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Effects of Stimulating Unconscious Fantasies of Oneness Using the Subliminal Psychodynamic Activation Method

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A Thesis

in

The Department

of

Psychology

Presented in Partial Fulfilment of the Requirements
for the Degree of Doctor of Philosophy at
Concordia University
Montréal, Québec, Canada

August 1996

ABSTRACT

Effects of Stimulating Unconscious Fantasies of Oneness Using the Subliminal Psychodynamic Activation Method

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Concordia University, 1996

The subliminal psychodynamic activation (SPA) method, which was developed to test psychodynamic theories, remains highly controversial due, in part, to the counterintuitive nature of its results. Numerous concerns over experimental methodology also make it difficult to evaluate whether the method succeeds in fulfilling the original purpose. The studies reported herein were undertaken to address this issue. In three experiments with nonclinical subjects, Silverman's (1983) hypothesis that the stimulation of unconscious fantasies of oneness with mother is capable of engendering salutary behavioral effects was examined. In Experiment 1, 50 men and 50 women were tachistoscopically shown, for four ms, one of five stimuli: MOMMY AND I ARE ONE, DADDY AND I ARE ONE, MYMMO NAD I REA ENO, and two other messages to test subsidiary hypotheses. Men were expected to show a significant decrease in anxiety, as assessed by heart rate, to the MOMMY stimulus, and women to either to the MOMMY or DADDY stimulus, or to both. The subliminal stimuli did not produce differential effects on anxiety, thus failing to lend support to the experimental hypotheses. However, a significant correlation was observed for women between responsiveness to the MOMMY phrase and scores on

measures of self-perception. Experiment 2 followed a similar design to that of Experiment 1 except that all stimuli were presented at each participant's individually determined subjective threshold. No support for the main hypotheses was found, and the previously observed association between responsivity to the MOMMY message and self-perception was absent. In Experiment 3, stimuli were presented both at subliminal and supraliminal levels, and a new dependent variable of fine motor performance was added which has been employed successfully by researchers before. The MOMMY message failed to influence heart rate and fine motor performance significantly compared to a control message, and neither self-perception nor degree of attachment with mother was related to message effects. It is suggested that the SPA method may not be efficacious for investigating psychodynamic propositions, at least with nonclinical populations. In the light of current results, future empirical study of psychoanalysis is considered without relying on SPA as an investigative tool.

ACKNOWLEDGEMENTS

It is truly not platitudinous in this context to say that I have benefited enormously from the labor of a very large number of people, and I shall take this opportunity to express my thanks and gratitude for their contribution. I was introduced to the SPA method by Kevin McConkey from whom I took an undergraduate course in abnormal psychology. I would like to acknowledge the help and support I have received from Herbert Ladd, who has, on many occasions, gone out of his way to help me, even in nonacademic areas. I thank him for accepting me as a graduate student and for agreeing to work with me in a field which was new to him. I also express my thanks to the late Lloyd Silverman for encouragement and his help with an earlier project.

A number of friends and acquaintances have contributed generously in time and energy, without whom this thesis would never have reached this stage. I would like to mention Steffan Apel, Mark Krasney, Katherine Velikonja, Suzuko Yorozu, Yolande Menard, Carolyn Nelham, Bryn Aldworth, Sally Bailes, Shari Joseph, Lisa Steinbach, Nancy Christi, Cindy Rutkowski, Eric Donsky, Bruno Azoulam, Paul Dubuc, Sean Moore, Genevieve Cloutier, Helen Parent, Eliane Masson, and John Miller. They were responsible for carrying out a variety of tasks such as assisting with the running of the experiments, recruitment of subjects, preparation of stimuli, coding, serving as pilot subjects, photocopying,

moral support, and for many other things that escape my memory at present. Special thanks to Mrs. Eleanor Fraser for recording countless articles and books, without which my journey through these experiments would have been very insecure and precarious. I would also like to thank Michael von Grunau for his helpful comments and critique, Jean-Roch Laurence for his support and unique insights, Dr. Gerald Auchinachie for suggesting important stylistic changes, and Dr. Joel Weinberger for agreeing to be the external examiner for the dissertation and for his tough questioning during the defense.

From the large list of individuals mentioned above is missing the name of my friend Antonios Paraherakis. Despite searching long and hard for appropriate words in my lexicon, I am unable to come up with any that can do justice to acknowledge his extreme diligence and immensely valuable contribution. He assisted in testing scores of subjects, carried out the coding of the fine motor task, provided editorial comments on the manuscript, put up with my variable moods, and was always available for consultation.

Throughout the long life of the thesis, there were moments when I wondered whether what I was doing had any real meaning at all, and in these desperate times I turned to music and literature for consolation, sustenance, and renewal. The music of Beethoven, Mahler, and Shostakovich proved particularly comforting for my nerves, although some

would disagree with me as to whether Shostakovich's music possesses any soothing qualities what-so-ever, and might assert that his music is detrimental to one's mental health. Numerous books also provided good companionship, especially the writings of, and about, Shaw, Tolstoy, and Bulgakov were most effective in keeping me sane. I should also mention Stephen Jay Gould's books on evolution and intelligence which proved to be highly stimulating and thought provoking. But it was Bulgakov's many lines from The Master and Margarita that I recited repeatedly in desperate moments which irritated all my lab colleagues to no end. May I cite but one of those lines once again, it will sound nostalgic to those who worked with me. Should I remember "the mist that came from the Medditerranean Sea", or how the Procurator of Judea felt on the 14th day of the spring month of Nisan, but maybe the following will be more appropriate: **Even by moonlight there's no peace for me at night, oh ye gods!**

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INTRODUCTION

No other theory in the entire history of psychology has engendered so much intrigue and debate as Freud's monumental psychoanalytic theory. Both opponents and proponents of Freud have felt a cogent need to battle each other over the master's work and have employed the harshest possible language to vilify the theory or have bent over backwards to defend it, even in the light of glaring epistemic pitfalls inherent in Freud's thinking as he erected his original edifice. A century has elapsed since psychoanalysis was first propounded by Freud and one need only browse through various journals and lists of published books in the last decade to realize that interest in psychoanalysis and its subsequent modifications, subsumed under the rubric of psychodynamic theories, remains high. In fact, some have even ventured so far as to call for a rapprochement between psychoanalysis and cognitive science (Erdelyi, 1985; Horowitz, 1988; Power & Brewin, 1991), a position which would have been considered heretical by both camps not so long ago.

Critiques have indicted psychoanalysis on numerous grounds but perhaps the most often cited charge concerns the alleged scientific untestability of its stated propositions. Promulgation of this viewpoint can be credited to Carl Popper who campaigned tirelessly in favor of his criterion of falsifiability which he used to demarcate the boundary

between science and nonscience. In applying the principle of falsifiability to psychoanalysis, Popper adduced that Freud's theory is couched in so uncertain terms that no human behavior could ever refute its basic premises, and he felt compelled to pronounce a verdict of untestability against psychoanalysis and consigned it to the dustbin of nonscientific disciplines (Popper, 1962). However, in recent years, Popper's case against psychoanalysis has been challenged and it has been suggested that it was based on an inaccurate reading of Freud (Grunbaum, 1984, 1993). Grunbaum has carefully extracted numerous hypotheses from Freud's original writings which, he claims, should prove to be empirically testable, and if so, psychoanalysis may yet meet the exacting criteria of science after all. Furthermore, Grunbaum has drawn attention to many instances to show that when cognizant of rival hypotheses, and when confronted with clinically disconfirming data, Freud was obliged to make several modifications to his theory.

Another serious charge leveled against psychodynamically oriented theoreticians concerns a lack of systematic attempt on their part to collect data in well-controlled experiments (Eysenck & Wilson, 1973). It is perhaps true that a large number of psychodynamicians (e.g., Wallerstein, 1988) do not see the experimental method as a suitable means for studying their subject matter and assert that the only legitimate and appropriate <u>modus operandi</u> of

their trade is the clinical couch. Such attitudes have strengthened the fallacious impression of untestability of psychodynamic propositions and have undermined the sincere efforts of a small number of experimentally-minded investigators who have endeavored to put psychodynamic hypotheses to scientific scrutiny in the laboratory.

One such effort in this direction was made by Lloyd Silverman in the mid 1960s, who developed an innovative experimental technique known as subliminal psychodynamic activation (SPA [L. H. Silverman & D. K. Silverman, 1964]). For the most part, however, psychodynamically inclined practitioners prefer testing their ideas by relying on clinical data, but as Grunbaum (1984, 1993) has noted, in his very influential and well-researched critique of psychoanalysis, clinical data are epistemically contaminated by the therapeutic process and therefore cannot be relied upon to validate psychodynamic propositions. If psychodynamic theorists ever hope to gain a wider acceptance of their views about human behavior, they must direct their attention to the laboratory for supportive evidence. In this context, Silverman's ingenious experimental procedure designed to test such hypotheses was long overdue and represented a bold attempt to revitalize a severely wounded theory.

At the outset, a distinction has to be made between Freud's metapsychological and clinical theories. The former

refers to hypothetical mentalistic constructs such as instincts and psychic energy and to their explanations. Clinical theory on the other hand, involves elucidation of human behavior in general, and psychopathology in particular, based on unconscious motives, conflicts, wishes, fantasies, etc. (Silverman, 1976). Metapsychological theory, Freud argued, forms the top layer of psychoanalysis and could be easily discarded or replaced, if necessary, without any deleterious consequence for the existence of the clinical theory (Freud, 1925/1959). The clinical theory may be seen as further consisting of either genetic or dynamic propositions. The former attempt to account for human behavior in terms of distant childhood experiences, and the latter are evoked to explain behavior in terms of the existing unconscious conflicts, anxieties, wishes, etc. Silverman's SPA method was designed to test dynamic propositions embedded in the clinical theory of Freud and post Freudian psychodynamicians (Silverman, 1983).

In psychoanalytic terms, unconscious libidinal and aggressive impulses have the potential of affecting an individual's personality and conscious behavior (Freud, 1915/1957). Stated differently, the unconscious consists of dynamic processes which act upon the individual as a driving force to exert powerful influences. Besides conceptualizing the unconscious psychodynamically, it has been increasingly approached from other theoretical points of view. For

instance, the term cognitive unconscious (Kihlstrom, 1987) is given to unconscious processes which are not seen as a driving force, possessing powers of affecting and altering human personality. In this scheme, the unconscious influences may be limited to simple perceptual, linguistic, and semantic effects (Greenwald, 1992). Crudely speaking, the dynamic unconscious is emotional, affect-laden, and irrational, while the cognitive unconscious is thought-laden and relatively more rational. Silverman's SPA technique was designed to deal only with the dynamic view of the unconscious.

The Subliminal Psychodynamic Activation Method

In the SPA method, subjects are exposed to, in a double-blind fashion, repeated presentations of subliminal (4 ms exposure) linguistic and/or pictorial stimuli designed to either intensify unconscious conflicts or to gratify unconscious fantasies and wishes. Psychodynamically derived stimuli (e.g., DESTROY MOTHER, or MOMMY AND I ARE ONE) represent the experimental condition, and stimuli deemed to be psychodynamically neutral (e.g., PEOPLE ARE WALKING) form the control condition. A variety of self-report inventories, projective techniques, and behavioral measures are then employed to compare the effects of subliminal stimuli in both experimental and control conditions. If subliminal experimental messages produce a greater change in the dependent variable than do control messages, this is

taken to mean that psychodynamically derived stimuli evince these changes by affecting unconscious states (Silverman, 1983). The rationale for using subliminal stimuli is predicated upon the assumption that presentation of stimuli below the subject's threshold for awareness would bypass defense mechanisms (e.g., rationalization, denial, intellectualization, or in the more modern terminology of cognitive science, conscious counter-control strategies [Kihlstrom, 1987]), and would stimulate unconscious states directly. On the other hand, if the stimuli are presented at the conscious level, above the subjects' threshold for awareness, these defense mechanisms or conscious counter-control strategies would act to neutralize their intended effects.

The SPA method has been used in over 100 studies to-date and many disparate populations have been examined, ranging from schizophrenics, depressed patients, stutterers, male homosexuals, to college students. These studies can be divided into three categories: conflict-intensification studies, conflict-diminution studies, and treatment adjunct studies. In the first class of experiments, various clinical and nonclinical populations are exposed to stimuli regarded as psychoanalytically relevant to a particular conflict. For example, the message DESTROY MOTHER, an aggressive stimulus for schizophrenic patients, and GO SHIT, an anal message for stutterers, has led to intensification

of pathological symptoms. Table 1 presents a sample of the type of linguistic stimuli used with various clinical and nonclinical populations to exacerbate unconscious conflicts and/or anxieties. In the second class of experiments are those investigations in which a subliminal stimulus deemed to be pathology ameliorative (e.g., MOMMY AND I ARE ONE) is presented to bring about positive behavioral changes. Finally, the third class of studies involve the joint administration of a specific therapeutic regimen intended to treat a particular psychological condition, and the presentation of a positive SPA message aimed at enhancing the effectiveness of the former. It would be instructive at this stage to describe some early SPA studies to illustrate the detailed workings of this procedure.

Examples of SPA studies. Silverman, Spiro, Weissberg, and Candell (1969) conducted an experiment to examine two claims concerning the role of unconscious conflicts and wishes in schizophrenia. The first hypothesis was derived from the work of a number of psychoanalytic authors (e.g., Bak, 1954) who have suggested that the manifestation of psychotic symptomatology in schizophrenia is a response to aggressive unconscious conflicts. According to Bak, schizophrenic symptoms of ego disturbance are a defense against aggression involving regression to primary narcissism, a state of fusion in which an infant experienced him/herself and the external world as merged. The

Table 1

Examples of the Type of Conflict-Intensification Messages Used in Spa Studies

Population	Conflict Type	Message Used
Schizophrenics	Aggressive	DESTROY MOTHER
Depressives	Guilt-arousing	LEAVING MOM IS WRONG
Male homosexuals	Incestuous	FUCK MOMMY
Stutterers	Anal	GO SHIT
Binge eaters	Abandonment	MOMMY IS LEAVING ME
Narcissistics	Dependency/Rage	I AM NEEDY AND HATEFUL
Normal males	Oedipal	BEATING DAD IS WRONG

Note. These examples have been taken from Patton (1992; binge eaters), Shulman and Ferguson (1988; narcissistics), and Silverman (1983; all others).

occurrence of schizophrenic symptoms aids the patient in returning to this blended state and acts as a means to defend against aggressive impulses of destroying an object (a significant person in the patient's life), and against the resulting fear of being destroyed in punishment for harboring these hostile wishes. Silverman et al., (1969) reasoned that if a stimulus with aggressive content is presented subliminally, it might stimulate this supposed unconscious conflict over aggressive wishes active in schizophrenic patients, and thus might intensify their pathology. The subliminal stimulus employed for this purpose was DESTROY MOTHER.

A second claim tested by Silverman et al. concerned the role of unconscious wish for merger or oneness with another person. This particular hypothesis was based on the assertion of various psychoanalytic writers who view pathological thinking in schizophrenia as a substitute for the need to merge with a significant person in the lives of schizophrenic patients. The authors surmised that if the need to merge is gratified by suitable means, the necessity for substitutive schizophrenic symptoms may be lessened, resulting in diminished pathology. This supposition was tested by presenting the subliminal message MOMMY AND I ARE ONE.

