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The Effects of Priming and Subliminal Oedipal-Related Stimuli on Competitive Behavior of College Males

Katherine C. Haspel
University of Rhode Island

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THE EFFECTS OF PRIMING AND SUBLIMINAL
OEDIPAL-RELATED STIMULI ON COMPETITIVE
BEHAVIOR OF COLLEGE MALES

BY

KATHERINE C. HASPEL

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
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ABSTRACT

This research explored the effect of priming and subliminal oedipal stimulation on the dart throwing performance of 36 college males. The design was similar to that used by Silverman, Ross, Adler, and Lustig (in press) in that each subject was seen individually and, in addition, had pre and post measures taken for the three within subject experimental conditions. Each within-subject condition consisted of a verbal message and a congruent picture presented at a speed of 4 msec. One condition was designed to enhance oedipal guilt, one to decrease it, and one to serve as a neutral control.

The 36 subjects were divided into three priming groups of 12 subjects each. One group, designed as a replication of the work done by Silverman et al. (in press), was presented with both direct and projective priming material designed to arouse oedipal guilt; one group was shown neutral direct material and oedipal-related projective material; and one group saw neutral material only. It was predicted that the subliminal stimuli would have the same effect in all three groups.

The data was analyzed with a repeated measures analysis of covariance. No significant main effects or interaction effects of stimulus content were found. The only significant

effect emerging was an interaction between prime and experimenter. In addition, a priori comparisons conducted on the full prime replication group also yielded no significant results.

The results were discussed for their significance in demonstrating that if there is an effect of subliminal oedipal stimulation on dart-throwing performance, it is at best a weak one. Questions about both the reliability and generalizability of the results of the work of Silverman et al. (in press) were raised.

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THE EFFECTS OF PRIMING AND SUBLIMINAL OEDIPAL-RELATED STIMULI ON COMPETITIVE BEHAVIOR OF COLLEGE MALES

Psychoanalytic theory has been poorly researched and is considered by many, both analysts and non-analysts alike, to be unresearchable. While this may in fact be true of its metapsychological theory, parts of its clinical theory lend themselves to empirical investigation.

The distinction between clinical and metapsychological theories has been made by recent psychoanalytic writers (e.g., Klein, 1976; Schafer, 1976; Silverman, 1976). Clinical theory is that part of the theory based on data, i.e., material from clinical work. Included in it are both dynamic and genetic propositions. Dynamic propositions deal with current unconscious conflicts that are said to motivate behavior. Genetic propositions are those which hypothesize the past cause of the present underlying conflict. An example of a dynamic proposition is that male homosexuality is motivated (in part) as a defense against unconscious incestuous wishes toward one's mother; that is, a sexual relationship with a woman is unconsciously equated with incest and is therefore avoided. A related genetic proposition is that men who have these strong conflicts over their incestuous wishes are men whose mothers behaved too seductively toward them when they were children.

Metapsychological propositions go beyond the data; they can even be viewed as "theory about the theory." Included among them are the constructs of drive, energy, id, and ego. Some psychoanalytic writers have asserted that metapsychological propositions are in fact inessential to psychoanalytic theory (e.g., Klein, 1976). They are certainly almost impossible to validate empirically. Clinical propositions on the other hand, are more testable. But because even the clinical theory deals with unconscious processes or past events, convincing empirical support of it has been scant.

Silverman (1976) reports a program of research that claims such support. Specifically, he claims that his subliminal research using syndrome-specific conflictual stimuli has provided convincing evidence for psychoanalytic theory's dynamic propositions, that is, for the psychoanalytic assumption of active unconscious wishes that motivate day-to-day behavior. Psychologists of a psychoanalytic persuasion may welcome his work as convincing support, while those of a non-analytic orientation will probably be more skeptical. Given the debate that his research is likely to stimulate, it is important that some of Silverman's most central procedures be replicated in independent laboratories.

From a reading of Silverman's (1976) most recent review article in American Psychologist his work seems difficult to refute. As one looks more closely at the original research, however, it becomes apparent that his

results are neither as strong nor as clean methodologically as his 1976 paper would suggest. A more critical review is in order.

Silverman and his associates began approximately 13 years ago to investigate psychoanalytic hypotheses using tachistoscopic presentations of what were hypothesized to be wish-related stimuli. Although the largest body of this research was conducted with schizophrenics, other groups studied include depressives, stutterers, male homosexuals, obese people, phobics, and normal college students and hospital employees. Psychoanalytic hypotheses relating to both the intensification of pathology and to its reduction have been investigated; the former have been tested only in laboratory situations, but the latter both in the laboratory and in actual interventions.

The general procedure for pathology intensification is as follows: subjects are seen for a number of sessions in which both baseline and critical measures of their pathology are taken. (Measures used have included the Rorschach, adjective check lists, and observations of pathological non-verbal behavior.) In between these measures the subjects look into a tachistoscope and are shown conflictual or neutral verbal and/or pictorial stimuli exposed for 4 milliseconds. In addition, before the baseline measure of pathology is taken, subjects are shown neutral tachistoscopic presentations. This practice is to ensure that the two measures of pathology are made under comparable conditions. The experimenter interacting with the subject is always blind as to

what stimulus is in the tachistoscope. It should also be noted that in some of his work, in addition to the 4-msec exposure of the stimulus, Silverman also showed subjects the same stimulus supraliminally, that is, for 10 seconds. This exposure tended not to increase pathology in the way that the subliminal exposure did; but, as will be shown later, contrary to Silverman's assertion in his 1976 review, some supraliminal effects were found (e.g., Cox, 1974; Rustein & Goldberger, 1973).

The analogue pathology-reduction paradigm is similar, the only difference being that subjects are shown stimuli hypothesized to reduce rather than increase their pathology. Pathology-reduction work designed to have a lasting effect has involved subjects' viewing certain subliminal stimuli repeatedly over time. As the research proposed herein includes both pathology intensification and reduction, a discussion of each aspect of Silverman's work will be taken in its turn. We will discuss his work with psychiatric populations and then his research using normal subjects.

By far Silverman's largest body of data concerns pathology intensification in male schizophrenics (Lomangino, 1969; Moriarty, 1968; Silverman, 1966, 1971; Silverman & Candell, 1970; Silverman, Candell, Pettit, & Blum, 1971; Silverman & Silverman, 1967; Silverman & Spiro, 1967a, 1968; Silverman, Spiro, Weisberg, & Candell, 1969; Spiro & Silverman, 1969). The major hypothesis tested has been that schizophrenia (called by Silverman and his associates, "primary process ego pathology") is motivated at least in

part by conflicts over aggressive wishes, specifically that schizophrenic symptoms are a defense against these wishes. The relevant symptoms include both disturbances in thinking and in nonverbal behavior which make the subject appear to others to be illogical, loose, inappropriate, and strange.

This hypothesis was tested by presenting schizophrenic subjects an aggressive stimulus and comparing their change scores in this session with change scores in another session in which a neutral stimulus was presented. Various verbal and pictorial aggressive and neutral stimuli were used. For example, a picture of a tiger chasing a monkey was compared to a picture of a bird alighting (Silverman, 1966); a picture of a man with a dagger was compared to a picture of a man reading (Silverman & Silverman, 1967); a picture of a man about to stab a woman accompanied by the words "destroy mother" was compared to a picture of two men facing each other with bland looking expressions accompanied by the verbal message "men talking" (Silverman et al., 1969).

Dependent variables included pathological thinking as measured by a story recall task, a word association task, and Rorschach-type ink blots, and an observational measure of pathological nonverbal behavior. Significant differences were found in all but one of the studies (Silverman, Candell, Pettit, & Blum, 1971) on at least one of the measures used; that is, on at least one of the dependent variables, schizophrenic subjects showed a greater increase in pathology when exposed to a subliminal aggressive stimulus than when shown a neutral stimulus. In studies involving schizophrenics

hospitalized for longer periods of time, significant differences on more measures were found (Silverman, 1971).

Another variable manipulated with schizophrenic subjects was the arousal of libidinal wishes with a libidinal stimulus (a picture of a buxom nude woman). Although this stimulus was found to lead to a decrease in efficiency on intelligence test-type questions, it did not lead to an increase in ego pathology as measured by pathological thinking and pathological nonverbal behavior (Silverman & Silverman, 1957).

Four studies also looked at the effect of a supraliminal exposure of an aggressive stimulus (Lomangino, 1969; Moriarty, 1968; Silverman & Candell, 1970; Silverman & Spiro, 1968). In three studies no significant differences were found when the supraliminal condition was compared to either a subliminal neutral condition (Lomangino, 1969; Silverman & Spiro, 1968) or a supraliminal neutral condition (Silverman & Candell, 1970). In addition, Silverman & Spiro (1968) found a significant difference between the subliminal and supraliminal aggressive conditions in the same direction as the difference between the subliminal aggressive and neutral conditions (i.e., the subliminal aggressive stimulus increased pathology significantly more than a supraliminal presentation of the same stimulus). On the other hand, Moriarty (1968) found a decrease in the efficiency of schizophrenics on an arithmetic task after the presentation of a supraliminal aggressive stimulus.

Two important drawbacks of Silverman's work on

pathology intensification with schizophrenics should be noted. First, the entire body of research has been conducted using only male subjects, thereby limiting generalizability. Second, except for the Lomangino (1969) and Moriarty (1968) studies, all analyses reported consist only of a series of t tests, even when multivariate techniques (e.g., Hotelling's T^2 , analysis of variance, analysis of covariance, multivariate analysis of variance) are more appropriate (i.e., when more than two conditions and/or more than one dependent variable are involved).

Less extensive research has been carried out with stutterers (Silverman, Klinger, Lustbader, Farrell, & Martin, 1972) and with male homosexuals (Silverman, Kwawer, Walitzky, & Coron, 1973). Two psychoanalytic hypotheses were investigated with stutterers: (1) that stuttering will increase when oral aggressive wishes are aroused by a picture of a roaring lion, and (2) that stuttering will increase when anal wishes are aroused by a picture of a dog defecating. Both stimuli led to significantly more stuttering on a paraphrase task than did a neutral stimulus. As pilot work showed no significant differences between a supraliminal presentation of either conflict stimulus and a subliminal neutral stimulus, no supraliminal condition was used in the study.

