concern.

The second objective was to extend the generality of attitude conditioning to complex pictorial stimuli presented for short exposure durations (100 msecs). Although the findings generally did not support the conditioning hypothesis, there were data suggesting that a similar future experiment with stronger pairings manipulations might clearly accomplish the objective. The tendency for a greater conditioning effect in Experiment 2 than in Experiment 1 indicated that stronger pairings manipulations in Experiment 2 may have strengthened the results. A third experiment further strengthening the manipulations (all pleasant vs. all aversive pairings) might clearly reveal conditioning effects for pictorial stimuli presented at 100 msecs.

The third objective was to learn more about the role of awareness in attitude conditioning research. The clearest finding of this research was the subjects were more aware of the contingencies and purpose of the experiment in Experiment 2 than in Experiment 1, and that this was probably a function of the strengthened pairings manipulation in Experiment 2. There were also data which strongly suggest that Page's conception of demand awareness as a dichotomy needs to be seriously questioned. It appears that some subjects can entertain several hypotheses simultaneously without being certain about any one of them. It was also found that subjects can be demand aware without being contingency aware.

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# APPENDIX A

## Individual Slide Ratings for Each Stimulus Category

| A Neutral | B Pleasant | B Neutral | B Aversive |
|---|---|---|---|
| 4.85 | (Scenery) | (Scenery) | |
| 4.95 | | | |
| | 2.30 | 5.20 | 7.00 |
| | 2.50 | 5.40 | 8.20 |
| | 2.95 | 5.45 | 8.40 |
| | 2.95 | 5.50 | 8.60 |
| | 3.05 | 5.50 | 9.00 |
| | 3.15 | 5.55 | |
| | 3.15 | 5.65 | |
| | 3.20 | 5.65 | |
| | 3.25 | 5.90 | |
| | 3.65 | 5.95 | |
| | (Nudes) | | |
| | 2.35 | 3.75 | |
| | 2.40 | 3.80 | |
| | 2.40 | 3.85 | |
| | 2.60 | 3.90 | |
| | 2.70 | 4.10 | |

NOTE: 1 = extremely pleasant, 9 = extremely unpleasant

# APPENDIX B

## Instructions, Cover Story, and Consent Form

The purpose of this study is to explore several aspects of visual perception. We are interested in such matters as repetition of pictures, grouping (such as presenting 2, 3, or 4 pictures closely together), speed of presentation, category of picture, and so on. Different participants are exposed to only some of these conditions. For example, you will be observing 2 pictures presented closely together, and every picture will be exposed for 1/10 of a second.

Since the pictures will be visible for only a very brief amount of time, you will hear a warning tone just before the pictures are exposed. All you are asked to do is to look at the pictures. You need not try to actively remember everything you see. Just watch the pictures as if you're watching a movie.

Before proceeding with the experiment you should be aware that some of the slides you will view may be pornographic, and there may also be a few slides of diseased or injured persons.* We understand that many people do not want to look at such material for a number of reasons. If you do not wish to be exposed to any of these pictures, please tell the experimenter.

I am aware that some pornographic slides and slides of injured persons may be shown in the present experiment. I have no reservations about participation in this experiment.

Signature _____

Age _____

---

*Slides of injured persons were not mentioned in the consent form for Experiment 1, since none of those slides were presented. The instructions were the same for both experiments in all other respects.

# APPENDIX C

## Semantic Differential Measure

You will now be shown 10 more slides, presented at the same speed as before. Please indicate your reactions to each slide by placing an "X" in the space that most appropriately represents your impressions. The following scales will be used.

Pleasant / / / / / / / / / /Unpleasant

Cool / / / / / / / / / /Warm

Stimulating / / / / / / / / / /Unstimulating

Desirable / / / / / / / / / /Undesirable

Agitated / / / / / / / / / /Calm

These ratings will be made for each separate slide. I will advance to the next slide when you have completed the five ratings. If there are no questions, turn the page and we will begin.

# APPENDIX D

## Dummy Recognition Measure

I would like you to complete a short recognition task. You will view 10 slides, each one exposed for 1/2 second. After each slide indicate whether or not you have seen it before by marking Yes or No.

| | Yes | No |
|---|---|---|
| 1. | ___ | ___ |
| 2. | ___ | ___ |
| 3. | ___ | ___ |
| 4. | ___ | ___ |
| 5. | ___ | ___ |
| 6. | ___ | ___ |
| 7. | ___ | ___ |
| 8. | ___ | ___ |
| 9. | ___ | ___ |
| 10. | ___ | ___ |

# APPENDIX E

## Rank Order Measure

On the table in front of you are 5 pieces of tape numbered 1 through 5. You will shortly be given pictures of 5 slides you have already seen. I would like you to do 3 things:

1) Rank order the pictures from those you like most to those you like least. "1" represents most pleasant and "5" represents least pleasant. Arrange the 5 pictures along the table number locations. Use only 1 picture in each category.