Fifty-two hospitalized male schizophrenic patients were tested individually and were shown, in a counterbalanced

order, one of three subliminal stimuli on three separate days.[1] In each session two different measures of pathological thinking were obtained. One involved a story recall task in which the subjects listened to a passage and were asked to recapitulate it subsequently. Pathological thinking was defined in terms of intrusion of irrelevant material into the passage, and the degree of disorganization and confusion reflected in the story. The second measure of pathological thinking was a word association task which required patients to give word associates to 20 relatively neutral words. Loose, personal, and clang associations, repetition of the to-be-associated words, failure to respond, blocking, etc. were recorded and served as indices of pathology. Both evaluations were carried out by an observer who was "blind" to the stimuli shown. In each session a baseline measure of pathology was taken after which the subjects were tachistoscopically exposed to, in a double-blind fashion, four presentations of a subliminal stimulus with each exposure lasting four ms. Another measure of pathological thinking was obtained after stimulus presentation.

The results showed that compared to the control message MEN TALKING, the stimulus with aggressive content DESTROY

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[1]This study included a fourth stimulus and was carried out over five days. For the purpose of this discussion, however, those details not directly relevant to the issues discussed here have been excluded.

MOTHER produced a significant increase in pathology. On the other hand, presentation of MOMMY AND I ARE ONE led to a significant decrease in pathological thinking. However, these beneficial gains were moderated by a variable which Silverman et al., (1969) described as self-object differentiation. Subjects who judged themselves as having relatively high levels of self-differentiation from mother showed the expected positive effects with the symbiotic message, and those with relatively low levels of self-differentiation did not (see below for a discussion of this issue).

Silverman et al., (1969) interpreted these findings as showing support for the psychoanalytic hypothesis that schizophrenic symptomatology is a manifestation of unconscious aggressive conflicts, and that this conflictual state serves as a substitute expression for needs to merge self with another object. If the wish to merge with another person is gratified by the stimulation of unconscious fantasies of oneness, the need for symptom substitution diminishes, resulting in decreased pathology.

Following this initial study, numerous other investigations were carried out with schizophrenic patients and their results were seen as lending further credence to the psychoanalytic formulations about the motivating factors implicated in schizophrenia (see Mendelsohn & Silverman, 1982 for a review). Having confirmed a set of hypotheses

related to one particular disorder, Silverman next planned to test a number of other psychodynamic propositions involving the link between specific unconscious conflicts and their corresponding behavioral manifestations.

In a set of investigations Silverman and his colleagues tested the psychoanalytic notions of male homosexuality.[2] For the most part, psychoanalysts view homosexual behavior in males as resulting from conflicts over incestuous wishes toward the mother. Specifically, homosexual behavior is believed to be motivated by an unresolved unconscious conflict which has its basis in childhood feelings of sexual attraction a boy possesses for his mother and the resulting fear of castration by the father for having such incestuous desires (Fenichel, 1945). In adulthood, heterosexuality for these persons is unconsciously equated with incest and has the potential of producing fears of castration. As a result, heterosexual encounters are avoided and an emotionally safer environment of homosexuality is preferred.

Silverman, Kwawer, Wolytzky, and Coron (1973) reasoned that if unconscious incestuous wishes are stimulated by appropriate means, and since these wishes have the potential of triggering unconscious fears of castration linked with incestuous desires, this situation might intensify

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[2]SPA researchers do not necessarily think of homosexuality as pathological, rather it is conceptualized as a condition in which an incest-related conflict is responsible for homosexual proclivities (Silverman et al., 1973).

homosexual desires. In their study, Silverman et al., (1973) compared the effects of a subliminal incest stimulus FUCK MOMMY with a subliminal control message PERSON THINKING on groups of homosexual and heterosexual male subjects. Both before and after stimulus presentation, all participants completed a sexual feelings assessment task. This required subjects to rate 10 pictures of men and 10 of women on a 20-point scale for sexual attractiveness experienced at that time. Participants also indicated, using the same scale, how inclined they were at that moment for a sexual encounter with a female and a male of their choice. The difference between the total ratings of attractiveness for males and females served as the dependent variable. The results indicated that for the homosexual men, there was an increase in homosexual feelings after exposure to the incest stimulus when compared with the control condition. No significant differences existed between these two messages for the heterosexual subjects. Thus, the hypothesis that homosexual orientation in males is related to unconscious incestuous cravings was confirmed. However, the authors cautioned against a strict incest interpretation of the findings as it is possible that a less specific heterosexual stimulus, not involving mother, could have produced similar results as well. Nevertheless,

findings from this investigation are consistent with psychodynamic thinking concerning male homosexuality.[3]

The SPA method has also been used with persons with a speech impediment. Psychoanalysis considers stuttering to result from an unconscious anal conflict involving wishes of expelling and retaining of feces. Thus, a stutterer may be torn between a desire to speak (an unacceptable impulse to expel) and not to speak (retaining of feces), and the symptom of speech impediment serves as a compromise manifestation. To verify this view of stuttering, Silverman, Klinger, Lustbader, Farrell, and Martin (1972) presented a stimulus with anal content subliminally, a picture of a dog defecating, and a neutral stimulus to 22 subjects with speech difficulties. As expected, the anal stimulus led to a significant increase in the occurrence of stuttering behavior compared to the control message, and supported the psychoanalytic notion that stuttering is associated with unconscious anal desires.[4]

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[3]One problem with the use of the sexual orientation index is that unlike homosexual subjects, heterosexual persons may not be willing to indicate consciously, an increased preference for males over females, even if same-sex desires are stimulated by the incestuous message (Balay & Shevrin, 1988).

[4]The authors also tested an alternative psychoanalytic hypothesis that views stuttering to be linked with oral-aggressive wishes and not to anal ones. This supposition was tested by presenting a picture of a roaring lion. This stimulus condition also produced significant worsening of stuttering. However, the effects with the oral-aggressive stimulus were considerably weaker than those seen with the anal message.

One final clinical population to be studied with the SPA method in its early years was depressed patients. The specific unconscious conflict believed to be implicated in depression is aggressive impulses, turned inward against oneself. Originally, these aggressive impulses are directed against another person in the patient's life who has now become a source of disappointment to the patient. Partly because the feelings of hostility toward another person are unacceptable, they are directed against oneself and this act then produces feelings of self-loathing and dysphoria. Rutstein and Goldberger (1973) presented the subliminal message DESTROY MOTHER to a group of hospitalized depressed women, with the intention of intensifying their depressive symptomatology. The findings of this experiment indicated that the aggressively toned stimulus increased feelings of depression on the Multiple Affect Adjective Check List (Zuckerman & Lubin, 1965; as cited by Rutstein & Goldberger, 1973) compared to a control message. The data from the study were interpreted similarly to those of other SPA investigations: Presentation of a subliminal, conflict-intensifying stimulus heightens a relevant unconscious conflict which leads to measurable changes in behaviors that are thematically linked to the supposed unconscious state active in patients (Silverman, 1983).

Specificity of SPA effects. The results of SPA studies reviewed so far suggest that specific unconscious conflicts

are triggered when subliminal stimuli intended to contact those unconscious states are presented. However, these findings may be explained more parsimoniously in nonpsychoanalytic terms: Subliminal stimuli with aversive or unpleasant content can potentially lead to the heightening of negative affect and/or behavior, and one need not assume that a specific unconscious conflict has been triggered. For instance, it is possible that the stimulus DESTROY MOTHER or GO SHIT would be experienced negatively by schizophrenics, homosexuals, stutterers, and depressed patients alike. To rule out this alternative explanation, Silverman, Bronstein, and Mendelsohn (1976) designed a major study in which subjects with disparate symptomatologies were exposed to stimuli that were either psychodynamically relevant to the individuals' underlying unconscious conflicts or irrelevant to them.

In this experiment, groups of schizophrenics, male homosexuals, stutterers, and depressed patients were subliminally exposed to three messages. The first was a psychodynamically relevant stimulus for that particular population, the second stimulus was psychodynamic in nature but irrelevant to the unconscious conflict characterizing that particular symptomatology, and the third was a control stimulus. Schizophrenic patients were shown an aggressive stimulus (conflict relevant) and an incest stimulus (conflict irrelevant). For male homosexuals the stimuli

were incest and aggressive, for stutterers the specific messages were anal and aggressive, and for depressed patients they were aggressive and anal in nature. If an underlying unconscious conflict is being triggered, which in turn is responsible for the specific overt behavior being examined, only the stimulus believed to be cognate to that conflict should produce exacerbation of specific symptoms. For the most part, the results of this investigation were in agreement with the conflict specificity hypothesis; that is, for schizophrenics, male homosexuals, and stutterers there was an intensification of manifest symptomatology only following the conflict-relevant stimulus and never after the conflict-irrelevant stimulus.[5]

Silverman et al., (1976) concluded that specific unconscious conflicts are triggered only by relevant subliminal stimuli. They used these findings to counter the argument that any given aversive stimulus is sufficient to produce exacerbation of symptomatology. Although the study just reviewed is perhaps the strongest test of the conflict specificity hypothesis, a note of caution must be added at this point. In Silverman et al.'s investigation, three different subliminal conflict-intensification stimuli

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[5]As expected, the conflict-irrelevant stimulus produced no significant changes in dysphoric mood in depressed patients compared to the control message. However, the conflict-relevant stimulus failed to increase depression. This latter result represents a failure to reproduce the earlier successful findings of Rutstein and Goldberger (1973) with the aggressively toned stimulus.

produced expected effects on dependent variables that were specific to the conflicts of each of the three populations. However, it is possible that any one of these conflict-arousing messages could have also produced the same behavioral effects on the same symptom or dependent variable involving a different population for whom this stimulus would have been conflict-irrelevant. To illustrate, suppose that the anal message GO SHIT intensifies stuttering in persons with this particular speech impediment, as it did in the study under review. Had this message been shown to schizophrenics, homosexuals, and depressed patients, and had the same stuttering index been also used to assess stuttering with all participants as was done with stutterers, it may have shown negative effects on the speech patterns of all four populations. Silverman et al., (1976) failed to include all possible dependent variables in conjunction with all critical subliminal stimuli for every population they studied. Despite these limitations, the results of their study are provocative and provide perhaps one of the few instances where psychoanalytic formulations have received strong support from experimentally based data.

In the next phase of the SPA paradigm, Silverman and his colleagues turned their attention to the investigation of what some psychodynamic authors call the fantasies of oneness. The desire for symbiosis or merger with the good mother of early childhood is believed to be a ubiquitous

unconscious wish (Mahler, 1968). To examine the claim that fulfillment of a universal wish for oneness with the mother figure is behaviorally adaptive, Silverman arrived at the phrase MOMMY AND I ARE ONE. This message has been presented to various populations in well over 50 studies. The MOMMY phrase has been claimed to effect a wide variety of beneficial results such as increased academic performance among high school students (Ariam & Siller, 1982) and college students (Parker, 1982), temporary reductions in depression (Thornton, 1987),[6] schizophrenic pathology (Fribourg, 1981), improved behavioral conduct, school achievement, and self-concept among adolescents with emotional problems (Bryant-Tuckett & Silverman, 1984), and has been found to enhance the therapeutic benefits in treatment programs for cigarette smoking (Palmatier & Bornstein, 1980), alcohol addiction (Schurtman, Palmatier, & Martin, 1982), heroin addiction (Thornton, Igleheart, & Silverman, 1987), obesity (Silverman, Martin, Ungaro, & Mendelsohn, 1978), insect phobia (Silverman, Frank, & Dachinger, 1974; see also, Silverman & Weinberger, 1985, for a detailed listing of studies). The experimental methodology involved in the behavioral adaptation studies with the MOMMY message is somewhat different from that of the conflict-intensification studies. In the latter, a

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[6]In this study, stimuli were not presented in a doubleblind fashion, and therefore the results are subject to placebo effects.

within-subjects design was used wherein all subliminal stimuli were shown to each participant, whereas a between-subjects design was employed in the former.

To take some typical examples from treatment adjunct studies, consider first the experiment reported by Palmatier and Bornstein (1980). Two groups of smokers were offered a rapid-smoking treatment regimen to treat tobacco addiction, as well as being exposed to one of two subliminal stimuli repeatedly over 12 sessions. All participants had stopped smoking by the end of the treatment program. However, at a one month follow-up assessment it was discovered that, of those subjects shown the symbiotic message MOMMY AND I ARE ONE, 67% still abstained from smoking, while only 12.5% of the control group participants did so. At a three month follow-up, these rates were 44% and 12.5%, respectively. Similarly, the MOMMY stimulus has been shown to enhance academic performance. In one investigation, two groups of pre-freshmen students enrolled in an enrichment program to learn mathematics were exposed to either the MOMMY message or to the control phrase PEOPLE ARE WALKING at regular intervals over five and a half weeks. As expected, those students shown the oneness stimulus performed significantly better than those exposed to the control stimulus on a posttest administered at the completion of the course (Hudesman, Page, & Rautiainen, 1992).

Besides the treatment adjunct and educational studies, the MOMMY stimulus has been used with normal (nonclinical) subjects to produce beneficial behavioral changes. College students in one experiment were more willing to discuss topics having a positive valance with a hypnotist after the subliminal presentation of MOMMY AND I ARE ONE than after the control message. This measure was believed to indicate increased rapport with the hypnotist (Frauman, Lynn, Hardaway, & Molteni, 1984). Relatedly, Linehan and O'Toole (1982) found that female college students disclosed more about themselves to a counselor in group sessions if they had viewed the MOMMY message prior to the counseling meetings than subjects who had been exposed to a control stimulus. Furthermore, the MOMMY message has been shown to enhance performance on a fine motor task (Gustafson & Kallmen, 1990, 1991), and to be effective in reducing state anxiety (Orbach, Shopen-Kofman, & Mikulincer, 1994).

Theoretical justification for the use of MOMMY AND I ARE ONE. The notion that the message MOMMY AND I ARE ONE triggers oneness fantasies and therefore leads to positive behavioral changes was based on the clinical experience and theories of numerous practitioners of psychoanalysis. Silverman has referred to the work of many therapists (e.g., Limentani, 1956; Nacht, 1964) who speak of their schizophrenic patients' attempts to establish oneness-type ties with their analysts in the treatment setting,

relationships which are reminiscent of the mother-child symbiotic bonds. The patient unconsciously equates the therapist with a parental figure from early childhood with whom a symbiotic relationship is desirable and something to strive for. A number of psychoanalysts actively attempt to gratify these oneness wishes in order to enhance the effects of therapy for their clients (see Silverman, Lachmann, & Milich, 1982). As an illustration, Silverman et al., (1982) noted one type of intervention which, according to them, is designed to encourage symbiotic associations between analysts and analysands in order to gratify oneness needs of the latter. In the technique termed "mirroring", therapists are required to simulate their patients' mannerisms including the style of speech, inflection, emotional tone, and breathing at the same rate as the patients (Bandler & Grinder 1975).

Aside from the surplusage of anecdotal clinical evidence highlighting the value of oneness-type therapeutic relationships, the writings of Margaret Mahler on early childhood development were extremely influential in guiding the course of SPA research. Although Freud had put forward a theory of early childhood development, he was less occupied with the process of mother-infant attachment and showed a greater concern with the theoretical elucidation of psychological processes taking place during later childhood, the Oedipal years (Bergman & Ellman, 1985). In marked

contrast to Freud, Mahler was more interested in the pre-Oedipal stage of psycho-social development, specifically the development of mother-infant bond and its progression through the first three years of life (Mahler, 1968; Mahler, Pine, & Bergman, 1975).