Two groups of male homosexuals not in psychotherapy were studied, the second study being a replication of results found on a post hoc basis in the first. The hypothesis investigated was that a subliminally presented incestuous stimulus would increase the homosexuals' scores in the direction of

homosexuality on a sexual feelings assessment. The stimulus used was a picture of a nude man and woman in a sexually suggestive pose accompanied by the verbal message "fuck mommy." The sexual feelings assessment consisted of ratings of pictures of ten males and ten females. A group of heterosexual males was included for comparison purposes in the second study. The hypothesis was upheld. No differences between the incestuous and control conditions were found for the heterosexual males.

Although Silverman (1976) indicates that his work with depressives produced strong support for the psychoanalytic theory of depression, closer look at that work shows the results to be more equivocal. The hypothesis investigated was that depressive symptoms are motivated by a conflict over aggressive wishes. Stimuli presented were similar to the stimuli used with schizophrenics. In one study female hospitalized depressives were found to show a greater increase in depression after an aggressive stimulus than after a neutral stimulus (Rustein & Goldberger, 1973). Depression was measured by an adjective check list. However, this result was not upheld on replication (Silverman, Bronstein, & Mendelsohn, 1976).

In another study of hospitalized depressed patients, this time males, Cox (1974), using four analyses of variance, found significant results in the predicted direction only for psychotic patients and only on one of his five variables (i.e., an increase in intropunitive responses on a measure of direction of aggression). In addition, both of these

studies found changes when a supraliminal aggressive condition was compared to the neutral condition. Cox found psychotic depressives to decrease introjective responses in these sessions. Similarly, Rustein and Goldberger found an increase in outward aggression as measured by the Rorschach in their supraliminal condition.

Additional problems exist in the two other studies of depressives cited by Silverman in his review article (Miller, 1974; Varga, 1974). These were conducted with nonpsychiatric populations. Varga (1974) studied college students pre-screened for depressive trends. Although he found a significant drop in their hypomania scores after the presentation of a subliminal aggressive stimulus, all other significant results he reports were found on measures combined on a post hoc basis. In addition, his hypomania scale was derived by separating the depressive from the hypomanic adjectives of the Multiple Affect Adjective Check List depression scale, which he presented as a 50-point scale rather than as a check list. Both of these procedures were likely to have reduced the validity of this scale.

At first glance Miller's (1974) results appear quite impressive, as she reports significant differences on several measures between her depressed and nondepressed groups. However, upon closer examination, one sees her overall analyses of covariance found only one interaction effect on one dependent variable. Her multiple significant results were produced by her follow-up (Duncan's range) tests. These should have been conducted only after simple effects tests

were done for the significant interaction effect and only for that particular interaction. In addition, Duncan's range tests probably contain too much likelihood of Type I error (i.e., rejecting the null hypothesis when it is in fact true). This makes it even more clear that Silverman's inappropriate use of multiple t tests may have had the effect of finding significant differences when there in fact were none.

Another important aspect of Silverman and his associates' work on pathology intensification should be mentioned. As it could be argued that any conflictual stimulus could arouse any pathology, Silverman et al. (1976) investigated the question of the specificity of the relationship of each pathology to the stimulus used to increase its manifestations. To do so they replicated the work with all four diagnostic categories studied. They showed subjects two conflictual stimuli, one that had increased the pathology in an earlier study and one that had increased the pathology of subjects in another diagnostic category. For no group did the "unrelated" stimulus lead to an increase in the specific pathology (it should be noted, however, that for the depressed subjects in this study, neither did the "related" aggressive stimulus).

In addition to studying the pathology intensifying effects of subliminal stimuli, Silverman and his associates investigated the ability of such stimuli to temporarily reduce pathology. As is the case with their work on pathology intensification, the largest body of work

investigating pathology reduction has been conducted with male schizophrenics (Bronstein, 1977; Kaye, 1975; Silverman & Candell, 1970; Silverman, Candell, Pettit, & Blum, 1971; Silverman, Levinson, Mendelsohn, Ungaro, & Bronstein, 1975; Silverman, Pettit, & Dunne, 1971; Silverman et al., 1969). All but one study (Silverman, Ross, Adler, & Lustig, in press) has investigated only the pathology-reducing effect of some sort of symbiotic stimulus. Most are laboratory studies investigating the temporary effect of the stimulus on manifestations of pathology, but a few have investigated the long term effects of the presentation of a pathology-reducing stimulus over time (Parker, cited in Silverman, Note 1; Silverman et al., 1975; Silverman, Frank, & Dachinger, 1974; Silverman, Martin, Ungaro, & Mendelsohn, Note 2).

The laboratory work with male schizophrenics used the subliminal symbiotic verbal message "mommy and I are one," sometimes accompanied by a picture of a man and woman with the boundaries between them indistinct. This stimulus was found to lead to a decrease in pathological thinking and/or pathological nonverbal behavior for those schizophrenics relatively differentiated from their mothers (as measured by an adjective check list). It was also found to lead to a decrease in self-object differentiation (Silverman, Candell, Pettit, & Blum, 1971; Silverman, Pettit, & Dunne, 1971). Further studies found that no other symbiotic stimulus (e.g., "mommy and I are the same," Bronstein, 1977) had the same pathology-reducing effect, except "my girl and I are one"

(Kaye, 1975), which had an even greater effect than the "mommy and I are one" message. For female schizophrenics, who were used as subjects in only one study, "daddy and I are one," rather than "mommy and I are one," had a pathology reducing effect (Cohen, cited in Silverman, in press). One study investigated the effect of a supraliminal symbiotic stimulus on pathology reduction and found no differences between this and a supraliminal neutral stimulus (Silverman & Candell, 1970). However, no comparison of the supraliminal symbiotic with either the subliminal symbiotic or the subliminal neutral condition are reported.

Another group for whom the laboratory effect of the symbiotic stimulus was investigated was male homosexuals (Silverman et al., 1973). The scores of these subjects on a Rorschach threat index decreased after the presentation of the symbiotic stimulus.

Other work with the symbiotic stimulus has investigated its effect when used as part of a treatment procedure. One of the first groups with whom this was attempted was schizophrenics, who were shown either the symbiotic or a neutral stimulus three times a week for six weeks along with other treatment (Silverman et al., 1975). When the t values for the eight dependent variables were pooled and transformed into a χ^2 function, a significant difference between the groups was found. This procedure was illegitimate, however, as one should not combine results from different dependent measures in this way. The original t tests yielded significant differences on only one measure (self concept).

Notably, patients in both groups showed significant improvement on six of the measures.

When used instead of relaxation in a systematic desensitization paradigm with insect phobics, the symbiotic stimulus was found to lead to significantly more improvement than a neutral stimulus (Silverman et al., 1974). Measures showing this difference were a behavioral avoidance test and the experimenter's rating of anxiety. No comparison between the symbiotic stimulus and relaxation itself has been made.

Two studies were conducted involving the behavioral treatment of obese women (Silverman et al., Note 2). During their weekly treatment sessions, half of the subjects in each study were shown the subliminal symbiotic stimulus and half were shown a neutral stimulus. No between group differences were found at the end of 8 (Study 1) or 12 (Study 2) weeks of treatment. However, subjects who were shown the subliminal symbiotic stimulus showed significantly greater weight loss at a 4-week follow-up than did subjects shown the neutral stimulus. This difference was maintained with the one group of subjects (Study 2) also seen at an 8-week follow-up.

Two major objections to Silverman's work have been raised in the literature. The first takes issue with the ethics of Silverman's experiments and the second with the interpretation of his data.

The ethics of his procedures have been criticized primarily in studies designed to increase subjects' pathology (Lasser, 1977). Silverman (Note 1) has been able to

answer these ethical questions with the following data: (1) When the control session has followed the experimental session by one to three days, no differences even approaching significance have been found between the two baseline measurements of the subjects' pathology. (2) One study measured pathology twice, first immediately after the presentation of the subliminal stimuli and again 15 to 30 minutes later (Silverman, Candell, Pettit, & Blum, Note 3). Notably, the significant change from baseline to the first critical measurement was not found when the baseline was compared to the second critical measurement.

Guthrie and Wiener (1966) and Wiener and Kleespies (1968) have offered an alternative explanation of Silverman's results. They suggest that his data is obtained as a result of supraliminal structural information ("partial cues") available to the subjects under supposedly subliminal conditions. Using stimuli from an earlier study of subliminal registration (Eagle, 1959), Guthrie and Wiener (1966) demonstrated that: (1) angularity in and of itself is perceived by subjects as negative; (2) Eagle's aggressive stimulus was more angular than was his benevolent stimulus; and (3) in an experiment comparing subliminal stimuli differing in both angularity and aggressive content masked by a supraliminal neutral stimulus, subjects rated the neutral stimulus more negatively after the angular, but not after the aggressive, preceding stimulus.

Silverman and Spiro (1967b) countered by testing their own aggressive stimuli for angularity versus curvedness.

They did this both at the exposure duration used by Guthrie and Wiener (i.e., at the duration where the subject first reported seeing something) and at the duration of the presentation of stimuli in their own work (i.e., 4 msec). Six different pairings of aggressive and neutral stimuli were shown. The three significant differences found on the angularity-curved dimension were in the direction of the neutral stimulus being more angular or the aggressive being more curved. Wiener and Kleespies (1968) then argue that it could be a cue other than angularity that leads to Silverman's results. However, the consistency of Silverman and his associates' findings using a large number of different stimuli make this hypothesis difficult to support.

The other argument Silverman and Spiro (1967b) and Silverman (1968) use in support of the subliminality of their stimuli is the results of their discrimination task. This task was administered in most studies, always after the experimental manipulations. It was typically conducted in one of two ways: (1) Subjects were shown two stimuli at the 4-msec exposure and told that one was A and one was B; they were then shown A and B in a random order ten times and usually given a monetary incentive to tell which was which. (2) Or subjects were shown ten 4-msec exposures of two different stimuli in a random order and given a monetary incentive for telling whether each stimulus was the same as or different from the one immediately preceeding it. In their most recent work Silverman et al. (in press) used 20 trials in this task. Silverman (1976) reports that over

90% of his subjects cannot distinguish at better than a chance level ($p < .10$) one stimulus from another. Moreover, he states that the results supporting his hypotheses are not dependent on the small group of subjects who do discriminate.