2) After having rank ordered the pictures, copy the code number that is on the back of the picture beside the rank number below. For example, if the number is 79 on the back of the picture you placed in position 3, then simply write "79" beside the number 3.

| Rank | Code # |
|---|---|
| 1. | _____ |
| 2. | _____ |
| 3. | _____ |
| 4. | _____ |
| 5. | _____ |

3) If there are any specific reasons why you feel that certain pictures are more pleasant than other pictures, please indicate those reasons on the back of this sheet.

# APPENDIX F

## Awareness Tests 1 and 2: Multiple Choice and Short Answer Tests of General Awareness

During many experiments participants develop various ideas about the purposes of the investigation. This, of course, is natural and is to be expected. But whether or not the participants' ideas reflect the real purposes of the experiment may have a meaningful impact on how the results are interpreted. In this experiment it is easy to develop many ideas about the experimental plan, so it is important to know what you feel we are trying to discover.

On the next page there is a variety of explanations provided, some true and some false. Please do the following:

1. Mark an "X" by the explanation or explanations that you believe are true. If you do not believe a certain explanation is true, then leave the space blank, that is to the left of the letter.

2. Indicate your degree of confidence for each explanation you believe is true--a scale which ranges from "uncertain" to "certain" is provided below each explanation.

If you have no questions, proceed to the next page.

**Awareness Test 1: Multiple Choice Test of General Awareness**

**The purpose of the experiment is to determine how the ratings of certain slides are influenced by:**

___ a) the number of slides per grouping

Guessing : : : : : : : : Certain

___ b) evaluative relationships between slides presented closely together

Guessing : : : : : : : : Certain

___ c) repetition of certain slides

Guessing : : : : : : : : Certain

___ d) time intervals between slides within a grouping

Guessing : : : : : : : : Certain

___ e) time intervals between groupings

Guessing : : : : : : : : Certain

___ f) different categories of slides

Guessing : : : : : : : : Certain

___ g) the sex of the experimenter

Guessing : : : : : : : : Certain

___ h) exposure duration of the slides

Guessing : : : : : : : : Certain

___ i) temperature of the experimental room

Guessing : : : : : : : : Certain

___ j) other--please specify:

Guessing : : : : : : : : Certain

Awareness Test 2: Short Answer Test of General Awareness

For the 3 explanations you are most certain of, write out what results YOU think the investigator is expecting. For example, if room luminance level had been offered as an explanation and you had picked it, you might comment that low illumination results in poorer recognition of pictures (or of one type of pictures but not another), or that poorer illumination results in greater liking for certain pictures (perhaps for pornographic material but not for scenic slides). There are numerous possibilities of course. Be as specific as you can. If you have no idea of what the investigator could be looking for, then simply put down a question mark. Refer back to the 3 explanations as much as needed.

| Explanation chosen (indicate letter) | Your guess of the investigator's prediction. |
|---|---|
| 1. | |
| 2. | |
| 3. | |

# APPENDIX G

## Forced Choice Test of Contingency and Demand Awareness

### Experiment 1

1) In this experiment one of the slides you saw was always paired with pleasant slides (sometimes with beautiful scenery and sometimes with attractive women). Another slide was always paired with neutral slides (sometimes with dull scenery and sometimes with relatively unattractive women). Did you ever notice or suspect this?

   Yes ____ No ____

   If YES, when did you suspect this?

   How certain were you of this at the time?

   /___/___/___/___/___/___/___/___/___/___/

   Uncertain Certain

2) Immediately after you viewed the slide pairings, the experimenter had you rate 10 slides presented at the same speed as before. These were the slides that you rated on dimensions such as "Pleasant-Unpleasant," "Cool-Warm," "Stimulating-Unstimulating," etc. While making the ratings, were you aware that one of these 10 slides was the slide that was always paired with pleasant slides, or that another one of those 10 slides was the slide that was always paired with neutral slides?

   Yes ____ No ____

   If YES, how certain were you of this while making the ratings?

   /___/___/___/___/___/___/___/___/___/___/

   Uncertain Certain

3) When you rated the 10 slides, the experimenter expected that you would rate the slide that was always paired with pleasant slides as more pleasant than the slide that was always paired with neutral slides. Did you suspect at that time that this was the hypothesis?

   Yes ____ No ____

...

If YES, how certain were you of this while making the ratings?

/ / / / / / / / / /

Uncertain Certain

4) While rank ordering the 5 pictures from most pleasant to least pleasant, were you aware that one of the pictures was of the slide that was always paired with pleasant slides, or that another one of the pictures was of the slide that was always paired with neutral slides?