According to Mahler, an infant proceeds through two distinct stages of development called symbiosis and separation-individuation, whose ultimate culmination point is the attainment of self-identity and autonomy based primarily on the infant's interaction with the mother. The process of birth delivers an infant into a world where the first month of life is characterized by a total lack of awareness of the surroundings and where physiological needs rule supreme. Gradually, the mother's continued care and love help to extricate the infant out of this vegetative, "primary narcissistic" state and lead him/her directly into the first phase of psychological development, termed by Mahler as the symbiotic period. The word symbiosis in this context refers to a mutually beneficial relationship in which the infant depends totally on the mother for his/her physical survival and the latter derives emotional gratification from the former as a consequence of their joint interaction. Commencing around the age of two months during the symbiotic period, the infant is only tenebrously aware of an external need-satisfying object, the mother, and cannot yet discriminate between the attempts of others and

self to reduce bodily tensions. The infant behaves as if he and mother were an omnipotent system of dual unity within one common boundary. It is a time when "the I is not yet differentiated from the Not I" (p. 44), a state of undifferentiated fusion (Mahler et al., 1975). Only very gradually does the infant gain insight that need-satisfaction is externally based and gains the realization that his/her survival and well-being depend on this outer source. As a result of this realization the infant orients himself/herself affectively toward the mother and the original need for symbiosis with the mother now becomes a wish for her, and later it will be transformed into a psychological longing for her. The symbiotic bond is deepened by many behaviors on the mother's part, including singing and talking tenderly to the infant, making eye contacts, and on the infant's part, by his/her own positive response patterns to these attempts by the mother. Mahler not only considered the symbiotic phase to be of utmost importance for the physical survival of the infant, but she further claimed that the quality of attachment an infant succeeds in establishing at this time serves as a primal soil from which all subsequent human relationships germinate. If the symbiotic phase is marked by adequate comfort, need-fulfillment, tension-reduction, and pleasure, the infant will be then ready to break out of this

protective shell and prepared to embark on the next stage of psychological journey.

Beginning at approximately 6 months of age and lasting until the end of the third year, the second phase of development, known as the separation-individuation period, consists of four subphases and has two major aims: recognition of psychological separateness of oneself from mother, and the attainment of unique personality characteristics. By the onset of the first subphase of differentiation, the infant has acquired many perceptual capacities including the ability to scan the immediate environment for detail, to notice and remember faces, to explore objects manually, and a limited motoric ability has also been attained. These burgeoning powers allow the infant to interact with others and to initiate the all-important process of demarcating boundaries between the worlds of self and nonself, particularly between self and mother. The infant actively explores the mother's body by such actions as pulling her hair, touching her facial parts, climbing onto and pushing her body, and looks at her with interest, all of which lead to the increased awareness of her as a uniquely distinct individual. Thus, between 6-8 months of age, roughly the interval covered by this subphase, the process of defining self boundaries is well underway.

In the second subphase termed "practicing", encompassing the period of 8-16 months after birth, the infant acquires a number of new and important behavioral skills including crawling, upright posture, and locomotion. Physical maturation is accompanied by advances in cognitive areas. The infant takes pleasure in his/her mastery of new talents and uses them to venture away from the mother and into the world at large. One enormously significant consequence of physical and cognitive maturity is the further differentiation of the self, separate from mother. The rapidly growing infant now learns to enjoy the mother from a distance as he/she (infant) continues to explore the surroundings. However, the need for symbiosis has not dissipated as shown by the infant's repeated tendency to return to the mother for comfort, what Mahler et al., (1975) termed "emotional refueling". Having received mother's reassurance, and psychologically replenished, the infant is once again ready to deal with external reality. In this way, the mother becomes a "home base" or a center point from which the toddler launches his/her exploratory peregrinations. Another characteristic of this period according to Mahler's observations is the infant's apparent obliviousness of the mother while the infant is engrossed in various exploratory activities. For a healthy psychological progression to occur from this to the next subphase, it is essential that the mother make some alterations in her

interactions with the infant. Whereas previously her role was one of providing comfort while remaining in close proximity to the infant, it must now change to allow for the toddler to separate from her and leave the sheltered precinct. If the mother encourages independence and, at the same time, is available for physical comfort and psychological sustenance, a transition to the next stage of development will occur smoothly.

A real turning point in the process of development arises in the third phase of "rapprochement" which lasts from about the age of 16 months to 24 months after birth. Greater cognitive and linguistic powers as well as symbolic play, widen the toddler's horizons and further deepen his/her sense of uniqueness. But the realization of oneself as separate from mother leads to feelings of disquietude and the toddler expresses an increased need for mother compared to the previous subphase. This increased demand for the mother is reflected in the toddler's desire to share everything with her and the tendency to require considerably greater attention from her. The subphase of rapprochement reveals a conflict in the toddler: the wish to remain symbiotically connected with the mother on the one hand, and the desire to maintain and exert one's own independence on the other. The behavioral pattern revealing this conflict is the toddler's tendency to "shadow" the mother (i.e., follow her movements), reflecting the wish for union, and

"darting away" from her anticipating being chased and captured by her, fear of losing independence and reengulfment by her. The observable manifestations of so-called "rapprochement crisis" are the toddler's whining, temper tantrums, and separation-anxiety in the mother's absence. However, gradually, the toddler learns that he/she can no longer maintain a symbiotic existence with the parent and begins to relinquish the notion of his/her own omnipotence and grandeur.

The fourth subphase, consolidation of individuality and the beginnings of emotional object constancy, commences around the child's second birthday and lasts until the end of that year. (To be more precise, this period is considered by Mahler to be an open-ended phase.) The child's separate sense of individuality continues to solidify. The mother's positive image, if she has been experienced favorably in preceding stages, is internalized as that of a good mother. The internally assimilated representation of the mother helps the child to function in her absence and he/she shows signs of frustration tolerance, even though the mother may still be psychologically longed for. With the emergence of a child's unique identity, and self-other (mother) boundaries clearly demarcated, the goals of the pre-Oedipal phase are achieved.

So far, the discussion of Mahler's theory has largely focused on the development of relatively normal children,

but it must be emphasized that Mahler arrived at her theoretical position based on the observation of healthy mother-child interactions as well as on her experience involving the treatment of children with various psychiatric syndromes. Mahler has described the early childhood developmental difficulties in the symbiotic and separation-individuation phases which can have profound behavioral consequences for children. In particular, Mahler (1968) emphasized two types of problems, one pertaining to the absence of a proper symbiotic bond between mother and child, and the second concerning the relative lack of differentiation of a child's unique sense of identity, separate from the mother. These developmental problems may be attributed to either inadequate mothering or the child's own inherent inability to become part of the symbiotic bond. In either case, both obstacles, according to Mahler, could issue in the formation of childhood psychotic disturbances. Even many adults during psychosis, Mahler posited, regress to the delusional and hallucinatory behavioral pattern associated with the symbiotic phase.

Returning now to Silverman's work, it should be possible to set in context why he settled upon the message MOMMY AND I ARE ONE in order to bring about salutary behavioral changes. Silverman's rationale could be summarized as follows: Mahler and numerous other psychoanalysts have proposed that schizophrenic

symptomatology expresses a wish for oneness with the mother figure of early childhood, and if these wishes are successfully gratified, it should prove to be pathology-ameliorative. Also, many psychologically healthy adults are motivated by symbiotic desires and they seek the fulfillment of oneness wishes in many different ways. For example, the search for oneness is reflected in such diverse behaviors as jogging and meditation and even the act of being in love provides gratification of these yearnings (Bergmann, 1971; Silverman & Weinberger, 1985). Thus, Silverman reasoned that if symbiotic longings are so ubiquitous, it should be somehow possible to gratify them in the laboratory, and this wish fulfillment might prove to be beneficial for many individuals. Consequently, the MOMMY stimulus was incorporated into SPA experiments and utilized with a wide range of populations to trigger unconscious fantasies of oneness[7]. It was believed that the MOMMY message would stimulate the desire for merger with mother, the origins of which lie in the symbiotic and/or separation-individuation phases when the mother was associated with positive

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[7]Silverman et al., (1982) have argued that the MOMMY message may not be gratifying symbiotic wishes directly; it may be simply fulfilling a fantasy of these wishes being fulfilled. Also, the authors have noted that the MOMMY message is intended to satisfy symbiotic-like oneness fantasies and not symbiotic wishes because it is difficult to ascertain the extent to which an adult's wish for oneness is similar to an infant's need for symbiosis. Hence, Silverman and colleagues prefer the expression "symbiotic-like oneness fantasies" rather than the term symbiotic oneness fantasies.

experiences of providing protection, comfort, and nurturance (Silverman, 1983; Silverman et al., 1982). As reported above, the results of experiments employing the MOMMY AND I ARE ONE message corroborated the hypothesis of pathology amelioration in schizophrenia, improved functioning in other clinical and nonclinical subjects, and positive behavioral changes in college students.

At this juncture a legitimate question may well be asked about the alleged positive qualities intrinsic in the MOMMY AND I ARE ONE stimulus: What are the internal changes produced in the organism by the stimulation of oneness fantasies which result in diminished pathology or improved performance on a variety of tasks? Although this issue has not received much attention in the SPA literature to-date, Silverman and Weinberger (1985) have outlined three tentative proposals to explain the intermediate changes caused by, or the possible links between the unconscious perception of the MOMMY message, input, and its resulting observable effects, output.

The first mechanism by which the MOMMY message engenders propitious effects might be by lowering anxiety levels and by promoting positive affect. The idea of oneness may make subjects feel comforted, protected, and cared for and thereby reduce subjective feelings of anxiety with a concomitant uplifting of mood. This formulation would be consistent with the theoretical view that a

conflict over oneness desires and striving for independence operate at the unconscious level in adulthood and the fulfillment of oneness fantasies temporarily alleviates this conflict. Support for this hypothesis is provided by several studies. For example, in some investigations the MOMMY message, as compared to a control stimulus, was associated with reduced levels of state anxiety (see Silverman & Weinberger, 1985). In other experiments the same message increased positive affect. In a study by Weinberger and Kelner (1990), subjects were subliminally shown three stimuli: MOMMY AND I ARE ONE, MOMMY IS GONE, and the control message PEOPLE ARE WALKING. The participants were asked to recall early childhood memories and to rate the affective quality and intensity of these memories. The authors found that subjects who were exposed to the MOMMY stimulus rated their early memories as being more positive, whereas subjects shown the MOMMY IS GONE stimulus rated their memories less positively as compared to the control group subjects. Similarly, Branscomb (1988) found evidence of improved mood in her female participants on a measure of positive affect in a spontaneously generated story, after these subjects had been stimulated with the MOMMY message.

A second way in which the suggestion of union with mother might produce favorable effects is by gratifying dependency needs in those individuals for whom substitutive maladaptive behaviors (e.g., drug, tobacco, and alcohol

addiction, excessive food consumption) serve this function; that is, when dependency needs are satisfied by the stimulation of oneness fantasies, subjects' reliance on negative forms of behavior should decrease and their independent functioning should increase. In support of this proposition are those treatment adjunct studies in which the MOMMY stimulus was associated with decreased heroin intake (Thornton et al., 1987), reduced cigarette smoking (Palmatier & Bornstein, 1980), and weight loss (Silverman, et al., 1978) as compared to a control message. In another investigation, Bryant-Tuckett and Silverman (1984) tested the effects of the MOMMY message on 64 emotionally disturbed adolescents who were residents in a treatment school. These subjects were given four-ms exposures of either the MOMMY stimulus or the control message PEOPLE ARE WALKING five times per week for six consecutive weeks. Besides improving behavioral conduct on a number of dimensions, the experimental message was also associated with increased independent functioning in the classroom as rated by the students' teachers.

A third proposed mechanism to explain the avowed effectiveness of the MOMMY message is that stimulation of oneness fantasies enhances subjects' receptivity to the suggestions put forward by a therapist or a helping figure, who may be unconsciously seen in the role of mommy, representing the quintessence of nurturance and help. In

this conducive atmosphere, then, the therapists suggestions are likely to be complied with at the conscious level. SPA findings which bear on this supposition come from experiments demonstrating improvements in academic performance (Ariam & Siller, 1982; Cook, 1985; Hudesman et al., 1992; Parker, 1982), and therapy adjunct studies showing greater beneficial results with the MOMMY message than with a control stimulus. Studies in which subjects managed to established increased level of rapport with a counselor (Linehan & O'Toole, 1982) and with a hypnotist (Frauman et al., 1984) provide further support for this claim.

The evidence advanced to account for the internal changes brought about by the MOMMY message and its alleged implication for stimulating oneness fantasy is indirect, since all findings enumerated above merely reflect (1) an increase in performance on a given task; (2) an increase in positive affect; and (3) a decrease in anxiety or pathology. There are no studies to-date which suggest the activation of any type of fantasy, be it symbiotic or any other kind. The triggering of oneness fantasies is only an inference derived from ostensibly observable behavioral signs (Bornstein & Masling, 1984). One requires a more direct method for assessing how the MOMMY message is mentally represented and what kind of internal cognitive changes are occasioned by its unconscious perception.

Current Status of SPA

Since its inception in 1964 the SPA method has evoked a great deal of curiosity and intrigue in psychoanalytic circles and among experimentally-minded psychologists. Numerous attempts have been made to replicate Silverman's experiments, the findings of which have been inconsistent and have generated a heated debate about the overall validity of SPA as a viable technique for the investigation of psychodynamic propositions. Before recounting the theoretical as well as the methodological charges impugned against SPA, a close look at some studies which have failed to endorse SPA findings is required.

Porterfield and Golding (1985) attempted to replicate Silverman et al.'s (1969) findings involving an increase in schizophrenic symptoms following an aggressive stimulus, and a decrease in pathology after exposure to a symbiotic merging stimulus. In order to strengthen the SPA methodology, these authors introduced a number of procedural refinements. For example, in most of Silverman's studies with schizophrenic patients, the classificatory schemes used in the 1960s and 1970s probably yielded highly unreliable diagnoses, leading to the inclusion of heterogenous samples of patients in those investigations. Porterfield and Golding utilized a more sensitive nosological system for diagnosing schizophrenia in their experiment (DSM-III). A second modification to the experimental procedure involved

the use of a relatively neutral control stimulus. Rather than employing the traditional phrase PEOPLE ARE WALKING, the authors used an anagram of the MOMMY AND I ARE ONE message, DMNOA NIM Y ERO EMA. Besides the symbiotic and the control stimuli, the thirty schizophrenic participants were also exposed to an oral aggressive, pathology-intensifying stimulus TIGER EATS PERSON. Three dependent variables, inkblot thought pathology, inkblot form quality, and interference on the Stroop Color-Word Test, were used to assess cognitive functioning. The results did not reveal any support for Silverman's hypotheses; that is, neither the aggressive stimulus increase pathology on any of the three dependent variables, nor did the symbiotic stimulus reduce pathology significantly compared to the meaningless phrase. Thus, despite adhering strictly to Silverman's methodology and despite introducing new refinements to the technique, Porterfield and Golding failed to corroborate the psychoanalytic hypotheses concerning schizophrenia. Silverman (1985) criticized Porterfield and Golding for not including the dependent variable of nonverbal pathology in their study, a measure which had yielded positive effects in some earlier SPA studies (see Mendelsohn & Silverman, 1982), but since Porterfield and Golding did include the previously successful inkblot test, it is difficult to provide a rational explanation as to why these authors did not succeed

in their painstaking efforts to reproduce the original findings.