Although this data is impressive, there are problems with both the design of Silverman's discrimination task and the analysis of his results. The fact that subjects were usually given only ten trials means that even at the .10 significance level a subject must get at least eight (or only two) correct trials in order to be considered able to discriminate. In addition, the procedure of showing the stimuli singly in random order is problematical because the subject does not view the stimuli he is discriminating between on each trial. Finally, power is reduced in Silverman's analysis because each individual's results are viewed separately. Combining the data of all subjects with a non-parametric statistical technique may have been able to detect discrimination that Silverman missed.

In addition to criticisms Silverman has received in the literature, other drawbacks of his work with psychiatric populations has been noted above. A summary of some of them is in order: (1) Most of the work has been conducted only with male subjects, thereby limiting generalizability; (2) measures of pathology tended to be constructed by the researchers themselves (e.g., sexual feelings assessment) and/or to be of questionable reliability and validity (e.g., the Rorschach); and (3) inappropriate and/or too-liberal (i.e., too much chance of Type I error) data analyses tended

to be used.

Silverman and his associates have attempted to correct the latter two criticisms in their better designed work with normal subjects, thereby making this work both more difficult to refute and more deserving of replication. The most impressive study to date has been one conducted by Silverman, Ross, Adler, and Lustig (in press) who investigated oedipal competitive feelings in four groups of male college students. The dependent variable was a behavioral measure of dart throwing ability, and multivariate analysis techniques were applied to the data. Subjects in three of the groups were found to increase their dart throwing performance when shown the subliminal verbal message "beating dad is o.k." in sequence with a picture of a younger and an older man, both smiling; they decreased their performance when shown the message "beating dad is wrong" in sequence with a picture of the same two men frowning.

The procedure involved showing each subject all stimuli in one session, in counterbalanced order, continually taking baseline and critical measures of dart throwing. All data were analyzed using an analysis of covariance followed by Duncan's range tests. The first study found that both the WRONG and the OK stimuli differed significantly in the predicted directions from a neutral stimulus ($p < .001$). Two symbiotic stimuli ("mommy and I are one" and "daddy and I are one") were not found to differ significantly from the neutral stimulus. The second study found the WRONG and the OK stimuli to differ significantly from each other ($p < .001$),

but only the WRONG stimulus to differ from the neutral ($p < .01$). No significant differences for the symbiotic message ("mommy and I are one") were found.

A third study was conducted, which did not find significant differences among the conditions at all. However, the stimuli in this study were shown at considerably higher illumination levels than in the previous two dart studies. A fourth study was then conducted to see if it was indeed the higher illumination levels that led to the lack of significant findings; therefore, two groups of subjects were used, each shown the stimuli at different illumination levels. A significant stimulus by group interaction was found on an analysis of covariance. When followed by analyses of covariance for the groups separately, only for the low illumination group was a significant effect found. As in the first two studies, the WRONG and OK means were found to differ significantly from each other ($p < .005$), but this time only the OK mean differed significantly from the control ($p < .05$). Again, no significant differences for the symbiotic stimulus ("mommy and I are one") were obtained.

The major drawback of this study and, in fact, of most of Silverman and his associates' work with normal populations, was that all subjects were "primed" prior to the presentation of the subliminal stimuli. Theoretically this practice was to "trigger" derivatives of whatever conflict was being studied at the time. This priming has always included a story recall task using a story related to the particular conflict being studied (e.g., studies of students judged to be prone

to depression used an aggressive prime; Miller, 1974; Varga, 1974). Silverman (1965) and Miller (1974) assert that the priming triggers drive derivatives already active in the subject. They say it is necessary with normal subjects because, unlike psychiatric subjects, normal people are not continually internally stimulated by these conflicts.

The common practice of using priming grew from the results of Silverman's (1965) study, which was designed to see if aggressive stimuli could lead to an increase in manifestations of ego pathology in male hospital employees. Results in the predicted direction were found only for subjects primed with an aggressive passage. Although an earlier study using male college students did find results without priming (Silverman & Silverman, 1964), Silverman's 1965 results have been used as a justification for most later priming.

There are several difficulties with such a justification. First, Silverman's (1965) study was methodologically weak. He saw 25 of an original 32 subjects in an unprimed condition before he thought of using a prime; when the hypothesized results were found for only the 7 primed subjects, Silverman added 45 more subjects, all of whom he primed. In addition, he did not get the predicted results on his primary variable (pathological thinking) for the entire group of primed subjects. He therefore removed from the group 9 subjects who were found to have had aggressive associations to the control stimulus; it was only without these subjects that the difference in pathological thinking

between the control and experimental sessions reached significance. He also found, on a post hoc basis, that only those primed subjects who had a relatively poor ability to neutralize aggression (as measured by their baseline Rorschachs) showed a significant difference between experimental and control sessions.

The difference between the unprimed subjects' change scores in the experimental and control sessions were found to approach significance ($p=.06$) in the direction opposite to that predicted (i.e., pathological thinking increased more in the control than in the aggressive session). This was neither dealt with adequately by Silverman (1965), nor was an attempt at replication made.

The replication study does not even use an unprimed group (Silverman & Goldweber, 1966). Rather, it concentrates on investigating the supraliminal-subliminal question with normal subjects and on replicating Silverman's finding that it is only with poor neutralizers that an aggressive subliminal stimulus has an effect. The supraliminal results are equivocal and show another use to which priming has been put. It was only after a post hoc analysis, excluding those subjects rated as deniers of aggression (based on their recall of the priming passage), that the difference between the subliminal aggressive and supraliminal aggressive conditions reached significance. The hypothesis that the subliminal effect would be observed only in poor neutralizers was upheld. It should be noted, however, that people who have difficulty neutralizing aggression can be viewed as a

particular "pathological" subgroup of a normal population.

Even if one accepts the necessity of priming in order to increase pathological thinking in (a subgroup of) a normal population, it could be that schizophrenic-like ego pathology is such an extreme symptom that normals must be primed for it to appear. It is possible that less severe symptoms and more common conflicts could be aroused without using a prime. Silverman and Silverman's (1964) study is a point in fact. The conflictual stimulus they used was the torso of a nude female; the dependent variable was an increase or decrease in certain Rorschach content categories. Significant differences between experimental and control conditions were found without priming. In addition, Golland (1967) conducted a study of female college students, only half of whom were primed. He used an aggressive subliminal stimulus and the dependent variable of Rorschach aggression-subject scores. Golland reports that priming "was not a necessary condition of the aggressive subliminal effect, although it might help to make the effect more observable (p. 4123)."

Besides work studying ego pathology in hospital employees (Silverman, 1965; Silverman & Goldweber, 1966), priming was used with normal subjects in investigations of defensiveness (Golland, 1967) creativity (Antell, 1970); with prescreened subjects judged to be prone to particular conflicts in studies of the female castration complex (Ellman, 1971), avoidance of success (Cherry, cited in Silverman et al., in press), and depression (Miller, 1974; Varga, 1974).

The only work with normal subjects that did not use a prime at all was a study investigating pathology reduction rather than intensification (Parder, cited in Silverman, Note 2). Notably, significant results were found. College students who were shown either the symbiotic stimulus "mommy and I are one" or the verbal message "prof and I are one" four times a week for six weeks received higher grades than students shown a neutral stimulus. It is therefore clear that although the practice of priming normal subjects has become routine, the necessity of doing so has not been demonstrated. Whether consistent subliminal effects can be found without priming is in need of further investigation.

Justification for the use of priming has included reference to earlier subliminal work in which a greater subliminal effect (as measured by recall and/or recognition of associates to the subliminally presented word "cheese") was found in cases of food deprivation (Spence & Ehrenberg, 1964); food deprivation plus "set" (i.e., reading a story about food, Gordon & Spence, 1966); and "set" alone (i.e., presentation of the word in a setting filled with a cheese odor, Gadlin & Fiss, 1967). Psychoanalytic drives are therefore made analogous to the hunger drive; i.e., both are considered to be something internal to all people, which can be "triggered" with the use of appropriate stimuli.

Alternate explanations for the effect of a prime have not been investigated. Wiener and Kleespies (1968) suggest that the prime could indicate to the subjects the results the experimenter is seeking. However, Silverman's finding

of within subject differences, along with the results of his discrimination task, weakens this argument. But it could be that, rather than pull on conflicts already existing in the subjects, priming creates a "pathology" which is then affected by the subliminal stimuli. Whether priming triggers something internal or imposes something external remains open to question.

The dart study, because of its use of two different kinds of priming material, lends itself to an investigation of the priming question. One type of priming material used in the dart study explicitly dealt with competitive and/or oedipal feelings, and one was designed to tap these feelings in an indirect way. Included in the former was a story recall task and a questionnaire about competition and the subject's mother and father. The more indirect primes were a Rorschach card (Card IV) and two TAT cards (6BM and 7BM), chosen for their hypothesized tendencies to "pull" material related to the mother and father and therefore to tap oedipal conflicts. Whereas one could argue that the story recall and questionnaire could create a conflict in the subjects that could then lead to susceptibility to oedipal-related subliminal stimulation, that argument would be more difficult to make if the subjects saw only the projective test cards. If the projective measures were the only prime, Silverman's assertion that priming is only stirring up conflicts already there would be more difficult to refute. And, of course, if Silverman and his associates' results could be obtained without the use of priming at all, the existence of unconscious

wishes tapped by subliminal stimuli would be even more strongly supported. On the other hand, if Silverman's results can only be obtained using all of his priming material, they could be interpreted as resulting from something put into the subject's mind that was not there to begin with. His interpretation of his data using normal subjects, then, in spite of its good methodology, would be left open to serious question.

The study to be described investigated the question of the effect of priming. Specifically, Silverman's dart-throwing study was replicated under the following conditions: (1) using all of the conflict-related priming material Silverman and his associates used in their work; (2) using Silverman's projective priming material and other neutral material; and (3) using only neutral priming material. Only the stimuli showing significant differences in previous research were used (i.e., "beating dad is wrong," "beating dad is o.k.," "people are walking").