Yes ____ No ____

If YES, how certain were you of this while rank ordering the pictures?

/ / / / / / / / / /

Uncertain Certain

5) When you rank ordered the 5 pictures, the experimenter expected that you would rank the picture of the slide that was always paired with pleasant slides as more pleasant than the picture of the slide that was always paired with neutral slides. Did you suspect at that time that this was the hypothesis?

Yes ____ No ____

If YES, how certain were you of this while rank ordering th pictures?

/ / / / / / / / / /

Uncertain Certain

Experiment 2

1) In this experiment one of the slides you saw was always paired with pleasant slides (sometimes with beautiful scenery and sometimes with attractive women). Another slide was always paired with neutral or unpleasant slides (sometimes with dull scenery and sometimes with injured persons). Did you ever notice or suspect this?

Yes ____ No ____

If YES, when did you suspect this?

How certain were you of this at that time?

/ / / / / / / / / /

Uncertain Certain

2) Immediately after you viewed the slide pairings, the experimenter had you rate 10 slides presented at the same speed as before. These were the slides that you rated on dimensions such as "Pleasant-Unpleasant," "Cool-Warm," "Stimulating-Unstimulating," etc. While making the ratings were you aware that one of these 10 slides was the slide that was always paired with pleasant slides, or that another one of those 10 slides was the slide that was always paired with neutral or unpleasant slides?

Yes ____ No ____

If YES, how certain were you of this while making the ratings?

/ / / / / / / / / /

Uncertain Certain

3) When you rated the 10 slides, the experimenter expected that you would rate the slide that was always paired with pleasant slides as more pleasant than the slide that was always paired with neutral or unpleasant slides. Did you suspect at that time this was the hypothesis?

Yes ____ No ____

If YES, how certain were you of this while making the ratings?

/ / / / / / / / / /

Uncertain Certain

4) While rank ordering the 5 pictures from most pleasant to least pleasant, were you aware that one of the pictures was of the slide that was always paired with pleasant slides, or that another one of the pictures was of the slide that was always paired with neutral or unpleasant slides?

Yes ____ No ____

If YES, how certain were you of this <u>while rank ordering the pictures</u>?

/ / / / / / / / / /

Uncertain Certain

5) When you rank ordered the 5 pictures, the experimenter expected that you would rank the picture of the slide that was always paired with pleasant slides as more pleasant than the picture of the slide that was always paired with neutral or unpleasant slides. Did you suspect at the time that this was the hypothesis?

Yes ____ No ____

If YES, how certain were you of this <u>while rank ordering the pictures</u>?

/ / / / / / / / / /

Uncertain Certain

# APPENDIX H

## Debriefing

You are probably now aware that you were not correctly informed of the true purpose of the experiment in the beginning. There is a good reason for this. We now wish to explain the real purpose honestly.

The crucial concern is whether a person's attitudes can be influenced by meaningful relationships of which he is unaware. A good example is commercials. Advertised products are often paired with beautiful women, pastoral scenery, sensitizing words, etc. It is possible that we are influenced by such relationships without being consciously aware of them.

In this experiment we were interested in whether this sort of "attitude conditioning" could occur for pictures presented at high speeds. It was necessary to make sure that you were not aware of the consistent relationships. This is because lack of conscious awareness is in itself an important issue regarding the conditioning of attitudes. Had we not used deception, we would not know whether attitudes were changed with or without conscious awareness.

If the use of deception in this experiment has disturbed you, please indicate below. Any comments, positive or negative, are welcome. The experimenter would like to talk to you about the research project before you leave.

Thank you for participating.

# APPENDIX I

## MANOVA for Experiment One

*Multivariate Test of Significance* (Wilks Lambda Criterion)

| Test of Roots | *F* | *DF HYP* | *DF ERR* | *P LESS THAN* | *R* |
|---|---|---|---|---|---|
| 1 through 1 | 0.554 | 2.0 | 17.0 | .585 | .247 |

*Univariate F Tests*

| *VARIABLE* | *F(1, 18)* | *MEAN SQ.* | *P LESS THAN* | *STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS* |
|---|---|---|---|---|
| Semantic Differential | 0.000 | 0.000 | 1.000 | -0.947 |
| Rank Order | 0.619 | 2.450 | 0.442 | 1.377 |

# APPENDIX J

## MANOVA for Experiment Two

*Multivariate Test of Significance* (Wilks Lambda Criterion)

| Test of Roots 1 through 1 | *F* | *DF HYP* | *DF ERR* | *P LESS THAN* | *R* |
|---|---|---|---|---|---|
| | 1.632 | 2.0 | 17.0 | .225 | .401 |