Another example of a rigorous replication attempt is that of Condon and Allen (1980) who undertook to reproduce the findings of a SPA study by Silverman et al., (1974), in which the MOMMY message had been effective in reducing insect phobia when the stimulus was incorporated into a systematic desensitization program. A number of methodological improvements were made to the study but the results were still nonsupportive. Subliminal presentation of the symbiotic stimulus did not alter the insect phobic behaviors of college women compared to a control stimulus, leading to yet another failure to demonstrate the efficacy of triggering symbiotic fantasies for the purpose of producing positive behavioral adaptation. As with the Porterfield and Golding (1985) experiment, Silverman (1982) ascribed this lack of success to innumerable discrepancies between the Silverman et al., (1974) and the Condon and Allen (1980) studies. For example, Silverman argued that Condon and Allen's subjects were selected from a population of college students whereas in the original 1974 investigation, the subjects were recruited from the general population and had a more severe form of insect phobia. In this way, the motivational level of the two samples was probably quite different which may have accounted for a lack of success with the MOMMY message in the Condon and Allen

study. Even if this line of reasoning is accepted as logically sound, it loses its cogency when considered in the light of other studies involving college students who have responded favorably to the oneness message in similar situations (Linehan & O'Toole, 1982). Condon and Allen's investigation must be taken for what it is, an abortive attempt to bolster Silverman's claims concerning the positive effects of the MOMMY AND I ARE ONE stimulus.

Another group of investigators have tried to establish whether the MOMMY message is effective in reducing state anxiety, as has been claimed to occur in a number of studies (see Silverman & Weinberger, 1985 for a list of unpublished studies on this topic). Clark and Procidano (1987), Greenberg (1992), Holmes (1991), and Snodgrass (1988) provide four examples of experiments in which the MOMMY message did not succeed in lowering subjective anxiety levels as measured by the Strait-Trait Anxiety Inventory (Spielberger, 1979). Once again, SPA effects have been questioned and their reproducibility shown to be elusive.

To throw some light on inconsistent findings in the SPA literature, a number of critical appraisals of the field have been published recently. These critics have reached widely differing opinions about the empirical validity of the SPA findings. While commenting on SPA results in particular, and on the status of SPA as a research procedure in general, one reviewer wrote: "SPA is not a validly

established phenomenon. Poorly controlled experiments can never yield clear-cut, generally acceptable findings, because such findings will always be open to different interpretations. The future of SPA appears to depend on the running of well controlled experiments . . ." (Fudin, 1987, p. 642). A similar judgment was pronounced by Balay and Shevrin (1988). These authors pointed to a vast array of problems with Silverman's methodology and they chastised him for neglecting the crucial task of exact replication and for unnecessarily widening the SPA paradigm, without establishing the validity of its previous findings. An entirely opposite viewpoint was articulated by Hardaway (1990) who conducted an extensive meta-analytic review of SPA studies, the results of which lent support to the claim that the MOMMY AND I ARE ONE message produces reliable effects across different subject populations. Based on his quantitative review of the literature he concluded that the positive findings with the MOMMY message are not inconsistent; they may appear so because of inadequate sampling of research data reported by various reviewers. Further attempts at merely replicating the effects of the MOMMY stimulus, Hardaway asserted, are superfluous. However, Fudin did not accept Hardaway's favorable assessment of SPA findings and rejected the idea that further replication attempts to investigate the alleged beneficial qualities of the MOMMY stimulus are redundant.

Instead, Fudin argued that Hardaway's meta-analysis, although important, does not take into account the methodological flaws inherent in the SPA procedure which bring into doubt the conclusions drawn from it. However, he moderated his earlier grim view of SPA when he wrote, "something important is happening during SPA" (p. 957), but implied that it is unclear as to what it is and how reliable it is (Fudin & Benjamin, 1992). In order to appreciate more fully the reasons for differing judgments reached by various commentators, it would be important to evaluate in detail the procedural and theoretical shortcomings associated with Silverman's experimental paradigm.

Criticisms of SPA

Inappropriate control stimuli. In many SPA investigations the experimental stimulus MOMMY AND I ARE ONE has been compared with the control phrase PEOPLE ARE WALKING. Two different types of objections can be raised against the use of this control message. First, it is obvious that the phrase conveys linguistic meaning and therefore it would not be too implausible to conjecture that the stimulus, at least on a priori grounds, has the potential of generating unconscious affective responses in some individuals. A posteriori evidence for this premise can be extracted from the writings of SPA investigators themselves. In one study, the presentation of the WALKING stimulus led to a significant decrease in anxiety as

reflected by a decline in heart rate and the number of skin conductance responses (Garske & Moore, 1986; as cited by Snodgrass, 1988), something not easily explicable in terms of SPA effects. Yet another experiment revealed totally opposite effects; the same stimulus led to an increase in psychopathology in some subjects (Litwack, Wiedemann, & Yager, 1979). Finally, Silverman et al., (1982) discussed anecdotal examples of two women, one of whom reported a sudden increase in her walking activity after she had been repeatedly shown the WALKING stimulus. A second woman who had a childhood history of being forced to walk in the snow by a masochistic father, felt increasingly depressed when subliminally exposed to the same control message.

Relatedly, it has been noted by Balay and Shevrin (1988) that in at least three SPA investigations (Silverman et al., 1969; Silverman & Candell, 1970; Kaplan, Thornton, & Silverman, 1985) with schizophrenic patients, in which the MOMMY stimulus was claimed to have produced significantly greater reduction in psychopathology compared to the PEOPLE ARE WALKING phrase, the conclusions drawn from the results were specious. In these and other SPA studies, comparisons between experimental and control conditions were based on mean-change scores derived by subtracting the baseline pathology assessment ratings from those obtained after the critical postmessage condition. When Silverman and associates carried out statistical tests to determine which

of the two means, experimental or control, was significantly lower (reflecting decreased pathology), they discovered the mean for the MOMMY message to be lower than the mean for the Walking stimulus. However, upon a careful reexamination of the data by Balay and Shevrin (1988), it was observed that the mean-change pathology score associated with the control condition was higher than the experimental condition, and no significant variation had occurred in the scores after the presentation of the MOMMY message. In other words, the subjects experienced an increase in pathology with the PEOPLE ARE WALKING stimulus and no real change in pathology took place with the symbiotic phrase. Based on such evidence, one can rightfully wonder to what extent similar problems may have confounded the results of other SPA investigations. However, in Silverman's defense it must be stated that not all SPA experiments have relied on change scores to arrive at their conclusions and the results of at least those experiments cannot be impeached on Balay and Shevrin's charges. Nevertheless, the evidence presented so far points strongly to the glaring difficulties of using meaningful phrases as proper control stimuli for comparisons with meaningful experimental messages.

The second problem with PEOPLE ARE WALKING as a control stimulus for MOMMY AND I ARE ONE is their structural dissimilarities (Fudin, 1986). The two phrases do not have the same number of letters (16 vs 15) and number of words (3

vs 5), the length of words is entirely different (6, 3, 7, vs 5, 3, 1, 3, 3 letters), the position of letters in the two phrases is quite dissimilar, and the visual angles subtended by the stimuli is also very different. In fact the only similarity between the two messages is that they have one word in common (ARE), and only the second word in each phrase is of equal length. Based on this reasoning, Fudin (1986) argued that SPA findings may be more parsimoniously explicable in terms of the structural disparities between the experimental and control stimuli and/or because of the use of a non-neutral control message. As a suggestion he proposed a meaningless nonsense anagram message constructed by rearranging each of the words in the phrase MOMMY AND I ARE ONE. The resulting stimulus would be MYMMO NAD I REA ENO. Six letters of this new message remain in the same position as in the original phrase, the same number of words are used (five), all words are of the same length, and the letters used in the anagram are, of course, identical to those in the original message.

Partial encoding of stimuli. Fudin (1986) and Shapiro (1978) have questioned Silverman's (1978) assertion that the entire message MOMMY AND I ARE ONE is, and must be, encoded in order for its positive effects to be manifested. In the first place, Fudin raised objections as to whether the entire message is unconsciously perceived or whether one component word in the phrase may be sufficient to engender

the SPA effects. On the other hand, Shapiro specifically raised the possibility that the word ONE in the phrase MOMMY AND I ARE ONE may connote the idea of unity and if presented alone, may produce the same effects as seen with the complete statement. To test this assertion, Shapiro (1978) recommended a comparison between the messages ONE and MOMMY AND I ARE ONE. Fudin (1986) contended that before accepting Silverman's notion that the entire phrase is necessary for SPA effects, one must present in a within-subjects design the MOMMY AND I ARE ONE message together with its anagram control, as well as all partial versions of the symbiotic phrase, (MOMMY, MOMMY AND, MOMMY AND I, and MOMMY AND I ARE), with the anagram of each of these incomplete stimuli. If only the complete MOMMY AND I ARE ONE message produces positive effects compared to its anagram control, and all other stimuli show nonsignificant results, only then would one be certain about the registration of the entire phrase, and only then would one be forced to reject the alternative hypothesis of partial encoding. Silverman's claim that all words in the MOMMY message are registered was based on the findings of some studies in which variants of the MOMMY stimuli were found to be ineffective. For example, in a study by Bronstein and Rodin (1983) the stimuli MOMMY AND I ARE ALIKE and MOMMY AND I ARE THE SAME showed no significant effects on the reduction of schizophrenic pathology, whereas the MOMMY AND I ARE ONE message did. Also, when the message

DADDY AND I ARE ONE was used in one investigation (Jackson, 1983), it produced positive results with only female subjects and the MOMMY message was found to do the same for male participants. However, Fudin (1986) questioned the validity of this argument by pointing out that in these studies either a between-subjects design was employed, or the control phrase PEOPLE ARE WALKING was used to compare the results of the experimental stimuli, thereby rendering a straightforward interpretation of the data in terms of full encoding of MOMMY AND I ARE ONE treacherously difficult.

To-date, there have been three studies which included all partial messages as well as their respective anagrams to test Silverman et al.'s (1982) assertion of complete registration (Greenberg, 1990, 1992; Gustafson & Kallmen, 1991). In the case of Greenberg's two studies, one revealed no effects with any of the ten stimuli (Greenberg, 1992), but the second study showed a trend for the superiority of the MOMMY message in reducing state anxiety ($p < 0.06$). Gustafson and Kallmen's results showed that only the complete phrase MOMMY AND I ARE ONE improved performance on a fine motor task compared to the control message MYMMO NAD I REA ENO, and to the remaining eight stimuli. However, one minor defect in this investigation makes the otherwise irreproachable results somewhat suspect. The problem is that these authors conducted two separate experiments to arrive at their overall conclusions. In

Experiment 1, the complete MOMMY stimulus with its anagram and only one partial message, MOMMY AND I ARE, and its anagram, were presented, and the remaining three partial messages and their respective anagrams were shown in Experiment 2. Therefore, all the pitfalls associated with inter-experimental comparisons (e.g., different subjects and experimenters) come into play.

Whether unconscious perception encompasses comprehension of entire intricate sentences or whether it is limited only to the understanding of single words remains an open question, but recent research from cognitive psychology favors a circumscribed notion of the unconscious. For example, Greenwald and Liu (1985) have shown that the subliminal presentation of a masked word (e.g., HAPPY) facilitated evaluative judgment (faster reaction time) of an affectively-related, clearly visible word (e.g., VICTORY) but the presentation of a two-word phrase (e.g., ENEMY FAILS) had no facilitative effect on the subsequent recognition of an affectively cognate word. While reviewing this evidence from the subliminal perception literature, Kihlstrom (1993) posed the conundrum of the scope of the unconscious in these terms: "But first we have the problem of Greenwald's (1992) two-word challenge: if preconscious processing cannot analyze the meanings of fairly straightforward two-word phrases like ENEMY LOSES, why should it be able to understand a fairly obscure sentence

like MOMMY AND I ARE ONE"? (p. 346).[8] Clearly, further research is needed to demonstrate more convincingly that the full phrase, and not single words contained in the statement MOMMY AND I ARE ONE, produces the alleged salutary effects.

Alternative accounts of SPA effects. Several investigators have wondered whether the positive tone inherent in the MOMMY AND I ARE ONE message is sufficient to elicit a favorable behavioral response. Cook (1985) compared the effects of the MOMMY message with another phrase I UNDERSTAND STATISTIC/MEASUREMENT. These two and a control stimulus PEOPLE ARE WALKING were administered to three separate groups of graduate students enrolled in statistics and measurement courses. On the final examination, students exposed to the MOMMY phrase had significantly higher grades than the control group students. Although not statistically significant, there was a trend for the other nonsymbiotic but positively toned message group subjects to perform better than the control message group participants ($p < 0.09$). Snodgrass (1988) presented another nonsymbiotic but positively toned phrase I FEEL VERY

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[8]It should be pointed out, however, that in Greenwald and Liu's research, when two-word sentences such as ENEMY FAILS were presented supraliminally, they did not facilitate the subsequent recognition of single words. Thus, at least in this experimental paradigm, no evidence for complex meaning analysis was observed under both conscious and unconscious conditions, and it is interesting that two strong promoters of a circumscribed unconscious, Greenwald and Kihlstrom chose to emphasized absence of unconscious processing of complex sentences and relegated the importance of similar observations under conscious conditions.

GOOD to investigate its effects on anxiety reduction. Since he failed to observe any significant effects with the MOMMY message, it is difficult to interpret the nonsignificant findings with the alternative nonpsychodynamic stimulus.

There is some evidence from subliminal perception literature that both positively and negatively tinged stimuli, which are not necessarily derived from a psychodynamic point of view, are nevertheless unconsciously perceived and can have measurable influences on behavior. For example, subjects performance on a memory task improved after they listened to subliminal auditory suggestions encouraging better performance (Chakalis & Lowe, 1992); auditory presentation of nine negatively charged words (e.g., ABORTION, MURDER) led to increased GSR activity (Kotze, & Moller, 1990); and the visually shown subliminal phrase NO ONE LOVES ME increased electrodermal responding (Masling, Bornstein, Poynton, Reed, & Katkin, 1991). Thus, the possibility that the MOMMY statement is effective, not because it enkindles fantasies of oneness, but that it promotes positive mood thereby creating a conducive atmosphere for salutary responses to occur, requires further investigation.

Insensitive measures of anxiety and related concerns. A specific problem pertains to the SPA studies utilizing the symbiotic message MOMMY AND I ARE ONE in the reduction of state anxiety. There are several studies demonstrating that

the message is effective in lowering subjective levels of anxiety (Orbach et al., 1994; Silverman & Weinberger, 1985) as measured by the Spielberger State-Trait Anxiety Inventory (Spielberger, 1979). On the other hand, failed attempts to replicate these results can also be traced in the literature (e.g., Clark & Procidano, 1987; Snodgrass, 1988). One possible explanation for these discrepancies may be that a floor effect was present in some of these experiments; that is, the subjects' level of anxiety may have been so low at the outset of the studies that the message intended to reduce anxiety could not have decreased these levels any further. A possible way of avoiding such a problematic situation would be to introduce an anxiety-inducing task prior to stimulus exposure. Also, it is possible that subjective measures of anxiety are not the best means of capturing SPA effects. In a meta-analytic review, Bornstein (1990) showed that in general, objective behavioral measures manifested greater SPA effects than did subjective or projective measures. Similarly, in a study by Singh (1990) subjects showed a significant decrease in anxiety only on a physiological index (blood pressure readings) but not on a subjective rating scale following exposure to a symbiotic stimulus. In Singh's experiment, a floor effect was probably not present because an attempt was made to raise the participants' anxiety levels by requiring them to solve

difficult arithmetic problems prior to stimulus presentation.

The question of subliminality. The issue of whether stimuli presented in an experiment are perceived without conscious awareness is of utmost concern in all subliminal perception research and has a longstanding history of controversy in the area. With respect to the SPA method, subliminality of stimuli is more often believed than demonstrated, as very few studies have employed proper techniques for the assessment of stimulus awareness. Since the very beginnings of the SPA method, Silverman has chosen to present stimuli at a standard, arbitrary duration of four ms, and subsequent researchers, with few exceptions (e.g., Hudesman et al., 1992, used two ms), have observed this condition in their investigations. The obvious difficulty with the approach of presenting stimuli at a fixed duration is that individuals vary markedly in their level of threshold for awareness, and the time duration of four ms may be above the level of awareness for some subjects and inadequately below threshold for others. As a result, some subjects would be able to perceive the information consciously and for them the stimuli cannot be regarded as subliminal (Moore, 1989).