Silverman et al., (in press) and Silverman (in press) offer a clear explanation for the choice of these stimuli based on the psychoanalytic postulate of the oedipal conflict. As a boy differentiates himself from his mother and sees her as an external object, he directs his sexual impulses toward her. At the same time that these impulses are doomed to be largely ungratified, it becomes clear to the boy that his father is receiving the gratification denied to him. This leads the boy to experience competitive and hostile feelings toward his father. Fear of his father's retaliation, the

perception of his mother as a taboo object, and the boy's loving feelings towards his father all lead him to defend against both his sexual wishes for his mother and his aggressive impulses toward his father. Both of these impulses, as well as the defenses against them, are active in all males to a greater or lesser degree depending on how well the oedipal conflict has been resolved. Psychoanalytic writers have posited that they can interfere with competitive performance (e.g., Beisser, 1961). This is because of the unconscious equation of winning with defeating the father for the mother's love, which the boy both does and does not want to do. What the subliminal messages in the dart study do is side with one side or the other of this conflict, by either sanctioning ("beating dad is o.k.") or condemning ("beating dad is wrong") the idea of defeating the father in competition.

This study also included a discrimination task to check on the subliminality of the stimuli. The task was somewhat different in design from the one Silverman used in order to increase the possibility of finding discrimination if it is there. Subjects were given 20 discrimination trials and on each trial were shown both of the stimuli to be discriminated.

Predictions

As discussed above, the necessity of administering a prime before the presentation of subliminal stimuli has not been clearly demonstrated. In addition, psychoanalytic theory hypothesizes that the oedipal conflict is present to a greater

or lesser degree in all people. The subliminal stimuli were designed to tap this conflict in one of two ways. The WRONG stimulus was designed to condemn the idea of defeating the father in competition, whereas the OK stimulus was designed to sanction this idea. The third stimulus was a control.

The following was therefore predicted:

- (1) The WRONG stimulus would decrease subjects' dart scores relative to the control stimulus.
- (2) The OK stimulus would increase subjects' dart scores relative to the control stimulus.
- (3) The above two effects would be observed under all three priming conditions.

METHODS

Subjects

Subjects were 36 male undergraduates randomly selected from volunteers from two introductory psychology courses. Students in one course received extra credit for participation in this study; students in the other fulfilled a course requirement by doing so. Any student who wore tinted glasses¹ or who grew up in a home where English was not the primary language spoken² was not used in the study. The subjects ranged in age from 18 to 29 with a mode of 19 and a mean of 19.5. Each was randomly assigned to one of the three treatment groups.

Apparatus

The apparatus were designed to be as close to those used by Silverman et al. (in press) as possible.

All subjects were exposed to three experimental conditions, each one involving the tachistoscopic presentation of a different pair of verbal and pictorial stimuli. The stimuli were as exact copies of Silverman et al.'s as

¹Silverman (Note 4) reports that tinted glasses change the contrast of the stimulus field in the tachistoscope.

²Silverman et al. (in press) report finding that subjects who spent their childhoods in non-English-speaking homes do not show the same responses to English verbal subliminal messages that native English-speaking subjects do.

possible. The critical verbal stimuli were (1) BEATING DAD IS WRONG; (2) BEATING DAD IS O.K.; (3) PEOPLE ARE WALKING, each printed in black ink and occupying two lines on a white card.

The critical pictorial stimuli were line drawings intended to be congruent with the verbal messages. For stimulus 1, the picture consisted of a drawing of an older and a younger man looking at each other with their lips turned down, designed to portray oedipal guilt. For stimulus 2, the picture was identical except that the lips were turned up, portraying oedipal approval. For stimulus 3, the picture consisted of two bland-looking men situated next to each other so that they could be seen as walking.

These stimuli were shown through an electronically controlled two-field tachistoscope. The exposures of both verbal message and picture were for 4 msec, and each was shown four times from the same field. Between exposures the subject saw a blank field which went off each time the stimulus field went on. After being given the instructions "ready, set" the picture came on for 4 msec followed by the blank field for 5 sec, followed by the instructions "ready, set" and the verbal stimulus for 4 msec, followed by the blank field for another 5 sec. This sequence was repeated four times.

The tachistoscopic illumination levels were set to be 5 footlamberts for the stimulus field and 15 footlamberts for the blank field. The room lighting was set at 15 footlamberts. In addition, with pilot subjects, it was determined

that (1) a flicker or flash of light was clearly visible when each stimulus was exposed and (2) the flickers made by one stimulus were not distinguishable from those made by another.

The other apparatus used were four metal pointed darts and an American style dart board, consisting of seven concentric circles with the bull's-eye marked 100 and the others radiating progressively from the center marked 80, 60, 40, 20, and 10 respectively. The dart board was hung on the wall 98 inches from the throwing line, with the bottom of the dart board 58 inches from the floor.

Procedure

Except for the different prime conditions, the procedure was designed to be as close to that of Silverman et al. (in press) as possible.

The content of the priming material was an independent variable. Subjects were randomly divided into three groups, each of which was administered different priming material before the presentation of the subliminal stimuli.

(1) Full prime group. This group was given the same priming material used by Silverman et al. It included, in the following order: (1) a 10-item questionnaire involving questions about competition, mother, and father; (2) Rorschach card IV (the so-called father card); (3) TAT cards 7BM and 6BM (usually viewed as depicting a father-son scene and a mother-son scene respectively); and (4) a story recall task administered while S was still viewing card 6BM, after

he had told his own story.

(2) Partial prime group. The priming for this group included: (1) a neutral interests questionnaire consisting of modified items from the Strong Vocational Interests Blank (Campbell, 1974); (2) Rorschach card IV; (3) TAT cards 7BM and 6BM; and (4) a story recall task using a neutral story based on one used in previous research (Miller, 1973, p. 51), again read while S was looking at card 6BM after he had told his own story. The story used by Miller was lengthened using statements from the Encyclopedia Americana (1965) in order to be of approximately the same length as the oedipal conflict story.

(3) Neutral prime group. Before subliminal stimulation this group was given: (1) the neutral interests questionnaire; (2) Rorschach card V, chosen for its tendency to pull for a popular response (Exner, 1974); (3) two photographs previously rated as indifferent (Silverstein, 1966); and (4) the neutral story recall task, administered after S had told his own story about the second photograph, while he was still looking at that photograph.

Three different male experimenters were used for this study, each of whom saw four subjects in each treatment condition. The experimenters were BH, age 29, a graduate student in experimental psychology; PG, age 37, an undergraduate psychology major; and PC, age 31, a graduate student in clinical psychology. Only PC had been previously trained in the administration of projectives and only PC was a proponent of psychoanalytic theory.

When S arrived E first asked him to read an explanation of the study and to sign a consent form. S was told that he would be participating in a dart throwing tournament in which cash prizes would be awarded. He was told that one purpose of the experiment was to see if dart throwing ability could be affected by subliminal stimulation and that he would be informed about the content of the stimuli after the experiment was over.

E then administered the priming material appropriate for each group. After S completed the priming material, he took eight practice dart throws and was then put through the three subliminal treatment conditions in the same session. Each consisted of a baseline assessment of dart throwing ability in which S threw eight darts at the dart-board (four at a time with the subject retrieving the first set of darts so that he could throw the second set). This was followed by the subliminal presentation of one of the three pairs of stimuli already described. S then threw eight more darts in the manner described above. This was followed by the other conditions, in which pre and post assessments of dart throwing ability were again made.

As baseline dart throws were intended to serve in part as buffers (i.e., to absorb the impact of the prior critical condition before the next one was introduced), and in order for all dart throws to be conducted under comparable conditions, the baseline throws were also preceded by tachistoscopic exposures.

The stimuli for these "baseline" exposures were neutral

stimuli different from the control stimulus. They were presented in the following order: (1) PEOPLE ARE LOOKING in sequence with a picture of two bland-looking men facing out from the page; (2) PEOPLE ARE THINKING in sequence with a different picture of two bland-looking men facing out from the page; and (3) PEOPLE ARE STANDING in sequence with a picture of two bland-looking men facing each other.

While the sequence of baseline conditions remained fixed for all subjects, the presentations of the critical stimuli were counterbalanced. As there are six possible sequences in which the critical stimuli could be shown, each sequence was shown to two subjects in each group. A summary of the procedure appears in Table 1.

Stimuli were inserted into the tachistoscope without E's knowledge of the content. This was done by code colors on the back of the stimulus cards that were arranged in the correct order by someone else.

During S's dart throws E sat in a chair near the dart board and recorded the number of the circle in which each dart landed. S's score for each baseline and critical dart throwing series was the total of these numbers for the eight throws.

At the end of the session a discrimination task was administered to each S in order to check for the subliminality of the stimuli. This task was administered by one of four female experimenters who were introduced to the subject for the first time at this point. Each S was given 20 trials in which, under the same conditions as existed during the

TABLE 1Summary of Procedure

- 1) Introduction
- 2) Priming procedures
- 3) 8 practice dart throws
- 4) Baseline I stimulation (PEOPLE ARE LOOKING)
- 5) 8 Baseline I dart throws
- 6) Critical I stimulation (1/3 of Ss receive each of 3 "critical" stimuli)
- 7) 8 Critical I dart throws
- 8) Baseline II stimulation (PEOPLE ARE THINKING)
- 9) 8 Baseline II dart throws
- 10) Critical II stimulation (counterbalanced sequence)
- 11) 8 Critical II dart throws
- 12) Baseline III stimulation (PEOPLE ARE STANDING)
- 13) 8 Baseline III dart throws
- 14) Critical III stimulation (counterbalanced sequence)
- 15) 8 Critical III dart throws
- 16) Discrimination task
- 17) Debriefing

experiment proper, he was asked to try to distinguish the flickers made by one stimulus from those made by another. He was told that the S who could discriminate best would receive a cash prize. Before the 20 experimental trials each S was shown one message-picture stimulus identified as A and another one identified as B. In each of the following trials A and B were presented in random order and S was asked to say whether A appeared first or second. As there are three possible stimulus pairs and two orders of each pair, six different discriminations were administered, four to six subjects each, one to five, and one to seven.