*Univariate F Tests*

| *VARIABLE* | *F(1, 18)* | *MEAN SQ.* | *P LESS THAN* | *STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS* |
|---|---|---|---|---|
| *Semantic Differential* | *3.072* | *12.80* | *.097* | *0.814* |
| *Rank Order* | *1.462* | *6.05* | *.242* | *0.357* |

# APPENDIX K

## MANOVA for Condition One: Experiment One vs. Experiment Two

*Multivariate Test of Significance* (Wilks Lambda Criterion)

| Test of Roots | *F* | *DF HYP* | *DF ERR* | *P LESS THAN* | *R* |
|---|---|---|---|---|---|
| 1 through 1 | 1.190 | 2.0 | 17.0 | .328 | .350 |

*Univariate F Tests*

| *VARIABLE* | *F(1, 18)* | *MEAN SQ.* | *P LESS THAN* | *STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS* |
|---|---|---|---|---|
| Semantic Differential | 0.476 | 1.80 | .499 | -1.070 |
| Rank Order | 0.594 | 3.20 | .451 | 1.102 |

# APPENDIX L

**MANOVA** for Condition Two: Experiment One vs. Experiment Two

*Multivariate Test of Significance* (Wilks Lambda Criterion)

| Test of Roots | *F* | *DF HYP* | *DF ERR* | *P LESS THAN* | *R* |
|---|---|---|---|---|---|
| 1 through 1 | 2.667 | 2.0 | 17.0 | .098 | .489 |

*Univariate F Tests*

| *VARIABLE* | *F(1, 18)* | *MEAN SQ.* | *P LESS THAN* | *STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS* |
|---|---|---|---|---|
| Semantic Differential | 5.630 | 22.050 | .029 | 0.964 |
| Rank Order | 1.844 | 5.000 | .191 | 0.065 |

# APPENDIX M

## Number of Subjects Who Believed the Explanations on Awareness Test #1

| Explanation | Number of Ss Who Chose the Explanation | |
|---|---|---|
| | Experiment 1 | Experiment 2 |
| A | 1 | 4 |
| B (correct) | 7 | 13 |
| C | 11 | 16 |
| D | 3 | 4 |
| E | 1 | 3 |
| F | 11 | 13 |
| G | 5 | 5 |
| H | 9 | 11 |
| I | 0 | 0 |
| J | 7 | 5 |

# APPENDIX N

## Interrelations Among the Awareness Measures: Percentage of Agreement Across the Forty Subjects in Both Experiments

| | (1) Multiple Choice | (2) Short Answer | (3) Forced Choice | (4) Behavioural Forced Choice |
|---|---|---|---|---|
| Multiple Choice (1) | -- | 77.5 | 85.0 | 62.5 |
| Short Answer (2) | -- | -- | 75.0 | 65.0 |
| Forced Choice (3) | -- | -- | -- | 62.5 |
| Behavioural Forced Choice (4) | -- | -- | -- | -- |

# VITA

Surname: PENNER Given Names: RONALD STEVEN

Place of Birth: KANSAS CITY, MISSOURI, U.S.A.

Date of Birth: OCTOBER 29, 1952

Educational Institutions Attended,
with Dates of Entering and Leaving:

| | | | |
|---|---|---|---|
| UNIVERSITY OF KANSAS | 1970 | to | 1974 |
| UNIVERSITY OF VICTORIA | 1974 | to | 1976 |
| | ____ | to | ____ |

Degrees, Diplomas, Etc., Awarded,
with Dates and Names of Institutions:

| | | |
|---|---|---|
| B.A. (With Highest Distinction) | 1974 | UNIVERSITY OF KANSAS |
| | ____ | |

Honours and Awards:

University of Kansas Scholarship, 1971/72 ____

University of Kansas Scholarship, 1972/73

University of Kansas Scholarship, 1973/74

Liberal Arts & Sciences Summer Research Grant (Univ. of Kansas), 1972

National Science Foundation Undergraduate Research Participation Grant, 1973

The Chairman's Prize for Excellence in Undergraduate Research in Psychology (Univ. of Kansas), 1974

Phi Beta Kappa, 1974

VITA (continued)

University of Victoria Graduate Fellowship, 1974/75

University of Victoria Graduate Fellowship, 1975/76

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Publications:

Pirot, M., Penner, R. S., & Rosenblood, L. K. Report and validation of a novel telephone sampling technique. *Perceptual and Motor Skills*, 1976, in press.

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ATTITUDE CHANGE BY TACHISTOSCOPIC PAIRINGS OF COMPLEX PICTORIAL STIMULI: WITH EMPHASIS ON THE PREVENTION AND ASSESSMENT OF AWARENESS

Author [redacted]

Signature

RONALD S. PENNER

Name

18 August, 1976

Date