In SPA experiments, Silverman and others have attempted to demonstrate the subliminality of stimuli, for the most part, by utilizing a post-experimental discrimination task

which required subjects to make same-different judgments between experimental and control stimuli or between an experimental stimulus and a blank stimulus card. If, Silverman reasoned, subjects' discrimination responses are at chance levels, this would suggest that information was presented below the level of conscious awareness (Silverman & Weinberger, 1985). However, Silverman's implementation of this procedure can be criticized on two grounds: First, in those SPA experiments in which a stimulus discrimination procedure was used (e.g., Silverman, Ross, Adler, & Lustig, 1978), a practice far too uncommon), only very few trials were ever carried out, typically 20 trials per subject. Such a small number of trials does not permit one to make meaningful statistical comparisons (Merikle, 1982;). Furthermore, no systematic attempt has been made to control for response bias (i.e., the propensity of some subjects to respond by saying SAME or DIFFERENT) in a forced-choice discrimination task (compare Merikle, 1982). The second difficulty with Silverman's method of assessing subliminality is that only a small sample of subjects from the entire study is usually administered the discrimination task. Even if there were no objections with the subliminality procedure itself, and even if the participants' responses indicated null sensitivity to stimuli, there is no guarantee that these stimuli were presented below the level of conscious awareness for the

remaining large majority of subjects who did not receive the discrimination task. Even worse is the practice of other SPA investigators (e.g., Masling et al., 1991) who rely on a totally different sample of subjects, not part of the study proper, to demonstrate subliminality of stimuli. Thus, Silverman's claims of conscious unawareness in SPA research are based on shaky assumptions and subliminality of stimuli has not been demonstrated convincingly.

The adequacy of procedures designed to demonstrate stimulus unawareness is a thorny issue which has plagued the entire area of empirical research in subliminal perception ever since its beginning. After reviewing the early evidence for unconscious perception, Eriksen (1960) proclaimed that there was no conclusive proof to substantiate the claim that in the absence of conscious awareness, subjects' responses could be influenced by undetected information. He criticized the commonly used measure of subjective reports to index stimulus awareness and pointed out its deficiency by noting that when subjects declare their inability to perceive a given stimulus or to discriminate among a set of stimuli, their verbal reports of stimulus unawareness should not be taken to mean lack of consciousness; it may simply reflect subjects' own response criteria and/or experimenter bias. Subjects may consciously perceive the stimulus for a very brief period and they may either forget its content by the time they are questioned

about it, or they may be unwilling to report it because their perception of the stimulus is partial and fragmentary which makes no sense to them. Eriksen (1960) argued that only when subjects are forced to discriminate verbally among a set of stimuli, an objective criterion of awareness, and when the results of this task indicate null awareness, and if subjects are still influenced by this undiscriminable information, can one claim with any degree of certainty any evidence for perception without conscious awareness. Eriksen's critique was so devastatingly harsh that it had the effect of slowing down the pace of research activity on subliminal perception. But beginning in the late 1970s and early 1980s, there was a resurgence of interest in unconscious perception, with the focus of enquiry becoming more cognitive in nature and content. A few investigators began to claim evidence for the existence of semantic priming, facilitation of lexical decisions to target words, even when the stimuli were presented below the level of conscious awareness. In a typical experiment of this kind (e.g., Marcel, 1983), participants are successively shown two strings of letter combinations, one prime and the other a target, and the participants' task is to judge whether the target is a word or nonword. The decision to classify the target as a word is facilitated (faster reaction time), when the prime is semantically related to the target (e.g., DOCTOR-NURSE) as compared to when it is unrelated to the

target or is a nonword. Subliminality of the prime is achieved by presenting a pattern mask immediately after its exposure such that not only is the recognition of the prime word prevented, subjects are unable to indicate whether it is present or absent on a given trial. Semantic priming[9] effects are firmly established under conditions of clear visibility (compare Meyer, Schvaneveldt, & Ruddy, 1975). However, when a number of researchers presented evidence suggesting that priming effects also occur under conditions of conscious unawareness, it generated a fierce debate about the authenticity of subliminal perception and the definition of conscious unawareness. While reflecting upon the nature of this new dispute between the advocates and opponents of subliminal perception, one experiences déjà vu by reason of the striking similarity between the 1960s and 1980s in the type of arguments proffered and the issues raised.

Because the findings of semantic activation without conscious awareness were extremely significant for current theories of information processing in cognitive psychology, a number of experimenters hastened to replicate these intriguing results. Cheesman and Merikle (1984) corrected a number of methodological flaws inherent in the threshold

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[9]In cognitive psychology, semantic activation is believed to occur when for a short period, a given word stimulates the meanings of other words to which it is related. As a result the recognition of related target words is made easier and that of unrelated words more difficult. When the two successive words are unrelated, the meaning of the last word is not activated, and thus its slower recognition.

determination procedure of Marcel's (1983) studies and found no significant priming effects at levels below the point of conscious awareness. In further investigations Cheesman and Merikle (1984, 1986) noted that when stimuli were presented at the subjects' objectively determined threshold of awareness, that is, when objective discriminative responding was at chance levels, there was no evidence for semantic priming. On the other hand, when threshold was defined in terms of the participants' own subjective experience, that is, a point at which the subjects felt they could no longer discriminate among a finite set of stimuli at better than chance levels, but objectively they were performing at a level that exceeded chance performance, priming effects did exist. Subjective threshold is associated with higher stimulus energy levels or time durations than objective threshold. Priming effects, then, were demonstrable at subjective but not at objective thresholds. The conclusion reached by Cheesman and Merikle was that in the experiments of Marcel and others, subjective thresholds may have been unintentionally established but the authors were mistakenly led to believe that they had determined objective thresholds.

Another notable development at this time was the appearance of a critical review of evidence from three areas of subliminal perception, dichotic listening, parafoveal vision, and semantic priming (Holender, 1986). The

conclusions reached by Holender were almost identical to those of Eriksen's critique 26 years earlier. Holender found no strong evidence to vouch for the claim of unconscious perception in the absence of conscious awareness and he similarly called for improved methodology for demonstrating stimulus unawareness. Like Eriksen, Holender also recommended reliance on objective discriminative responding as criterion parexcellence to authenticate the phenomenon of unconscious perception. However, both Eriksen and Holender's exacting objective criterion of discriminative responding has come under close scrutiny in recent years. Bowers (1984) argued that if one relies exclusively on an objective rule for establishing stimulus unawareness, that is, when subjects are unable to detect the presence/absence of a stimulus, or when they are incapable of discriminating among a set of stimuli at better than chance levels, this strong requirement not only denies reality of subjects' own phenomenal experience of a non-aware state, but it might very well be tantamount to defining unconscious perception out of existence. Bowers drew a distinction between noticing and perceiving. Noticing of a stimulus may be equated with consciousness itself. On the other hand, perception of stimuli may occur in the total absence of conscious awareness even when subjects show a better than chance level performance on some verbal discrimination task. According to Bowers, perceiving

in the absence of noticing qualifies logically as unconscious perception. Advancing this argument a step further, Reingold and Merikle (1988) claimed that it is erroneous to assume that any measure used to assess conscious awareness, subjective self-reports or objective responses, is affected exclusively by conscious influences; this is merely an assumption which is rarely realized by investigators. It is possible that a given measure may be affected by either conscious, unconscious, or by both processes, and it is difficult to disentangle the separate contribution of each process. Merikle and his colleagues have further suggested that the debate over whether unconscious perception exists or not is futile, as a century of empirical work has not solved this basic definitional question of what constitutes evidence for consciousness (Merikle, 1992). They have called for refining the kind of questions that are posed about the nature of unconscious processes and have urged the abandonment of efforts to demonstrate merely the existence of this elusive phenomenon. Instead, they have proposed a shift in the way psychologists approach the entire issue of unconscious perception and have suggested that it would be more fruitful to investigate whether conscious and unconscious processes exert qualitatively different effects on behavior. If these processes turn out to be only quantitatively different, the latter being a weaker version of the former, then a long

advocated distinction between conscious and unconscious processes would be of very little value (Merikle, 1992).

How does Silverman's SPA method fare in light of the arguments enumerated above concerning the nature of unconscious processes? First, although many doubts can be raised as to whether SPA stimuli are perceived at the subliminal or supraliminal levels, Silverman has always claimed that SPA effects exist only when psychodynamically relevant messages are perceived without awareness and they have no effects when consciously perceived. Thus, almost 20 years before Merikle and colleagues arrived at the same position but from a different background, Silverman had already asserted that unconscious processes are indeed qualitatively different from conscious ones. His empirical data bearing on the issue are consistent with this notion and they can be used to buttress his position (Silverman, 1983). The supposition of a conscious-unconscious distinction was given further credence by a meta-analysis reported by Bornstein (1990), which included 11 studies (with 43 comparisons) examining subliminal and supraliminal presentation of drive-related psychodynamic stimuli. His results showed a mean effect size (*d*) of .196 with a combined *z* of 4.00 ($p < .00003$) and a fail-safe *N* of 211 studies. These findings suggest that psychodynamic stimuli produce more positive effects when presented subliminally than when shown supraliminally. Even though one might

question Silverman's use of a standard exposure duration of four ms thereby raising doubts about stimulus unawareness, empirical data are consistent with the qualitative difference approach advocated by Merikle. It should be pointed out that in some areas of subliminal perception, it may be more necessary to demonstrate null awareness of stimuli directly than in others. For example, in the semantic activation paradigm, the information processing approach can easily accommodate priming effects under supraliminal conditions, but the demonstration of such effects under subliminal conditions would require a major theoretical adjustment. Therefore, to know whether or not a stimulus is perceived with or without conscious awareness is of paramount importance. This point is further underscored by the fact that on purely a priori grounds, one cannot predict if priming effects are likely to be the same or different under subliminal conditions as they are under supraliminal ones. In this context, then, if subjects do become even momentarily conscious of a presented prime word, it will culminate in the occurrence of priming effects, and if one is not sure whether this result was due to conscious or unconscious influence, such data would always be treated with skepticism. In contrast to the semantic priming paradigm, now consider the SPA procedure. Even if subjects become momentarily aware of the phrase MOMMY AND I ARE ONE and then quickly lose its awareness, for most intents and

purposes, however, the stimulus can still be regarded as subliminal. This is because the subjects failed to represent the material in consciousness for any appreciable length of time for it to be remembered fragmentarily or completely, but it still produces the intended effects. A fortiori, when the MOMMY phrase is represented entirely in consciousness when exposed for long durations, its salutary effects become vitiated Bornstein, 1990). Thus, the hypothesis that partial clues or conscious awareness of stimuli can explain subliminal effects may be still relevant to the semantic activation paradigm, but it is not tenable in the case of SPA. In fact, one might argue that conscious awareness inhibits responding to affectively tinged psychodynamic stimuli and conscious unawareness promotes it (Bornstein, 1992).

Further converging evidence favoring the notion of conscious awareness as being incompatible with affective responding to stimuli comes from another paradigm, dubbed the method of subliminal mere exposure (SME). In a typical SME experiment (e.g., Kunst-Wilson and Zajonc, 1980), subjects are repeatedly shown, usually for 1 ms, a series of unfamiliar drawings of geometric shapes. Subsequently, the old figures are intermixed with previously unshown figures and are presented supraliminally in pairs, one new and one old. Subjects are asked to indicate which of the two stimuli was presented to them subliminally, the

discrimination task, and to indicate which of the two stimuli they like, the preference test. The findings show that for the discrimination task, the performance remains at chance levels, but subjects show a clear preference for the previously shown subliminal stimulus approximately 60% of the time. Thus, even when a direct measure of consciousness indicates no awareness of stimuli, an indirect preference measure points to unconscious perception. It should be noted, however, that the mere exposure effects are observable under conditions of total conscious awareness (Zajonc, 1968), but these effects increase in strength as stimulus duration is decreased, and they are particularly strong when subliminal conditions prevail (Bornstein, 1989).

It should be evident from the above discussion that although SPA researchers have not adequately addressed the issue of subliminality of stimuli, empirical data do favor the assertion that SPA stimuli produce their intended effects by being perceived unconsciously. This conclusion should not be regarded as congratulatory; instead, proper heed should be paid to ensure conscious unawareness of stimuli in all SPA experiments and if necessary, stimuli should be shown at the level of each subject's individually determined threshold. As to whether this threshold should be subjective or objective, the literature in the field would point to the former as more likely to yield positive effects.

Other Unresolved Issues in SPA Research

Besides the above-mentioned methodological problems with the SPA procedure, there remain several theoretical issues of interest which have either not received adequate empirical attention, or have remained largely unsettled. Two of these issues relevant to the present research are (1) the inconsistent effects of the MOMMY AND I ARE ONE message on female subjects, and (2) the search for mediating personality factors which might account for inconsistent results produced by the MOMMY stimulus. Each issue will be considered in turn.

The gender issue. In the initial phase of the SPA method, only male subjects were tested to explore the effects of oneness fantasies with the mother figure. The question whether stimulation of symbiotic wish fulfillment was adaptive only with the mother figure or whether oneness fantasies involving other individuals from a person's life could also prove beneficial was considered next. Kaye (1975) presented the MOMMY stimulus and the phrases MY GIRL AND I ARE ONE and DADDY AND I ARE ONE to male schizophrenics and found that symbiotic fantasies involving two different persons, MOMMY and MY GIRL were pathology ameliorative. No improvement was noted with the DADDY message. In another study, this time with female schizophrenic patients, Cohen (1977) showed that whereas the MOMMY stimulus did not reduce pathology, the DADDY message did. Finally, activation of

merging fantasies with the opposite sexed parent, but not with the same sexed parent, reduced pathology for male and female schizophrenic patients (Jackson, 1983).

The findings presented so far were interpreted by Silverman as suggesting that oneness fantasies with figures other than the mother could be beneficial. Particularly for females it is the oneness fantasies with the father figure which seem to play a greater role than the fantasies of oneness with the mother figure (Silverman et al., 1982; Silverman & Weinberger, 1985). At the same time, however, the differential responding of males and females to the MOMMY and DADDY stimuli would appear to require a modification to an earlier thesis put forward by Silverman that the oneness fantasy with only the mother figure is behaviorally adaptive, and that the origins of these fantasies lie in the symbiotic phase of development during the first six months of life. Furthermore, if females do respond more to the DADDY message, and males to the MOMMY message, as well to a stimulus encouraging merger with another significant woman in the person's life, might this not indicate a wish fulfillment arising from the Oedipal period of development and might it not have sexual overtones? Indeed, the possibility that Silverman's purported symbiotic stimuli trigger Oedipal desires was raised by Tabin and Tabin (1987), and Silverman himself was mindful of these theoretical underpinnings, but his

treatment of the issue was very cursory and he continued to focus his attention on symbiotic fantasies from the pre-Oedipal stage and proceeded to account for the observed inconsistent gender findings as follows:

Based on the writings of a number of psychoanalytic theorists, Silverman et al. (1982) noted that females have a different course of relationship with their fathers than do males during the symbiotic and separation-individuation phases. Abelin (1971) suggested that females attach themselves to their fathers at a much earlier age, between eight to ten months of age, than do males. Also, Bernstein (1980) proposed that women are less differentiated from their mothers than men. Since aggression aids infants in differentiating from their mothers (Jacobson, 1964), and since females are believed to be less aggressive than males, Silverman and colleagues thought that the former may be not only less differentiated from their mothers than males, but they may also have less of a need to differentiate from their mothers (Silverman et al., 1982). According to Silverman it is possible that, because females are less differentiated from their mothers, the MOMMY message might threaten their sense of identity and the stimulation of oneness fantasies may be unconsciously experienced as identity-threatening. For this reason, they may not show any beneficial effects with the MOMMY stimulus and may instead respond to a message designed to evoke fantasy of

merger with the father figure, from whom they are presumably more differentiated.