After the discrimination task, S was told that at the end of the semester someone would come to his class and pass out an explanation of the exact messages shown and the hypotheses of the experiment. He was told that we would prefer to wait until everyone had been run through the study before revealing the content of the subliminal stimuli. If an S had insisted on knowing immediately what the stimuli were, he would have been told and asked to keep their content a secret. No subject insisted on knowing the content at this point.

At the end of the semester a debriefing form was handed out to the subjects. In addition to a detailed explanation of the stimuli content and experimental hypotheses, it included an offer to the subject to make personal contact should he feel any lingering negative effects from the experiment or should he have any questions. No subject did so. The debriefing note also announced the prize winners, who received their cash prizes in the mail.

RESULTS

Overall Analysis

A three-way analysis of covariance with one repeated factor was carried out on the critical dart scores, with the baseline scores serving as the covariate. There were three levels of each factor. The two non-repeated factors were priming condition (full, partial, and neutral) and experimenter (BH, PG, and PC). The repeated factor was stimulus content (neutral, OK, and WRONG). The covariate was repeated under each level of the repeated factor. There were four subjects per cell. Means, standard deviations, and adjusted means of all cells are presented in Table 2.

The three-way (prime by experimenter by stimulus) analysis of covariance yielded no significant ($p < .05$) main effects or interaction effects of stimulus content (see Table 3). Moreover, the F -values of these effects were all less than 1.00. In addition, no significant main effect of priming group nor of experimenter were found. The only significant effect emerging was an interaction between prime and experimenter.

Simple effects tests were performed in order to interpret the significant interaction. A significant difference was found between the priming groups for the experimenter PC ($F(2,26)=4.41$; $p < .05$). No significant difference

TABLE 2

Means, Standard Deviations, and
Adjusted Means for the Dart Scores

Part I. Full Prime (P1)

 Experimenter BH (E1)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	510.00	435.00	455.00
SD	57.74	172.92	111.21
$\bar{X}$ (adj.)	508.32	433.32	449.44

 Experimenter PG (E2)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	447.50	440.00	455.00
SD	89.95	60.55	68.56
$\bar{X}$ (adj.)	466.54	437.03	441.67

 Experimenter PC (E3)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	542.50	555.00	540.00
SD	100.79	19.15	58.88
$\bar{X}$ (adj.)	499.38	530.01	533.14

TABLE 2

Means, Standard Deviations, and
Adjusted Means for the Dart Scores

Part II. Partial Prime (P2)

Experimenter BH (E1)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	430.00	525.00	537.50
SD	187.44	50.00	75.88
$\bar{X}$ (adj.)	469.76	532.39	560.43

Experimenter PG (E2)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	465.00	500.00	475.00
SD	165.83	96.95	133.04
$\bar{X}$ (adj.)	456.85	489.26	469.44

Experimenter PC (E3)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	437.50	387.50	450.00
SD	68.50	17.08	58.31
$\bar{X}$ (adj.)	424.17	413.02	456.09

TABLE 2

Means, Standard Deviations, and
Adjusted Means for the Dart Scores

Part III. Neutral Prime (P3)

Experimenter BH (E1)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	452.50	537.50	525.00
SD	179.14	61.31	83.47
$\bar{X}$ (adj.)	458.59	550.07	541.45

Experimenter PG (E2)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	522.50	520.00	472.50
SD	26.30	32.66	97.43
$\bar{X}$ (adj.)	529.89	514.44	447.51

Experimenter PC (E3)

Content	Neutral (S1)	OK (S2)	Wrong (S3)
$\bar{X}$	472.50	437.50	497.50
SD	63.44	62.38	46.40
$\bar{X}$ (adj.)	495.43	448.77	468.62

TABLE 3
Analysis of Covariance
Summary Table for Overall Analysis

Source	SS	df	MS	F
<u>Between Ss</u>				
Prime (P)	9846.63	2	4923.31	0.90
Experimenter (E)	26139.50	2	13069.75	2.38
PxE	70320.25	4	17580.06	3.20 *
Error	142931.06	26	5497.35	
<u>Within Ss</u>				
Stimulus (S)	3125.56	2	1562.78	0.26
SxF	13496.33	4	3374.09	0.57
SxE	18191.88	4	4547.97	0.76
SxPxE	45117.50	8	5639.69	0.95
Error	315563.50	53	5954.03	

* $p < .05$

was found between the priming groups at experimenter BH or experimenter PG. A follow-up Newman Keuls test showed the difference at experimenter PC to be accounted for by a difference between the full and partial prime conditions ($df=3.26$; $p<.05$). Figure 1 illustrates this interaction. The partial and neutral priming groups follow a pattern of decrease over all experimenters. The full prime group follows a similar pattern over experimenters BH and PG but is much higher than expected for experimenter PC.

Test for Sequence Effect

An additional two-way repeated measures analysis of covariance was conducted in order to check for a sequence effect. Sequence, i.e., the order in which the stimuli were presented, served as the non-repeated factor with six levels. Stimulus content was again the repeated factor. Baseline scores again served as the covariate. In this analysis there were six subjects per cell.

The two-way sequence by stimulus analysis of covariance yielded no significant main or interaction effects of the stimulus content, yielding F -values of less than 1.00 (stimulus: $F(2,59)=0.26$; stimulus x sequence: $F(10,59)=0.47$; $p>.05$). The main effect of sequence was also nonsignificant ($F(5,29)=2.06$; $p>.05$).

Tests on the Model

Tests were made of the assumptions underlying both of the analyses of covariance. To test the assumption of homogeneity of variance, F -max tests were performed on the

FIGURE 1Experimenter by Priming Condition Interaction

unadjusted standard deviations for both the three-way and the two-way analyses of covariance. In each case the data was collapsed across levels of stimulus, the repeated variable. Both F-values were nonsignificant, (stimulus x prime: $F_{\max}(9,3)=13.22$; $p>.05$; sequence: $F_{\max}(6,5)=4.15$; $p>.05$).

A three-way analysis of variance was conducted on the baseline dart scores in order to test the assumption that there is no difference between the groups on the covariate. The factors were prime (three levels), experimenter (three levels) and baseline stimulus (three levels, repeated: PEOPLE ARE LOOKING, PEOPLE ARE THINKING, and PEOPLE ARE STANDING). No significant effects were found (all F's >1.00).

A Priori Comparisons

Since stimulus content was the most important focus for replication and because of previous research findings (Silverman et al., in press), a priori comparisons of the three stimuli were conducted for the full prime replication group. With all three experimenters combined, each stimulus content was compared to each of the other two. Only the twelve subjects in the full prime group were included in these comparisons. The a priori comparisons are a more sensitive test of the predicted results than is the overall analysis of covariance. All three a priori comparisons were not significant (WRONG vs. OK: $F(1,53)=0.06$; WRONG vs. neutral: $F(1,53)=0.28$; OK vs. neutral: $F(1,53)=0.61$; $p>.05$). As can be seen, F-levels were again less than 1.00.

Because both the overall test and the a priori comparisons failed to replicate the previously reported results, a check was made on the reliability of the dependent variable. A Kendell's W was conducted on the three baseline dart scores, as these scores were neither expected to be nor found to be influenced by the treatment. The value of Kendell's W was .59 ($X^2(35)=61.74$; $p<.001$).

Discrimination Task Analysis

The results of all six discrimination tasks were analyzed together in a 2 by 12 Chi Square. Each discrimination task was also analyzed separately in a 2 by 2 Chi Square. No significant discrimination was found in either the overall 2 by 12 Chi Square ($X^2(11)=7.64$; $p>.05$) or in the individual 2 by 2 Chi Squares (A=OK, B=WRONG: $X^2(1)=.13$; A=WRONG, B=OK: $X^2(1)=.13$; A=OK, B=neutral: $X^2(1)=.31$; A=neutral, B=OK: $X^2(1)=.03$; A=WRONG, B=neutral: $X^2(1)=2.56$; A=neutral, B=WRONG: $X^2(1)=1.40$; $p>.05$).

DISCUSSION

The most striking finding of this study was its failure to replicate the results of Silverman et al. (in press). Improvement of dart throwing performance after viewing the stimulus BEATING DAD IS OK and worsening of performance after seeing BEATING DAD IS WRONG were not found to occur. This was true not only of subjects in the partial and neutral priming groups, who were treated somewhat differently from Silverman's subjects, but also of subjects in the full prime replication group. Even a priori comparisons conducted on the full prime group failed to yield the significant differences predicted. The lack of replication occurred in spite of the design outlined by Silverman being closely followed, including clarification of procedures through personal communications.

The lack of replication indicates that if there is an effect of subliminal oedipal stimulation on dart throwing performance, it is at best a weak one. Specifically, the failure to replicate throws some doubt onto the reliability and/or generalizability of the findings of Silverman and his associates. As the results of the discrimination task of the present study show the stimuli to be adequately subliminal, a difference in the subliminality of the stimuli is unlikely to be yielding the differential results. Rather, the first

explanation that must be considered is that Silverman's results were due to Type I error. One contributor to that error could be the inadequate reliability of dart throwing as a dependent variable. A coefficient of agreement of .59 between the three baseline scores indicates that at least some of the change on the dependent variable may be caused by the insufficient reliability of dart throwing as a dependent measure.

However, while this study failed to replicate, two other attempts at replication, which have become available since this study began, were more successful. Lonski and Palumbo (Note 5), using undergraduates at Hofstra University as subjects, did a dart throwing study using the stimuli BEATING DAD IS OK, BEATING DAD IS WRONG, PEOPLE ARE WALKING, BEATING MOM IS OK, and BEATING MOM IS WRONG. Their one significant finding was a difference between the two BEATING DAD stimuli ($p < .05$). However, their overall analysis of covariance did not yield any significant results. It was only when a separate analysis of covariance was carried out between the two BEATING DAD stimuli that the expected significant result was found. This indicates an effect less strong than that found by Silverman and his associates. Lonski and Palumbo also ran the study on female undergraduates (still using male experimenters) and found no significant differences. It should be noted that their one significant finding was out of 20 possible comparisons. Lonski and Palumbo do not state how many of these possible comparisons they conducted.