To summarize the discussion so far, at least two explanations for the SPA findings with respect to the gender issue are plausible. One is that the symbiotic fantasies with the opposite sexed parent, a romantic figure, produces beneficial results because of the stimulation of Oedipal fantasies. Second, it is possible that both males and females respond to the oneness fantasies stemming from the symbiotic and/or separation-individuation phases, but since the course of relationships with the two parents varies for both genders, females respond to the DADDY message and males to the MOMMY stimulus.

The gender issue was further confounded by some studies conducted with normal female populations in which the MOMMY stimulus produced positive behavioral improvements (Gustafson & Kallmen, 1990, 1991; Linehan & O'Toole, 1982; Orbach et al., 1994). At the same time, there have been very few studies with normal female populations which have directly compared the effects of both MOMMY and DADDY stimuli. In one study, however, compared to a control message, the DADDY message did reduce anxiety significantly in females as measured by blood pressure readings (Singh, 1990). But Singh did not present the MOMMY message in her experiment against which the effects of the DADDY stimulus could be evaluated. Furthermore, her study differed from

other SPA investigations in many respects which makes her findings questionable. For instance, she used a tachistoscope to present the stimuli supraliminally, and made a significant change in the procedure by utilizing a computer to present the stimuli subliminally, and it is not clear for what duration these latter messages were shown.

There is yet another problem with the gender studies: the difficulty of comparing the results of experiments employing the MOMMY and DADDY stimuli with clinical populations and those investigations which included college students. A large number of studies conducted to-date have involved only schizophrenic patients. There is no published account of a study using both the MOMMY and DADDY messages with normal (nonclinical) male and female subjects. As a result, the question whether females respond only to the MOMMY message, or to the DADDY phrase, or perhaps to both messages equally, is still unresolved. What appears to be the case is that males respond positively, and relatively consistently, to the MOMMY message and there is no theoretical reason to suppose that they will do so as well to the DADDY message. However, females appear to respond positively to either or both of these two messages, depending on the study. If both genders respond favorably only to the MOMMY message, this would lend support to the hypothesis of oneness fantasies from the symbiotic and/or separation-individuation phases. If males respond to the

MOMMY message and females to both messages, this result would be still consistent with the notion of fantasies of oneness stemming from the symbiotic and/or separation-individuation phases, but this theoretical view point will need to be broadened by assuming Abelin's (1971) conception that females have a symbiotic-type relationship with fathers at a very early age, which males do not. Finally, it is possible that females do not respond either to the MOMMY or the DADDY message. In this scenario, the hypothesis of a lack of differentiation from the mother would have to be invoked. The responsiveness of the female subjects to the MOMMY message may depend upon an individual difference factor, namely, the degree of differentiation from mother. In other words, those females with high levels of differentiation from mother may respond more positively than women with low levels of differentiation. Even this account would be consistent with the idea of oneness fantasies arising from the pre-Oedipal phase. If, on the other hand, males and females respond only to merger fantasies with the opposite sexed parent, this finding will lend support to Tabin & Tabin's (1987) hunch that symbiotic messages trigger Oedipal fantasies. This would be further corroborated if stimuli encouraging oneness fantasies with romantic figures such as boyfriends and girlfriends are also found to be effective. These issues are complex and need to be addressed seriously in future investigations. However, the

first task of any SPA investigation is to show (1) whether males respond positively to the MOMMY message in a study with stringent controls; and (2) to which message or messages do females respond. Only after these basic questions have been answered satisfactorily can one go on to explore the issue of whether fantasies of oneness are pre-Oedipal or Oedipal in nature.

Possible moderator variables. In order to explain inconsistent findings with the MOMMY message, a number of researchers have attempted to account for SPA effects in terms of personality variables and have carried out studies to look for them. Gustafson & Kallmen (1990) examined whether the type of defense mechanisms (e.g., repression, reaction formation, isolation) subjects possess influences the responsiveness to the MOMMY message. Although they were successful in showing the MOMMY stimulus to be effective in improving fine motor performance compared to a control stimulus, the personality factor of defense mechanisms was unrelated to the subjects' susceptibility to the message.

In another study, Silverman et al., (1969) found that schizophrenic patients who were judged to be relatively differentiated from their mothers, showed greater pathology diminution to the MOMMY message whereas relatively undifferentiated subjects did not. Self-object (mother) differentiation was assessed by asking the patients to rate themselves and a picture of an elderly woman on a 6-point

adjective rating scale, using 20 characteristics (e.g., energetic, kind, optimistic, irritable). The greater the discrepancy between the ratings of self and picture, the higher the degree of self-object differentiation. Based on the pattern of results with differentiated and undifferentiated subjects in this and other experiments, Silverman proposed that for male schizophrenic patients, the MOMMY message is ameliorative only if a sense of self is preserved. That is, if an individual has managed to establish clear boundaries between self and mother, he will be in a good position to derive positive benefits rendered by the symbiotic message. On the other hand, if the self-object boundaries are not well defined, the symbiotic message might be experienced unconsciously as identity-threatening. Such an individual will not benefit from the stimulation of oneness fantasies and may even be affected negatively (Silverman et al., 1982). Although the findings of Silverman et al., (1969) and those of others' (see Mendelsohn & Silverman, 1982), point to a possible mediating factor, self-object differentiation, Greenberg (1992) has recently questioned the validity of the instrument used to measure self-object differentiation, at least for normal subjects. She demonstrated a low correlation, an index of cross-validation, between Silverman's adjective rating scale and another relevant instrument. Greenberg claimed that it is not clear whether Silverman's scale measures the

psychological construct of differentiation from mother or something else. As a consequence of the doubts raised by Greenberg's (1992) study, the use of the self-differentiation factor to explain disparate responding pattern of subjects to the oneness message now appears to be a highly dubious practice.[10] Perhaps Silverman's differentiation scale assesses something entirely different from what he originally envisioned. What this factor is, in reality, should be considered seriously by SPA researchers.

A tentative lead in this direction was provided by Branscomb's (1988) investigation. She discovered that female subjects who scored high on the variable of autonomy, as measured by the subscale of Ego Strength (Barron, 1953) from the Minnesota Multiphasic Personality Inventory, reflecting an increased degree of independence and ego resources, and who also had positive relationships with their mothers (closeness of ties and mother encouraging separation or independence), tended to respond more favorably to the MOMMY message than females who scored low on Ego Strength and had less positive maternal relationships (lack of closeness and mother not encouraging separation or

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[10]One should not commit the error of overextending the conclusions drawn from studies with schizophrenic patients to make inferences about normal college students. Even if Silverman's differentiation scale is not valid for college students, as was shown by Greenberg (1992), it may yet serve a useful purpose with clinical populations. The validity of this instrument, however, for schizophrenic patients has never been demonstrated empirically by SPA researchers.

independence). One problem with the Ego Strength scale, alluded to by Branscomb herself, is that high scores on this instrument may reflect a quality of defensiveness or unwillingness to admit problems rather than revealing high autonomy (Dahlstrom, Welsh, & Dahlstrom, 1975).

Although Silverman and Branscomb's moderator variables, self-object differentiation and autonomy, present difficulties in measurement and interpretation, they can be reconceptualized in slightly different terms. Both variables connote a sense of independent functioning and deemphasize dependence on others. Also implied by these variables is an individual's perceived self-evaluation. Extrapolating from this standpoint, might not the variables of differentiation and autonomy be more appropriately described as an individual's self-concept, self-perception, or self-evaluation? If this is the case, then one could argue that subjects with high self-evaluation will respond more favorably to the fantasies of symbiosis than subjects with low self-evaluation. This would be because, following Silverman's rationale, persons with high self-evaluation would view themselves more positively and feel more independent. For such persons, the idea of becoming one with another will not arouse any feelings of losing control or independence. Conversely, if a person's self-evaluation or self-concept is low to begin with, the notion of merging with another person might be threatening because such

fantasies may have the connotation of losing control and giving it over to the person being merged with. To be one with another in the presence of healthy self-identity may not pose any menace, but in the reverse situation, it could be seen as diminishing further whatever identity the individual possesses.

Besides self-evaluation, the perceived quality of one's relationship with one's parents may also mediate the positive effects of the symbiotic fantasies, as shown by Branscomb's results. What is needed is an instrument to assess both self-evaluation and quality of parental relationship and to correlate these variables with the effects of SPA.

A Prelude to the Current Series of Investigations

A 30-year history of research has not led to the acceptance of SPA as a methodological tool for examining psychodynamic propositions experimentally. Moreover, the most basic findings accumulated by the use of this procedure still remain controversial, and some critics have even ventured as far as to dub the method unreliable. At the same time, however, interest in the SPA method has remained high and it has attracted a great deal of attention from both inside and outside the psychoanalytic circles. Because of the possible potential usefulness of the SPA method to a better understanding of psychoanalysis in particular, and of unconscious processes in general, it is necessary to correct

a number of longstanding methodological flaws of previous investigations in order to evaluate the meaning of SPA findings more clearly.

The position adopted here is a conservative one which does not assume that SPA effects have been established with any degree of certainty. The suggestion recommended by Hardaway (1990) that further experiments designed only to demonstrate positive effects imputed to the MOMMY AND I ARE ONE message are futile, is not accepted. Numerous methodological pitfalls and the possibility of explaining SPA effects in alternative ways, prevent one from endorsing wholeheartedly Hardaway's optimistic proclamation of SPA results as firmly established. It is noteworthy that certain nonsymbiotic maternal stimuli (e.g., MOMMY FEEDS ME WELL) which were not necessarily predicted to engender significant results in the original studies, nevertheless, achieved a significant effect size in Hardaway's meta-analysis (Greenwald, 1992). These points lead one to view the conclusions based on Hardaway's (1990) meta-analysis with some degree of skepticism. At the same time, one cannot ignore Hardaway's and Bornstein's (1990) quantitative reviews entirely; they are highly suggestive, but precisely what kind of phenomenon they point to is unclear for the reasons just propounded.

The present series of experiments is concerned with the supposed anxiety-reducing effects associated with the

subliminal presentation of the phrase MOMMY AND I ARE ONE. Generally stated, the main goals of these experiments are as follows: (1) To refine the SPA methodology by introducing stringent controls while remaining true to Silverman's original procedure as much as possible; (2) to test rival hypotheses that might explain SPA effects more parsimoniously; (3) to explore qualitative differences between SPA stimuli under subliminal and supraliminal conditions; (4) to determine whether female subjects respond positively to one or both symbiotic stimuli; (5) to investigate whether inconsistent SPA effects are explicable by as yet unknown personality variables.

In short, the emphasis of the present set of experiments was on gathering empirical data to check for the validity of SPA effects, and it was hoped that these studies would aid in pronouncing a more definitive judgement on the reliability of the SPA procedure than has been possible hitherto.

EXPERIMENT 1

In the first experiment, an attempt was made to replicate the findings of previous studies which showed that the phrase MOMMY AND I ARE ONE is capable of producing measurable decrements in the level of anxiety (Orbach et al., 1994; Silverman & Weinberger, 1985). The methodology employed in the first study was similar to the one followed by Silverman and colleagues. Adherence to the previous SPA procedure was necessary to determine whether SPA effects can be demonstrated reliably with the original procedure while, of course, observing new and essential controls, before introducing substantial alterations into the method. Accordingly, subliminality of stimuli was operationalized by adopting Silverman's criterion of a standard exposure duration of four ms.

Experiment 1 tested the anxiety-reducing effects of the MOMMY message using heart rate as a more sensitive dependent variable than the subjective measures of anxiety used by most investigators in the past. To minimize the possibility of a floor effect, before the presentation of stimuli, participants were asked to solve difficult arithmetic problems in order to induce situational anxiety.[11] If

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[11]Difficult or insolvable arithmetic problems have been used widely in psychological research to produce a temporary increase in stress or anxiety levels. Escalation of heart rate while attempting to solve such problems is then interpreted to indicate an increase in stress or anxiety (Borgeat, Boissonneault, Chaloult, & Elie, 1989).

subjects are made anxious by their inability to solve difficult arithmetic problems, their subjective level of anxiety should rise, and the phenomenal experience of anxiety should be accompanied by an increase in the level of autonomic arousal. Therefore, if the MOMMY phrase is capable of producing a decrease in subjective anxiety, this too should be reflected in decreased autonomic arousal as measured by heart rate. This hypothesis received some confirmation in a similar study conducted by Singh (1990), but as noted earlier, her experimental procedure lacked internal consistency which makes it difficult to interpret her results in a clear-cut fashion.

The impact of the phrase MOMMY AND I ARE ONE was compared against an anagram of the stimulus, namely, MYMMO NAD I REA ENO. To clarify the differential responding pattern of male and female subjects, the message DADDY AND I ARE ONE was also included in this experiment. To explore further whether a positively toned but a non-symbiotic message is capable of producing ameliorative effects similar to those expected with the MOMMY message, subjects were shown the phrase I AM HAPPY WITH MYSELF. This message was intended to promote positive affect, confidence, and reassurance. If a positively toned stimulus is sufficient to reduce anxiety, then those subjects exposed to the HAPPY phrase would experience a similar reduction in anxiety as compared to those participants who receive the subliminal

message MOMMY AND I ARE ONE. However, if Silverman is to be believed, only the symbiotic phrase should produce significant reductions in anxiety (Silverman & Weinberger, 1985). A fifth message, ONE, was included to determine whether this word alone could engender positive, anxiety-reducing effects as implied by Shapiro (1978). If Silverman's reasoning is correct that the entire phrase MOMMY AND I ARE ONE is necessary for the activation of symbiotic fantasies and the manifestation of positive effects (Silverman, 1978), anxiety decrements following the word ONE should not differ from those observed under the control condition.

For the five stimuli used in Experiment 1, the only firm prediction that could be stated at the outset was that male subjects were expected to show a greater reduction in anxiety following exposure to the MOMMY message as compared to those shown the anagram message. Female subjects may respond similarly with decreased anxiety to the MOMMY message or be susceptible to the DADDY stimulus, or it is also possible that they may respond equally to both symbiotic messages.[12]

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[12]One might argue that it is necessary to construct an anagram of each of the four experimental stimuli used in this study. Although this view may be correct to some extent, one should not forget that the only legitimate experimental stimulus is the MOMMY phrase and the other messages serve as control stimuli for different reasons: the first for structural similarity (MYMMO NAD I REA ENO), the second for a significant figure in the subjects' life (DADDY AND I ARE ONE), the third for positive affect (I AM HAPPY WITH MYSELF), and the fourth for testing uniqueness of a

Finally, to investigate the role of a possible mediating factor in the effectiveness of the MOMMY stimulus, four subscales from the Self-Perception Profile for College Students (Neeman & Harter, 1986), Global Self-Worth, Parent Relationships, Morality, and Romantic Relationships, were used. Based on previous theoretical considerations, it was hypothesized that for female subjects, Global Self-Worth and Parent Relationships subscales would account for a significant proportion of the variance in the heart rate data measuring the effectiveness of the MOMMY message. The remaining two subscales were included for exploratory purposes. Because male subjects for the most part have responded consistently to the MOMMY message, and since no mediating factors have been suggested for normal male subjects, no firm predictions were made about them regarding the explanatory power of any of the four subscales.

Method

Subjects

There were 50 male and 50 female junior college and university students, with normal or corrected-to-normal vision, who participated in the study voluntarily. The mean age of the male subjects was 21.70 years (*SD* = 2.85) and of the female participants, 21.44 years (*SD* = 2.86). Participants' age ranged from 17 to 33 years. Recruitment of subjects was accomplished by making announcements in

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particular word (ONE).

classrooms. Subjects who reported a history of dyslexia were not included in the experiment. The experimental session lasted approximately 45 minutes.

Silverman (1983) has claimed that it is crucial for the effectiveness of the symbiotic message MOMMY AND I ARE ONE that the stimulus be presented in the first language spoken by subjects during their early childhood years. This is presumably because the earliest childhood experiences are assimilated by children into their personalities based, in part, on the linguistic interactions with their mothers. Consistent with this idea, Silverman recommended that SPA experimenters utilizing the oneness message to stimulate symbiotic fantasies should use the most common referent to the mother figure employed in early childhood by a given subject. This referent word might vary from one region to another even in the same country. For example, it has been claimed by Silverman (1983) that the referent MOMMY is essential in the phrase MOMMY AND I ARE ONE when a SPA experiment is conducted in Northern United States with English-speaking subjects. On the other hand, in Southern United States the word MAMA, not MOMMY, is commonly employed to address mother by children, and therefore the use of the word MOMMY in the symbiotic message would render it ineffective there. Silverman attributed the nonsignificant effects of the symbiotic message in one experiment in this region (Loveland, 1977) to the inadvertent use of the word

MOMMY in the oneness phrase. Silverman has further pointed out that bilingual Puerto Rican subjects in New York have not responded to the MOMMY AND I ARE ONE stimulus, presumably because they did not use the referent MOMMY in their childhood.[13] To be consistent with Silverman's subject selection criterion, all subjects in the present experiment were required to have spoken English as their first language during preschool years.

Materials and Apparatus

The experiment was performed under constant illumination at all times. The luminance level in the laboratory was 54 cd/m^2. All stimuli were presented via a Ralph Gerbrands 3-field mirror tachistoscope (Model No. T-3B-1). The distance from the viewing hood to the stimulus projection surface was 78.74 cm. Five stimuli were used: MOMMY AND I ARE ONE, DADDY AND I ARE ONE, MYMMO NAD I REA ENO, I AM HAPPY WITH MYSELF, and ONE. All messages were printed in capital letters with a Hewlett Packard Laser Jet II printer (300 dots per inch) on white paper using a 16-point Courier font. The stimulus ONE was printed on one line and the other four phrases were on two lines such that the first three words were positioned on the upper line and

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[13]These statements about language requirements are not based on very strong empirical evidence; they were arrived at primarily from post hoc analyses conducted in a handful of experiments. The notion that, in order to be effective, the symbiotic oneness message must be presented in the first language spoken by subjects still requires empirical verification.

the remaining two words were located on the bottom line. These printed messages were then cut and pasted onto 10.16 x 14.478 cm index cards such that they were centered on the cards vertically and horizontally. The stimulus ONE was .396 cm in height and 1.113 cm in width. This subtended visual angles of 17′ vertical and 48′ horizontal. The other four messages were very similar to each other in height and width. They measured .953 cm in height (a visual angle of 41′) and ranged in width from a minimum of 3.731 cm (a visual angle of 2°42′) to a maximum of 3.970 cm (a visual angle of 2°53′). Another card with a black dot in its center was used to help the subjects to focus their gaze in the middle of the stimulus field. The dot measured .762 cm in height and .813 cm in width, and the corresponding visual angles were 33′ and 35′.

To induce situational anxiety, subjects were asked to solve a series of arithmetic problems. A total of fourteen problems were designed which required basic mathematical calculations: addition, subtraction, multiplication, and division. These problems were constructed in such a way that they would be insoluble by most subjects in the allotted time of 10 seconds per problem (see Appendix A).

The main dependent variable in the experiment was heart rate (a measure of anxiety) which was recorded with the help of a Polar Vantage XL Heart Rate Monitor. The device consisted of an electrode belt and an electronic receiver

watch. The subjects wore the belt wet against their skin around the thoracic cavity at the level of the sternum. The belt sent heart rate signals to the electronic watch which stored all information until the end of the experimental session, at which point the stored information was downloaded to an IBM compatible Toshiba T1000LE laptop computer with the aid of an interface unit accompanying the heart rate device. Heart rate was obtained as beats per minute at every five second interval during four periods (see below).

Many researchers in the area of subliminal perception have strongly recommended that subliminality of stimuli be ensured and demonstrated by employing suitable awareness measures. To determine whether the stimuli presented in this experiment were perceived consciously, two different procedures, a recall and a recognition task, were utilized. In the first case, once subjects had been exposed to their respective stimuli they were given a sheet of paper and were asked to recall and write down any part of the presented stimulus. In the second task, participants were given two lists of 25 phrases each and were asked to circle the phrase (only one phrase per list) that they believed was presented to them. For the second recognition list, subjects were given the choice of either selecting the same phrase as the first list or a different one. Both lists contained the same messages but arranged in a different order. The lists

included the five experimental stimuli as well as 20 other phrases chosen such that they were either similar in structure to the experimental messages or were of such a nature that subjects might expect to encounter them in an experimental setting of this type (see Appendix B). The rationale for using two lists was based on the claim of some researchers that recognition of a stimulus from among other stimuli may be more accurate on the second trial than on the first (Masling et al., 1991).

In order to determine whether scores on a measure of self-perception could be used to predict responsiveness to the symbiotic stimulus MOMMY AND I ARE ONE, Self-Perception Profile for College Students (Neemann & Harter, 1986) was employed. This inventory consisted of 12 subscales designed to assess subjects' self-perception in 12 different areas of life, as well as a separate subscale to measure overall self-worth. For the purpose of the current study, four subscales were used because they were deemed to be the most relevant. These subscales were: Parent Relationships, Morality, Romantic Relationships, and Global Self-Worth. The remaining nine subscales were believed to be of little importance in the present context and they were thus excluded. For example, on rational grounds, one would not think that the subscale of Athletic Competence would be a useful predictor of responsiveness to the symbiotic message. The reliability of the Self-Perception subscales ranged from

.86 to .88 as assessed by coefficient alpha (a measure of internal consistency) (Neemann & Harter, 1986).

The subscale of Global Self-Worth consisted of six items and the other three subscales were composed of four items each. These 18 items were placed in a random order and the entire questionnaire was given to each subject in this format (Appendix C).

Each item in the Self-Perception questionnaire listed two opposing statements separated by the word BUT. One statement indicated low competency and the other high competency. In half of the items, the statement representing low competency was placed first and in the other half, the high competency statement was placed first. To complete the Self-Perception inventory, subjects' task was two-fold. They were first required to choose whether the low or high competency statement applied to them, and then to decide whether that statement was "Sort of True" or "Really True" for them. All items were rated on a 4-point scale with 1 representing the lowest level of competency (Really True for me) and 4 representing the highest level of competency (Really True for me). The scores on the Global Self-Worth subscale could range from a minimum of 6 to a maximum of 24 points and on the other three subscales from 4 to 16 points.

Procedure

Pretest. Before conducting the study proper, a pretest was carried out to determine the appropriate luminance settings for the tachistoscopic fields in agreement with the recommendations made by Silverman and associates. Two criteria were followed in the pretest phase: (1) The field luminance settings had to be such that in a pilot test with five subjects, no subject should report seeing any lines below 12 ms (Weinberger & Kelner, 1990); and (2) the luminance level of the stimulus field had to be set lower than that for the field presenting a fixation dot (Silverman, 1983).

Five participants who did not form the subject sample of the study proper were tested individually with a series of ascending and descending trials. The ascending trials commenced at four ms and increased in steps of 1 ms until subjects reported the detection of any lines on the stimulus card. The descending trials began at 20 ms and continued until no lines were reportedly visible. In this manner, various field intensity levels were tried until such point that no subject reported viewing any lines below 12 ms. The results of this pretest led to the setting of the stimulus field at .36 cd/m^2 and 1.7 cd/m^2 for the field presenting the fixation dot. In other words, the lowest common denominator for all five subjects was these two field luminance levels at which no subject reported viewing any lines below 12 ms. Please note that the luminance readings

of the tachistoscopic fields were obtained from a distance of 78.74 cm by measuring the amount of reflected light from one of the stimulus cards. The background of the stimulus cards (measured with a blank card) had a luminance reading of .47 cd/m^2. Finally, the stimulus contrast was 12.3%.

Experiment proper. Ten male and ten female subjects were tested individually by two experimenters in each of the five stimulus conditions. The experimental procedure can be divided into three distinct phases: the baseline phase, the anxiety induction plus message presentation phase, and a post experimental phase consisting of subliminality assessment tasks and completion of a questionnaire.

Upon entering the laboratory, the participants were reminded that they were taking part in a study designed to investigate the effects of subliminal messages on behavior and were introduced to the experimental apparatus. Subjects were also informed that they would be exposed to briefly presented stimuli and that most people in similar experiments perceive these stimuli as flickers of light. They were encouraged to pay close attention to these brief flashes of light and should they discern any part of the stimulus consciously, they were asked to disclose the content to the experimenters immediately. They were further

informed that a correct reporting of the stimulus content would be rewarded by a payment of 100$.[14]

Following this introduction, subjects were given a copy of the consent form and were asked to sign it (Appendix D). Upon obtaining the subjects' assent to their participation in the study, the electronic belt of the heart rate monitor was moistened with water and fastened around the subjects' sternum. Next, the participants were asked to sit back quietly and listen to a tape recording of relaxing music and nature sounds (Gibson, 1990) over headphones. To help subjects relax maximally, only one experimenter remained in the room at this time. This phase of the experiment lasted

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[14]This procedure was adopted after considering the suggestion of many researchers (e.g., Holender, 1986), that experimenters should ensure, by whatever means possible, that subliminality of stimuli is maintained throughout the course of message presentation and even subsequent to its exposure. Critics have pointed out that one major objection with previous research on subliminal perception is the use of subjective reports to assess stimulus awareness. When participants indicate no awareness of the stimulus, this is often taken to mean that the stimulus was indeed subliminal. However, this technique is rife with pitfalls. It is possible that subjects perceive some fragment of the message and are either unwilling or hesitant to report it because they cannot recall the message in its entirety, or because the fragmentary message appears nonsensical to them. A second possibility is that participants perceive the message very briefly and forget its content almost immediately, and since they are questioned about its awareness after some delay, even a delay of few seconds, they can no longer remember it. Keeping this in mind, it was believed that an offer of a high monetary reward would increase the subjects' motivation to pay attention to the stimuli at all times, and that they would be more likely to report any part of the messages if they perceived it consciously, even if their perception consisted of fragments. Therefore, subjects who report the content of a given stimulus correctly would be detected with this method and could be eliminated from further analysis. Conversely, in the absence of any correct reports of stimulus content, one could be relatively confident, (in conjunction with the results of the recognition task, of stimulus unawareness.

10 minutes and constituted the baseline period. Heart rate was recorded every five seconds during baseline yielding 120 readings.

In phase two of the experiment, subjects were first asked to solve the arithmetic problems. During this time, at every 10-second interval one experimenter said "NEXT" and the subjects were required to proceed to the next problem in the series. This continued until 2 minutes had elapsed, at which point the subjects were instructed to look into the tachistoscope. When the subjects first looked into the viewing hood, they were shown a black dot for one second and were asked to focus their gaze at that position. Following the centering dot, there was a gap of 700 ms (total darkness) which was proceeded by the subliminal presentation of a stimulus for four ms. This constituted one trial and 8 such trials were completed for each subject, with an intertrial period of five seconds. (On the final trial, the 5-second inter-stimulus gap was eliminated). Thus, the message presentation period lasted 48.63 seconds for each subject. It should be noted that upon completing the arithmetic problems, the participants required varying amounts of time before they began viewing the subliminal stimulus. This time ranged from 3 to 5 seconds post arithmetic problems. Therefore, if subjects commenced viewing the stimulus 3 seconds post arithmetic problems, the message presentation stage ended at 51.63 seconds post

arithmetic problems. Similarly, for those subjects who began viewing the stimulus 5 seconds after the termination of the arithmetic problems, the last message sequence concluded 53.63 seconds post arithmetic problems. Once the stimulus presentation period had ended, subjects were asked to sit back for an additional 65 seconds while their heart rate continued to be monitored. The heart rate was recorded continuously every five seconds commencing at the outset of the arithmetic period and ceased four minutes afterwards. During the interval of arithmetic problems, 24 readings were obtained, 11 readings were recorded during message presentation, and 13 readings during the postmessage interval.

All messages were presented in a double-blind fashion. The experimenters were blind to the stimuli as all messages were coded on their backs and one experimenter used this coding scheme to load the stimulus cards into the tachistoscope before subjects entered the laboratory. The stimuli were changed frequently so that no more than approximately eight subjects were tested with one message consecutively. On the average, the cards were changed after every four subjects.

In the third phase of the experiment, the recall and recognition tasks were completed first. Following this, subjects were administered the Self-Perception inventory.

Participants were allowed as much time as required for the completion of these tasks.

Finally, subjects were debriefed concerning the exact purpose of the study. However, in order to maintain continued unawareness of the stimuli for the experimenters, and to prevent other potential subjects from becoming cognizant of the experimental messages, the stimulus content was not revealed to them at this juncture. They were promised a complete debriefing once the entire experiment had been completed.

Results

Subliminality of Stimuli

In the first task designed to assess stimulus awareness, participants were required to recall any content of the message they had been shown. Forty-six subjects reported seeing flashes of light, 28 did not report anything, 14 indicated that they discerned some type of pictures, images, or patterns (e.g., rectangle, square, pictures of a horse and flowers), eight participants reported perceiving indistinguishable writing, and four others recalled words or letters (the word THE, and the letters L, X, and B). These partial citings (as well as other descriptions) may be regarded as incorrect since these words and letters did not occur in the stimuli shown to the subjects. Some of the participants may have briefly perceived fragments of the stimuli and then attempted to

make some sense of them, or they may have been simply guessing. The experimental instructions encouraged reporting of any stimulus content without hesitation and subjects' incorrect citings may be attributable to their willingness to report almost anything with the hopes of being correct in order to win the reward of 100$.

For the recognition task, subjects were given two lists of phrases and were asked to circle one message that they believed was shown to them subliminally. There were 25 phrases on each list and the probability that a subject could identify the correct phrase on a given list was one out of 25 (4%). Since 100 subjects were tested, the probability of correct identifications per list was four responses. On the first recognition list, five subjects chose the correct stimuli. A chi-squared test indicated that this performance was not significantly different from chance (X^2 [1, $\underline{N}$ = 100] = 0.26, $\underline{ns}$). Similarly, on the second list, three subjects were accurate in their choice of stimuli. Again, a chi-squared test revealed that subjects' correct identifications did not exceed chance levels (X^2 [1, $\underline{N}$ = 100] = 0.26, $\underline{ns}$). Only one participant chose the stimulus correctly on both lists. Taken together, the findings of the recall and recognition tasks suggest that stimuli presented in this experiment were not perceived consciously and may be regarded as subliminal.

Effects of Subliminal Stimuli on Heart Rate

Please recall that for every subject, heart rate was obtained under four intervals: baseline (120 readings), arithmetic problems (24 readings), message presentation (11 readings), and postmessage interval (13 readings). For each participant, an average score was calculated during these four conditions. Table 2 presents means and standard deviations for male and female subjects for the five stimulus conditions during the four recording intervals.

Before evaluating the differential effects of the subliminal stimuli on heart rate, it was necessary to determine whether the arithmetic problems used to induce situational anxiety had achieved their desired effect. The mean heart rate during baseline was 79.12 beats/min. (*SD* = 11.31) and during arithmetic problems, it was 85.84 beats/min. (*SD* = 12.41.) A *t*-test indicated that heart rate during arithmetic problems was significantly higher than during baseline ($t[99] = -9.19$, $p<.0001$), suggesting that the arithmetic problems succeeded in producing situational anxiety, and therefore the possibility of a floor effect does not exist in this study.