The other replication attempt was carried out on male undergraduates at Brown University (Silverstein, Note 6). Silverstein conducted three separate studies, the first of which was a replication of the two BEATING DAD stimuli, plus MOMMY AND I ARE ONE and PEOPLE ARE WALKING. Although Silverstein found the two BEATING DAD stimuli to differ significantly ($p < .05$), his results must be viewed with caution because of his method of data analysis. Rather than perform an analysis of covariance, Silverstein did a series of t-tests on the baseline-critical difference scores, a procedure far more likely to result in Type I error. In addition, he did not replicate in his second study, in which the two BEATING DAD stimuli plus the messages DEFEATING DAD IS OK and DEFEATING DAD IS WRONG were used. Instead, in the second study the one significant t-test ($p < .05$) was a comparison of BEATING DAD IS WRONG with DEFEATING DAD IS OK. Silverstein's third study was designed to test the opposite side of the oedipal conflict with the following stimuli: WINNING MOM IS OK, WINNING MOM IS WRONG, WINNING DAD IS OK, and WINNING DAD IS WRONG. The two WINNING MOM stimuli were found to differ significantly ($p < .05$) in the predicted direction. It should be noted that a t-test on the two most divergent mean difference scores yielded the only significant results in each study.

Although these other investigators have replicated Silverman and his associates' findings, they have found a considerably weaker effect than Silverman reports. In addition, no effect at all was found in the present study.

The question, then, is one of trying to account for the discrepant results of different laboratories. One possible explanation is that Silverman's findings have limited generalizability. More specifically, the discrepancies in the results may be due to differences in the subject populations at the various research settings.

One difference that is immediately striking is that Brown, Hofstra, and New York University are all private universities whereas the University of Rhode Island is not. Three possible differences among students at private and public universities may be important. First, given the prestige of attending a private college and the competition of admission to one, students there may be more ambitious, achievement oriented, and competitive than are students at a state school. Second, parents who would pay the high costs of private education, whatever their socioeconomic level, may be more ambitious for their children than parents of similar socioeconomic status whose children attend a public university. One explanation of the different results, then, is that more ambitious students or students more pushed by their parents evidence oedipal dynamics more often or more easily than their less ambitious counterparts. Of course, before this explanation can be more than conjecture, further research is necessary comparing groups preselected for the amount of competitiveness or achievement orientation. Such a comparison was attempted by Silverman and his associates in their third dart study, but because this study yielded no significant results at all, the question remains

unanswered. No further attempts at exploration along these lines have been reported. The results of the present study indicate that such would be a useful path to pursue.

The third possible difference in populations at public and private universities is one of socioeconomic status itself; that is, students at a private university probably come from families of a higher socioeconomic level. Two speculations can be offered about this difference. First, there may be more competition and achievement orientation within the upper middle class subculture and therefore a greater prevalence of oedipal conflicts within this group. But it is also true that Freud and many later psychoanalysts came from the upper middle class. More importantly, most of their patients were middle class as well, and it was from the analyses of these patients that the theory developed. Therefore, one reasonable speculation is that oedipal conflicts are more likely among upper middle class subjects simply because it is primarily to upper middle class people that the theory applies.

Similarly, another rather intriguing speculation arises from the association of psychoanalytic theory with another particular group. In addition to being upper middle class, Sigmund Freud and many later psychoanalysts were also Jewish. Several theorists have hypothesized a relationship between Freud's ethnicity and his theory (e.g., Grollman, 1965). It is of note, then, that a second major population difference among the schools in question is a difference in the proportion of Jews in their student

bodies. Information gathered from the Jewish student organizations of the four schools reveal that the three where the dart study yielded significant effects have a higher percentage of Jewish students than does the University of Rhode Island. Specifically, both Hofstra (Note 7) and Brown (Note 8) report estimates of Jewish students three times as great as the estimate of 10% reported by the University of Rhode Island (Note 9). In addition, a report from the Jewish Association of College Youth (Note 10) indicates that New York University, where the strongest effects of the dart throwing paradigm were found, has one of the largest percentages of Jewish students of any college in the United States. It could be, then, that psychoanalytic postulates, and specifically in this case oedipal conflicts, are more uniquely ethnic phenomena than is commonly supposed. Again, it must be cautioned that the only way this hypothesis could be verified is by comparing at similar universities Jewish and non-Jewish students close in age, socioeconomic status, and other relevant variables.

In spite of the lack of replication in the present study, one significant result was yielded by the analysis of covariance; this was an interaction between prime and experimenter. As there is a 30% chance of finding one significant result at the .05 level among seven F-tests, this finding could be due to chance. Such a conclusion must especially be considered since the significant effect was unexpected and is difficult to understand.

There are other possible meanings of the interaction,

however, which should be explored. It will be remembered (see Figure 1) that the most different group is the full prime replication group tested by experimenter PC. It will also be remembered that PC is the only clinician of the three experimenters and the only one fully trained in the administration of projective tests, which were used as part of the priming material for this group. It could be, then, that PC's administration of the projectives was different from that of the other experimenters and that he therefore in some way enhanced subjects' dart throwing ability. This hypothesis is made less tenable, however, by the fact that projectives were also administered in the partial prime condition where PC's subjects did worst.

As it will also be remembered that PC is the only psychoanalytic proponent among the experimenters, it might be hypothesized that there was an experimenter expectancy effect. Specifically, perhaps because PC wished for the replication to succeed, he subtly encouraged subjects in the replication group to do well. Given the failure of the replication, it could also be hypothesized that because PC was blind as to stimulus content he could not influence subjects' differential performance but only their performance under all conditions.

In the other dart studies, however, perhaps even the differential performance of subjects according to stimulus content was influenced by experimenter variables. This could occur if some experimenters are able to arouse oedipal conflicts more easily than others. Though Silverman et al.

(in press) found the age of the experimenter not to have this effect, it is possible that more subtle experimenter characteristics do. One such characteristic could be the experimenter's own oedipal conflicts. Specifically, as researchers tend to study phenomena they are personally interested in, it is not unreasonable to assume that most experimenters in these studies have been proponents of psychoanalytic theory. Going further, it could be speculated that their interest in studying oedipal conflicts arises because they find its tenets personally applicable. One could further speculate, then, that perhaps it takes a person himself so conflicted to arouse the conflict in someone else, possibly by being nonverbally less supportive of subjects' failures. Whether or not this is the case, the fact that the present study revealed experimenter differences should caution future investigators to examine closely experimenter variables in their work. Another direction for future research would be to examine experimenter effects more systematically, perhaps by comparing experimenters preselected on the basis of theoretical bias, achievement orientation, or oedipal competitive conflicts.

At a minimum, the results of the present study seem to lend support to the growing body of literature since Malinowski (1924) that raises serious doubts about the universality and centrality of the oedipal complex for all individuals. The results of our study, taken together with the results of other dart studies, suggest that if there is any impact at all of unconscious oedipal strivings, such

impact is probably limited by the personality and/or cultural characteristics of subjects and/or experimenters.

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APPENDIX A

SUBLIMINAL STIMULI

Critical Stimulus 1

BEATING DAD
IS WRONG

Critical Stimulus 2

BEATING DAD
IS O.K.

Critical Stimulus 3

PEOPLE ARE
WALKING

Baseline Stimulus 1

PEOPLE ARE
LOOKING

Baseline Stimulus 2

PEOPLE ARE
THINKING

Baseline Stimulus 3

PEOPLE ARE
STANDING

APPENDIX B

OEDIPAL QUESTIONNAIRE

Name _____ Age _____

Address _____ Phone # _____

Level of Education _____ G.P.A. _____ Married? _____ Parent? _____

Father's Occupation _____ Your Occupational Goal _____

By circling the appropriate letter please indicate to what extent you agree or disagree with the statements below.

- a) strongly agree
- b) agree
- c) disagree
- d) strongly disagree

A. I am a competitive person.

a b c d

B. I would rather be "alone, at the top" than part of the masses.

a b c d

C. I have a relatively conflict-free relationship with my mother.

a b c d

D. I am close with my mother.

a b c d

E. I have a relatively conflict-free relationship with my father.

a b c d

F. I am close with my father.

a b c d

G. It is difficult for me to be assertive with other people.

a b c d

H. I am prone to feel guilty about things more than most people.

a b c d

I. Most people would consider my father a success.

a b c d

J. I consider my father a success.

a b c d

APPENDIX C

OEDIPAL STORY FOR STORY RECALL

This is a mother and her son standing there in a state of stunned silence. Just moments before, the father was also there, but he has stormed out of the room feeling extremely angry towards his son. They had had a loud argument in which the son told his father that he was no longer competent to run the family business, that he should retire, and that he (the son) should take over. Since the mother plays an important role in the running of the business, this would give the son an opportunity to fulfill a long-harbored secret wish of his: to spend more time with her and enjoy more often the closeness they've shared in the past. In his anger at being criticized by his son, the father threatened to ostracize the son altogether from the family business. As he stormed out of the room he cautioned: "Just remember who's still the father around here." The son is now feeling guilty and fears that he may have overstepped his bounds. He is also afraid that he has threatened the closeness which he and his father often experience together. The mother is torn between her love for her husband and her love for her son.

APPENDIX D
NEUTRAL QUESTIONNAIRE

Name _____ Age _____
Address _____ Phone # _____
Year in School _____ Live on Campus? _____ Married? _____ Parent? _____
Major _____ Home Town _____

By circling the appropriate letter please indicate to what extent you agree or disagree with the statements below.

- a) strongly agree
- b) agree
- c) disagree
- d) strongly disagree

- A. I enjoy camping.
 ☒ a b c d
- B. I like looking at things in a clothing store.
 ☒ a b c d
- C. I prefer reading a book to watching tv or going to a movie.
 ☒ a b c d
- D. I like people who daydream a lot.
 a ☒ b c d
- E. I like looking at things in a hardware store.
 a b c ☒ d
- F. I like conventions.
 a b c ☒ d
- G. I enjoy raising flowers and vegetables.
 a b c d
- H. I like living in the city.
 a b c d
- I. I prefer outside work to inside work.
 a b c d
- J. I like tinkering with small hand tools.
 a b c d

APPENDIX E

NEUTRAL STORY FOR STORY RECALL

Belgium is a small country not much larger than the state of Maryland. It is one of the most densely populated nations in Europe. It lies at the crossroads of the Continent and is a stopping place for travelers on their way to London, Paris and other world capitals. Because of its location, it is the scene of many international conferences and the headquarters of international government and business organizations. As a whole, Belgium's physical aspect presents no extremes. The lines of its horizon are calm, the slopes of its hills are soft, and the depressions spread out gently. The climate, which is rainy and damp in the greater part of the country calls for protection: raincoats and umbrellas are a component part of everybody's outfit. Although it must be considered a hazardous enterprise to define the national characteristics of a country, it is generally agreed in the case of Belgium that the inhabitants are essentially reasonable, sound, reliable, not given to any excess with regard to their way of living and thinking. They are very fond of music and the theater, and even small-sized towns find it impossible to do without an opera company.

APPENDIX F

DETAILS OF EXPERIMENTER-SUBJECT INTERACTION

Before S arrives: Turn on scope, adjust lights, arrange material.

When S arrives: "I'm _____ and as you know this is a study of factors that influence competitive performance. We can begin by your reading this information sheet." Show S sheet (see Appendix G), have him sign consent form (see Appendix H), then say "In addition to what was described on there, I want to add that the tournament part of the experiment will involve your throwing darts at the dart board up there. Before we get to that, however, let me explain about this equipment."

Reassurance about Tach: "The equipment here is called a tachistoscope, and will be used in the experiment. It can regulate precisely the amount of time a picture or message can be flashed and seen. In this experiment we will be flashing messages or pictures at a speed of 4 one-thousands of a second, a speed at which you would probably be aware only of a brief flash or flicker of light. The messages or pictures should register in your mind, however, and after the experiment you will have an opportunity to find out about the content of the stimuli you were shown."

Questionnaire: "Now I would like you to fill out this questionnaire."

Rorschach Card: "Now I am going to show you an ink blot, and I want you to tell me what you see. There are no right or wrong answers, different people see different kinds of things. If you should see more than one thing in the card, then tell me everything it looks like to you." Do inquiry as to location only. Do not allow Ss to give more than 8 responses.

TAT Card 7BM or photograph #1: "Now I am going to show you a picture, and I would like you to make up a story about the picture, having a past, present, and a future or outcome." Inquire into outcome if not spontaneously given. Inquire if an emotional description is used that is unclear.

TAT Card 6BM or photograph #2: ditto

Story Recall: "Now I am going to read you a story we made up

for the purpose of this experiment about this picture, and I will ask you to recall it back to me after I finish reading it." Read Story. "I would like you to recall the story as best you can, and tell it back to me."

Explanation of Tournament: "Okay, now we come to the tournament. As you can see, the top places so far are listed over here (see room diagram, Appendix L). The top three places in the tournament will receive cash prizes of \$12, \$8, and \$5. I'm going to have you throw a total of 48 darts. You will throw 6 series of 8 darts, and before each series you will sit over here and look into the tach. Your grand score will count in the tournament. Before I give you the instructions about that, why don't you come over and throw 8 practice darts? Stand behind this line, throw 4 darts, go and get them out yourself, and then throw 4 more. Make sure you throw them hard enough so they stick. If a dart doesn't stick, or if it falls out, your score for that throw will be zero."

Tournament Procedure: "Now, if you will come with me. You will sit here and look into the tach. I will be at the controls over here, and I will say 'Ready, set' and then press a button which will produce a flicker of light. Obviously, it's these flickers of light that contain words and pictures that are meant to affect your competitive performance. I can't tell you now what these words and pictures are, but you will be told later on. After seeing several flashes you will get up and throw a series of 8 darts. Then you will come back and look into the tach again. If you have any questions, hold them until the end of the experiment, and we can discuss them then. Now, look into the tach. Do you see a dot? Okay, try to focus on that. During the time we are doing this part of the experiment, try not to blink, and don't look up from the machine. I will show you a flash, wait a few seconds, then show you another. You will see 8 flickers in all. Okay, 'Ready, set?' . . . etc." First few times ask S if they saw the flickers, then ask them just to tell you if they don't see them.

Discrimination Task: (See Appendix I)

Debriefing: "We are finished now. As I told you at the beginning, our interest in this experiment was to see whether your dart throwing could be effected by the subliminal messages you were receiving. What we plan to do before the end of the term, is to distribute a form telling you what the hypotheses of the study are. We also will tell you the exact messages that you subliminally received. We would prefer to wait until everybody has been run through the study before revealing to anyone what the subliminal stimuli are. Is that alright with you?" If the subject insists on knowing at this time what the stimuli are, reveal them to him and ask him to keep this information secret.

APPENDIX G

INFORMATION ABOUT THE TOURNAMENT EXPERIMENT

There are many things which affect a person's competitive performance. One important group of factors, we believe, is the way in which people see, and/or remember faint or indistinct experiences. By experimentally studying this group of factors in people involved in competitive situations we hope to better understand how performance may be hindered or improved.

If you decide to participate in this study you will be asked to throw darts at a dartboard, answer some questions, make up short stories, and look at quickly flashed lights which will be words or pictures. From past experience with these or similar procedures we expect no ill effect to you. Also, we expect to learn a great deal about how competitive performance is affected, which, hopefully, will be useful one day in helping people in various realms of endeavor.

You do not have to participate in this study, and if you do agree to participate you can still change your mind at any time and withdraw from the study. Your decision to do so will in no way be held against you. This is simply a research study. All information will remain strictly confidential.

APPENDIX H

CONSENT FORM

Printed Name of S: _____

Psychology Course: _____

Section: _____

VOLUNTARY CONSENT FORM

Name of Experimenter _____ Faculty Sponsor _____
(for students)

Title of Study _____

Participation time _____ Credits earned _____

I freely consent to participate in the study indicated above. I am at least eighteen (18) years of age. To the best of my knowledge I have no physical or mental difficulties which would affect my participation in this study.

SIGNATURE: _____

DATE: _____

APPENDIX I

DISCRIMINATION TASK INSTRUCTIONS

"I'm _____ and I'm going to do the next task with you. There's just one more part of the experiment. I have two sets of slides here and I want to see whether you can tell them apart when I flash them at the same speed _____ did earlier. Try as hard as you can because the person who does best on this will win a \$5 cash prize. First I'll show you four exposures of set A. Then I'll show you four exposures of set B. After that I'll show you two sets of four exposures, always four of set A and four of set B. Each time I do so, I want you to tell me whether set A was shown first or second.

"O.K., if you would put your eyes up against the viewer, we can get started. During this task, please don't look up; keep your eyes focused on the machine. Here are four exposures of set A (flashes). Here are four exposures of set B (flashes). Now here's the first pair. Here's the first set (flashes). Here's the second set (flashes). Was set A shown first or second?

"O.K., here's the next pair. Here's the first set (flashes). Here's the second set (flashes). Was set A shown first or second?"

And so on.

Present the stimuli in the following order:

AB
AB
BA
BA
BA
AB
AB
BA
BA
AB
AB
BA
BA
AB
BA
AB
AB
BA
AB
AB
AB

APPENDIX J

TOURNAMENT EXPERIMENT DEBRIEFING FORM

As the experimenter told you, the purpose of the Tournament Experiment was to test whether competitive performance (in terms of dart throwing ability) could be affected by subliminal stimulation. The messages and pictures you were shown subliminally (or supraliminally for the control group) were designed to arouse certain motivations within you which, it was hypothesized, would affect your performance. While those of you in the subliminal condition probably were not consciously experiencing these motives during the experiment, it was expected that the messages and pictures you were shown would affect your performance anyway--for a very brief period of time.

Many psychoanalytically oriented psychiatrists and psychologists believe that behavior is greatly influenced by such unconscious motivations and furthermore, that certain categories of unconscious motivations are likely to be almost universally influential in the behavior of all kinds of people, both psychologically healthy and disturbed. In terms of competition, this psychoanalytic approach would predict that unconscious feelings about competing with one's parent of the same sex, as well as other feelings about one's parents, are important motivating factors which will affect competitive performance in positive or negative directions, depending upon the exact nature of the feelings.

Previous studies conducted at New York University tested this concept using subliminal presentations of messages and pictures. It was found that one stimulus when so presented led to improved dart throwing performance, while one other impaired performance. In other words, after the presentation of particular subliminal stimuli, dart throwing scores either increased or decreased when compared with a neutral stimulus. More specifically, two studies found that compared to the neutral control message PEOPLE ARE WALKING (accompanied by a congruent picture) which was not expected to arouse any important unconscious motives, the message BEATING DAD IS O.K. (plus a congruent picture) significantly improved dart throwing performance. Similarly compared, the message BEATING DAD IS WRONG (plus picture) significantly impaired dart throwing in two studies. That is, when negative feelings about competition with one's father were activated by the subliminal stimulation, performance dropped; when positive feelings about competition with one's father were stimulated, it improved.

The Tournament Experiment you were in included a replication of this previous work and is asking some additional questions. All of you saw the three stimuli described above, and we are predicting that we will find the same results for the subliminal condition as those found in previous research. Everyone also saw three "baseline" stimuli. These were included because we wanted a measure of your dart throwing ability when you were not shown the other stimuli. The baseline stimuli were: PEOPLE ARE THINKING, PEOPLE ARE LOOKING, and PEOPLE ARE STANDING; each was shown with a congruent picture. The supraliminal condition according to psychoanalytic theory should show no differences, as stimulus input is on a conscious rather than unconscious level. In addition, we are interested in finding out if the tasks you did before looking into the tachistoscope influenced the effect of the subliminal stimuli. Therefore, each of you was randomly assigned to one of three priming conditions (six groups). Subjects in each subliminal group as well as those in the appropriate supraliminal control group were presented different material (i.e., different questionnaires, ink blots, pictures, and story recall tasks). The previous work always included material designed to arouse the conflicts the subliminal messages were supposed to tap (i.e., feelings about competition with one's father). We therefore included one such group. Subjects in this group were given a questionnaire about competition and parents, read a story on this subject, and shown ink blots and pictures supposed to tap feelings about one's parents. We are investigating whether the subliminal stimuli will have an effect without prior arousal of this conflict. Therefore, we included two other groups. In one, subjects were shown all neutral material. The other group can be thought of as being in between the first two groups. Subjects were shown some conflictual material (ink blot and pictures) and some neutral material (questionnaire and story). We divided the material in this way because the ink blot and pictures are more indirect ways of arousing conflicts about competition than are the questionnaire and the story. As psychoanalytic theory hypothesizes that conflicts about competition are active in everyone, we have hypothesized that we will find the same effect of the subliminal stimuli in all groups.

Because it was assumed that advanced knowledge of the content of the subliminal stimuli would have contaminated the results, we have not revealed their specific content until now. We appreciate your cooperation in this crucial aspect of the experiment.

For those interested, the results of this experiment will be available in Chaffee 302 with Psychology 113 graduate assistants early in the second semester.

As promised, cash prizes will be awarded for the top three places in the tournament you were in. Prizes will be mailed to the following people:

1st place (\$12):

2nd place (\$8):

3rd place (\$5):

There was a tie for the best performance in the discrimination task (telling apart the different stimuli when flashed on subliminally). The \$5 prize will therefore be split between _____ and _____.

Finally, let us note that it has been the experience with experiments of this sort that for the overwhelming majority of subjects, the effects of the subliminal stimulation last but for a few minutes and then wear away. There have been, however, exceptions in which a rare individual reports that he thinks there may have been a lingering effect. There is a simple way of dissipating such a lingering effect so that if you feel such may have been the case for you, feel free to contact us. We are also available if you have further questions about the experiment that you would like us to answer. We can be reached by mail at the Psychology Department, Chaffee Building, Kingston, R. I. Bob Harris can be reached by phone in Wakefield at 789-1303. Kit Haspel can be reached in Providence at 272-3319.

Thank you very much for your participation in this experiment.

Katherine C. Haspel
Robert S. Harris

APPENDIX K

FEEDBACK FORM

These headings should be completed by the experimenter before this form is given to the subject.

Name of Experimenter _____ Faculty Sponsor _____
(for students)

Title of Study _____

This questionnaire is to be completed by the subject anonymously after leaving the experiment, and is to be returned by the subject directly to the Psychology Department Office.

1. When I consented to participate in this study I was told enough about the nature of the study to make an informed choice.

Circle one: Agree Uncertain Disagree

2. If I was deceived about the nature of this study prior to participation in it, I have now been fully satisfied by the experimenter's explanation of the need for this deception. (Check here if not deceived ____).

Circle one: Agree Uncertain Disagree

3. Participation in this study, including the debriefing afterwards, was a valuable educational experience.

Circle one: Agree Uncertain Disagree

4. Participation in this study placed me, personally, under a great deal of stress and discomfort.

Circle one: Agree Uncertain Disagree

5. The debriefing following the study was effective at dealing with any concerns the study raised for me. (Check here if the study raised no concerns for you ____).

Circle one: Agree Uncertain Disagree

6. I feel I was coerced into participation in this experiment by my instructor, who did not allow me any other reasonable options.

Circle one: Agree Uncertain Disagree

Thank you for your help in assuring the safety and value of research participation for future subjects.

APPENDIX L

ROOM DIAGRAM

APPENDIX M

MEANS AND STANDARD DEVIATIONS

OF BASELINE DART SCORES

Part I. Full Prime (P1)

Experimenter	BH (E1)	PG (E2)	PC (E3)
Baseline 1 $\bar{X}$	475.00	435.00	555.00
S	121.24	44.35	59.16
Baseline 2 $\bar{X}$	475.00	477.50	520.00
S	97.13	92.87	21.60
Baseline 3 $\bar{X}$	482.50	497.50	485.00
S	91.06	46.46	78.53

Part II. Partial Prime (P2)

Experimenter	BH (E1)	PG (E2)	PC (E3)
Baseline 1 $\bar{X}$	395.00	487.50	497.50
S	114.46	134.01	62.92
Baseline 2 $\bar{X}$	457.50	492.50	422.50
S	29.86	53.77	41.93
Baseline 3 $\bar{X}$	427.50	482.50	460.00
S	180.07	99.12	49.67

Part III. Neutral Prime (P3)

Experimenter	BH (E1)	PG (E2)	PC (E3)
Baseline 1 $\bar{X}$	460.00	457.50	427.50
S	139.52	79.32	109.35
Baseline 2 $\bar{X}$	447.50	482.50	450.00
S	153.70	54.39	108.63
Baseline 3 $\bar{X}$	440.00	520.00	527.50
S	192.70	76.16	51.23

APPENDIX N
SIMPLE EFFECTS TESTS ON PRIME
BY EXPERIMENTER INTERACTION

Source	SS	df	MS	F
Prime at BH (E1)	24381.69	2	12190.84	2.22
Prime at PG (E2)	14355.46	2	7167.73	1.30
Prime at PC (E3)	48533.55	2	24266.78	4.41 *
Error	142931.06	26	5492.35	

* $p < .05$

APPENDIX O

NEWMAN KEULS TEST OF PRIME

AT EXPERIMENTER PC

	Partial Prime (P2) 431.09	Neutral Prime (P3) 470.94	Full Prime (P1) 520.84
Partial Prime (P2)		39.85	89.75 *
Neutral Prime (P3)			49.90

* $p < .05$; df (3, 26)

APPENDIX P

MEANS, ADJUSTED MEANS, AND STANDARD DEVIATIONS OF DART SCORES
FOR SEQUENCE BY STIMULUS ANALYSIS OF COVARIANCE

Sequence 1 (N-W-O) *

Stimulus	Neutral	OK	Wrong
$\bar{X}$	453.33	498.33	525.00
S	153.84	80.10	68.92
$\bar{X}(\text{adj.})$	481.67	488.66	524.17

Sequence 2 (O-W-N) *

Stimulus	Neutral	OK	Wrong
$\bar{X}$	475.00	500.00	486.67
S	145.29	142.41	112.19
$\bar{X}(\text{adj.})$	476.82	522.15	510.58

Sequence 3 (W-O-N) *

Stimulus	Neutral	OK	Wrong
$\bar{X}$	435.00	475.00	436.67
S	133.08	88.71	106.52
$\bar{X}(\text{adj.})$	455.38	452.95	430.53

Sequence 4 (O-N-W) *

Stimulus	Neutral	OK	Wrong
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Sequence 5 (W-N-O) *

Stimulus	Neutral	OK	Wrong
$\bar{X}$	488.33	455.00	503.33
S	109.62	83.37	72.30
$\bar{X}(\text{adj.})$	492.80	462.12	512.22

Sequence 6 (N-O-W) *

Stimulus	Neutral	OK	Wrong
$\bar{X}$	480.00	465.00	488.33
S	61.97	86.89	57.42
$\bar{X}(\text{adj.})$	452.65	465.93	459.21

* N=Neutral
W=Wrong
O=OK

APPENDIX Q

SEQUENCE BY STIMULUS ANALYSIS OF COVARIANCE

SUMMARY TABLE

Source	SS	df	MS	F
<u>Between Ss</u>				
Sequence (Q)	65598.94	5	13119.79	2.06
Error	184913.31	29	6376.32	
<u>Within Ss</u>				
Stimulus (S)	3242.81	2	1621.41	0.26
QxS	28811.56	10	2881.16	0.47
Error	363561.25	59	6162.06	

APPENDIX R

STANDARD DEVIATIONS OF DART SCORES
COLLAPSED ACROSS LEVELS OF STIMULUS

Part I. Prime by Experimenter

Priming Group	Full Prime (P1)	Partial Prime (P2)	Neutral Prime (P3)
Experimenter			
BH (E1)	259.87	224.11	295.13
PG (E2)	123.93	377.18	134.04
PC (E3)	140.56	110.30	103.72

Part II. Sequence

Sequence	
1 (N-W-O) *	184.36
2 (O-W-N)	307.79
3 (W-O-N)	277.18
4 (O-N-W)	151.05
5 (W-N-O)	230.71
6 (N-O-W)	161.58

* N=Neutral
W=Wrong
O=OK

APPENDIX S

ANALYSIS OF VARIANCE ON BASELINE DART SCORES

SUMMARY TABLE

Source	SS	df	MS	F
<u>Between Ss</u>				
Prime (P)	18161.50	2	9080.75	.63
Experimenter (E)	23057.63	2	11528.81	.56
PxE	25103.38	4	6275.84	.86
Error	520507.19	27	19278.04	
<u>Within Ss</u>				
Baseline (B)	4190.69	2	2095.34	.66
BxP	10636.88	4	2659.22	.71
BxE	13509.00	4	3377.25	.61
BxPxE	39779.25	8	4972.41	.44
Error	266215.06	54	4929.91	

APPENDIX T
 ACTUAL AND GUESSED SEQUENCE
 OF STIMULI IN SIX DISCRIMINATION TASKS

I.	Guess 1st		Guess 2nd	
	A (OK)		B (Wrong)	
	Actual 1st	A	32	28
	Actual 2nd	B	30	30
	$\chi^2 = .13;$		df=1	
II.	Guess 1st		Guess 2nd	
	A (Wrong)		B (OK)	
	Actual 1st	A	32	28
	Actual 2nd	B	30	30
	$\chi^2 = .13;$		df=1	
III.	Guess 1st		Guess 2nd	
	A (OK)		B (Neutral)	
	Actual 1st	A	36	24
	Actual 2nd	B	33	27
	$\chi^2 = .31;$		df=1	

IV.

Guess 1st

Guess 2nd

		A (Neutral)	B (OK)
Actual 1st	A	32	28
Actual 2nd	B	31	29
		$\chi^2 = .03;$	df=1

V.

Guess 1st

Guess 2nd

		A (Wrong)	B (Neutral)
Actual 1st	A	28	22
Actual 2nd	B	20	30
		$\chi^2 = 2.56;$	df=1

VI.

Guess 1st

Guess 2nd

		A (Neutral)	B (Wrong)
Actual 1st	A	37	33
Actual 2nd	B	30	40
		$\chi^2 = 1.40;$	df=1