The next analysis of interest was to determine whether there were any pre-existing differences in the baseline heart rate scores for the ten groups of subjects. The baseline data were analyzed with a one-way analysis of variance which revealed no significant group differences

Table 2

Heart Rate Means and Standard Deviations Across Recording Intervals and Stimuli Shown

	Interval			
Stimulus	Baseline	Math	Message	Postmessage
MOMMY				
Males	87.89 (10.68)	93.12 (9.91)	84.02 (9.37)	85.73 (11.14)
Females	77.30 (10.80)	82.55 (10.30)	75.35 (10.21)	78.18 (9.99)
DADDY				
Males	80.52 (9.20)	83.25 (9.26)	76.24 (10.31)	80.32 (9.15)
Females	77.04 (13.42)	87.35 (14.51)	79.38 (11.29)	79.25 (13.20)
ONE				
Males	73.65 (10.81)	78.50 (11.15)	70.59 (8.14)	72.85 (8.26)
Females	77.44 (10.88)	85.31 (8.76)	77.55 (10.60)	79.01 (11.75)
HAPPY				
Males	76.81 (9.01)	83.89 (15.65)	73.88 (9.76)	73.16 (10.22)
Females	82.45 (9.91)	88.90 (9.30)	81.30 (9.30)	82.46 (9.15)
ANAGRAM				
Males	80.61 (12.60)	89.46 (15.84)	79.35 (14.25)	77.67 (14.34)
Females	78.29 (7.60)	86.10 (9.31)	75.56 (6.44)	77.74 (7.89)

(F[9,90] = 1.24, ns), and therefore one can safely advance to the next step in the analysis.

To assess the effects of subliminal stimuli on heart rate, a 2 (gender) X 4 (interval) X 5 (message) mixed analysis of variance was conducted, in which gender and message were the between-subjects variables and interval was a within-subjects variable (see Appendix E for a summary source table). The ANOVA revealed no main effects for the gender and message variables, but the main effect for the interval variable was significant (F[3,162] = 68.74, p < .0001). Scheffe's post hoc tests revealed that the mean heart rate was significantly higher during arithmetic problems than during baseline, message presentation, and postmessage intervals. The results pertaining to the interval variable merely confirm that compared to baseline, arithmetic problems increased heart rate significantly, and these heart rate scores declined during the next two intervals collapsed across the gender and message variables. There were no gender x message, gender x interval, message x interval, or gender x message x interval interaction effects. An absence of the message X interval and the triple interaction effects indicates that there was no support for any of the main experimental hypotheses. Subliminal stimuli did not affect heart rate scores differentially, nor did males and females show disparate

patterns of responding to the subliminal messages during the message presentation and postmessage intervals.

The next analysis was carried out on the average heart rate scores during the two intervals of message presentation and postmessage. It is possible that significant effects may have been present across the two periods and not separately in each interval (see Table 3 for means and standard deviations for the averaged heart rate scores of the two intervals). A 2 X 3 X 5 mixed analysis of variance was conducted to evaluate the influence of subliminal stimuli for males and females across the post-arithmetic interval. The analysis failed to show any main effects or interaction effects except a main effect for the interval variable ($F[2,188] = 103.53$, $p < .0001$). The latter result simply indicates the mean heart rate to be significantly higher during the arithmetic period compared to baseline, and significantly lower during the post-arithmetic period than during the arithmetic interval. Essentially, the analysis of variance reproduced the same pattern of findings as seen with the first ANOVA. No differential effects of the subliminal stimuli existed, and no differences between male and female subjects were observed with respect to the messages (see Appendix F for a summary source table).

Finally, an additional twenty-four 2 (gender) X 3 (interval) X 5 (message) mixed ANOVAs were performed using the heart rate scores of each of the five-second intervals

Table 3

Heart Rate Means and Standard Deviations for Five Stimuli During Message and Postmessage Periods Combined

Stimulus	Mean	Standard Deviation
MOMMY		
Males	84.95	10.53
Females	76.88	10.41
DADDY		
Males	78.45	9.69
Females	79.31	12.85
ONE		
Males	71.81	8.46
Females	78.33	11.65
HAPPY		
Males	73.49	10.32
Females	81.93	9.38
ANAGRAM		
Males	78.44	14.48
Females	76.74	7.52

during the message presentation and postmessage periods. To minimize the probability of a Type I error by using the same scores of baseline and arithmetic phases repeatedly, the alpha level for all F-tests was set at 0.01. None of the ANOVAs revealed any significant gender X message, or gender X message X interval interaction effects, any of which could have supported the experimental hypotheses.

Self-Perception and Responsiveness to MOMMY AND I ARE ONE

In an attempt to determine whether scores on a measure of self-perception could be used to predict responsiveness to the symbiotic stimulus MOMMY AND I ARE ONE, subjects completed four subscales from the Self-Perception Profile for College Students. To analyze these data, effectiveness to the MOMMY message was defined in terms of percent change scores in heart rate from baseline to message presentation. According to this definition the higher the percent change score for a given subject, the greater the individual's responsiveness to the subliminal stimulus (a decrease in anxiety). Only the message presentation period was chosen for this analysis since heart rate was expected to be influenced by subliminal stimuli to a greater extent during this phase than during the postmessage interval (Masling et al., 1991). Scores from the Self-Perception inventory and percent change scores of heart rate were entered into multiple regression equations. Only the data from 10 male and 10 female subjects who viewed the MOMMY message

qualified for the analysis. Because of the specific predictions stated earlier, two separate regression analyses were performed for each gender; that is, one analysis used two subscales, Global Self-Worth and Parent Relationships, and the other included all four subscales.

For male subjects, neither the two-factor nor the four-factor model accounted for a significant proportion of the variance in the heart rate data. In both models the respective R^2 values were 0.170 and 0.249 (the adjusted R^2 in both instances was 0.00). The F ratios in both models were not significant, nor were any of the t values which tested each standardized parameter estimate (ß) for the subscales separately. In the two-factor model the highest amount of variance accounted for by a single variable was 12.5% (Global Self-Worth) and in the four-factor model the highest value was 23.5% (Morality). Considering the squared semi-partial correlations next, it was observed that for the two-factor model, the Parent Relationships subscale accounted for 12.74% of the variance, after Global Self-Worth had already been taken into account. In the four-factor model, the largest squared semi-partial correlation value was that for the Morality subscale, accounting for 23.9% of the variance. In summary, no significant relationship was found for male subjects between self-perception scores and responsivity to the MOMMY stimulus,

which is consistent with the hypothesis stated earlier (see Table 4 for a multiple regression report).

For female subjects, the two-factor model was found to account for a significant amount of variance in the heart rate data ($F[2,7] = 6.44$ $p< 0.026$). The R^2 value was 0.6480 (the adjusted R^2 being 0.5475). Also, both t values testing for ß were significant, indicating the importance of both Global Self-Worth and Parent Relationships subscales. Considered separately, the former accounted for .17% and the latter accounted for 30.5% of the total variance. Evaluating next the squared semi-partial correlations, the Global Self-Worth subscale accounted for 34.3% of the variance over and above that accounted for by the Parent Relationships subscale. However, the Parent Relationships subscale accounted for 64.63% of the variance after the Global Self-Worth subscale had been taken into account. Therefore, when ordering the two squared semi-partial correlations, the Parent Relationships subscale accounted for a greater amount of variance than the Global Self-Worth subscale. Because of the substantially higher squared semi-partial correlation for the Parent Relationships factor than for the Global Self-Worth variable, a separate analysis was performed to determine whether the former subscale by itself would explain a significant proportion of the variance. The results were nonsignificant. Thus, both Parent Relationships and Global Self-Worth subscales are considered

Table 4

Multiple Regression Report for Males Using Two and Four Self-Perception Subscales as Predictors and Percent Change in Heart Rate Scores as a Dependent Variable

Variable	r	r^2	sr_i^2	β	t	p<
Two factors						
Global	-.2079	.0432	.0452	-.213	-.62	
Parent	-.3541	.1254	.1274	-.357	-1.04	
Four factors						
Global	-.2079	.0432	.0234	.0204	.040	
Parent	-.3541	.1254	.0581	-.110	-.21	
Morality	-.4848	.2350	.2199	-.414	-.67	
Romantic	.2828	.0799	.0054	.0489	.11	

together in all further interpretations of the data.

The R^2 value in the four-factor model was 0.7003, but the adjusted R^2 dropped to 0.4606). Looking at the results of the four-factor model, it was observed that the increase in the amount of variance accounted for in this model when compared with the two-factor model was small, 5.23%. At the same time, the overall variance accounted for by all four factors became non-significant ($F[4,5] = 2.92$, $p > 0.05$). Only the ß for the Parent Relationships subscale reached the desired level of significance ($p< 0.05$). The highest squared semi-partial correlation value was that for the subscale of Parent Relationships (.6132), again indicating its overall importance (see Table 5 for a multiple regression report, and Appendix G for descriptive statistics). (Separate multiple regression analyses were conducted for each of the four remaining messages, in the same manner as that for the MOMMY message, but none yielded significant results.)

In summary, the two-factor model is the optimal model for female subjects in explaining the variance of heart rate data. The simplest interpretation of these findings would be that subjects scoring high on the dimensions of Global Self-Worth and Parent Relationships tend to respond more positively to the symbiotic stimulus than do subjects with lower scores along these dimensions.

Table 5

Multiple Regression Report for Females Using Two and Four Self-Perception Subscales as Predictors and Percent Change in Heart Rate Scores as a Dependent Variable

Variable	*r*	r^2	sr_i^2	β	*t*	*p*<
Two factors						
Global	.0411	.0017	.343	.811	2.61	.035
Parent	.5523	.3050	.6463	1.113	3.59	.009
Four factors						
Global	.0411	.0017	.0331	.808	2.38	.063
Parent	.5523	.3050	.6132	1.111	3.26	.023
Morality	-.1195	.0143	.0195	-.165	-.58	
Romantic	-.1300	.0169	.0338	-.262	-.924	

Discussion

Effects of Subliminal Stimuli on Heart Rate

The results of Experiment 1 did not support the hypotheses that (1) the symbiotic message MOMMY AND I ARE ONE would produce greater anxiety decrements in males, and perhaps in females, than the control stimulus MYMMO NAD I REA ENO; and (2) female subjects might respond positively to the DADDY AND I ARE ONE message. This is evident from the nonsignificant interaction effects between the message and interval variables, and among the gender, message, and interval factors in the main analysis of variance. These nonsignificant findings with the MOMMY message are inconsistent with Silverman's (1983) contention that subliminal stimulation of symbiotic fantasies produces positive behavioral changes. At the same time, they do not support similar conclusions of a meta-analysis by Hardaway (1990). However, these data are in agreement with other investigators who have failed to demonstrate positive SPA effects with this message (Clark & Procidano, 1987; Snodgrass, 1988).

There are at least two different ways of interpreting the findings of this experiment. The first interpretation may be that the present results are genuine and that previous SPA effects were unreliable and capricious as they were occasioned by inadequate and faulty methodology. Fudin (1986) had noted that the ubiquitous use of a poor control

stimulus PEOPLE ARE WALKING may have contaminated prior findings in this area. He suggested that a number of improvements should be introduced into the method to see whether positive SPA effects can still be upheld by an improved experimental procedure. Based on the stringent methodology used in this experiment which yielded nonsupportive results, one must entertain the notion that previous SPA effects were unreliable and unreplicable.

An alternative interpretation of these data is based on the consideration that SPA effects are genuine and that their reproducibility depends upon a factor which was not controlled for in this study. One important procedural variable which has been proposed as being responsible for inconsistent findings in this area is the use of a fixed, arbitrary threshold, four ms, for the presentation of subliminal stimuli. It is widely accepted by experimental psychologists that individuals vary markedly in the level of threshold (Moore, 1989), meaning that a standard duration of exposure may be supraliminal for some subjects or too far below the level of threshold for others, thus preventing any subliminal effects from being manifested (Bornstein & Masling, 1984). Based on the above, it is suggested that the use of four ms as a standard duration of exposure may have masked any effects of the MOMMY message in the present study and others.

A study by Porterfield and Golding (1985) points to the problems associated with the use of four ms as a standard duration of exposure to define subliminality for all participants. These investigators, who failed to replicate the pathology-reducing effects with the MOMMY phrase, carried out a post-experimental recognition task to assess detectability of stimuli. This procedure required the presentation of three single letters as stimuli in increments of 2 ms, until the subjects correctly reported the stimuli. Their results showed that the threshold of recognition varied substantially across subjects (a mean of 31.07 and a range of 12 to 80 ms), which led the authors to conclude that for some of their participants the experimental stimuli at four ms were presented considerably below the level of detectability, and thus subliminality varied markedly among subjects. In two other experiments (Gustafson & Kallmen, 1990, 1991), approximately five percent of the participants correctly reported the content of experimental messages when the stimuli were presented for four ms.

It should be remembered that Experiment 1 was designed to be as similar as possible in methodology to Silverman's original procedure, while incorporating a number of long and overdue experimental controls. A standard exposure duration was decided upon to ascertain whether SPA effects could be replicated at four ms as has been observed in numerous other

studies. Now that a highly controlled investigation has failed to reveal SPA effects at four ms, and the inadequacy of operationalizing subliminality in this way has been well documented, it would be prudent to determine individual thresholds for the presentation of stimuli.

To rule out alternative accounts of SPA effects, two other stimuli, I AM HAPPY WITH MYSELF, and ONE, were also presented to the subjects. As was the case with the two symbiotic stimuli, these two alternative messages produced no significant decrease in anxiety compared to the control phrase. In the absence of any positive effects with the MOMMY message, such nonsignificant findings are difficult to interpret. One explanation may be that the alternative messages have no anxiety-reducing property and only the complete MOMMY message possesses this characteristic. It is also possible that these messages possess anxiety-reducing quality but it was masked in the present experiment because a standard duration of exposure was used, instead of presenting the stimuli at each subject's threshold of awareness. In future studies the specific hypothesis that each of these two stimuli was designed to test should be examined in order to refute more parsimonious explanations of SPA effects.

Self-Perception as a Mediating Factor

The original hypothesis predicted that at least for female subjects, two self-perception subscales, Global Self-

Worth and Parent Relationships, would predict responsiveness to the MOMMY message. At the same time, two other subscales, Morality and Romantic Relationships were also included for exploratory purposes. The results of two separate multiple regression analyses performed for each gender showed that only the proposed two-factor model for female subjects could explain a significant proportion of the variance in the heart rate data. These findings may be interpreted as indicating that female subjects who had higher scores on Global Self-Worth and Parent Relationships experienced a greater reduction in anxiety following exposure to the MOMMY phrase than those who had lower scores on these dimensions. One way to conceptualize the observed findings is by supposing that not all female subjects respond to the MOMMY message consistently and in a comparable manner. Women who have a high self-concept, paired with good parental relationships, tend to benefit from the symbiotic stimulus (greater anxiety reduction). On the other hand, females with low self-concept and poor perceived parental relationships respond with either attenuated effects (less anxiety reduction) or no beneficial effects. Women with a favorable self-evaluation and whose parental relationships are also satisfactory may feel independent and autonomous, which then helps them to function at a higher level and they do not feel threatened by a loss of individuality when shown the MOMMY message.

Conversely, when women with a low self-concept and poor parental relationships are exposed to the MOMMY stimulus, they may unconsciously fear the loss of their individuality by the possibility of engulfment by mother.

The self-perception findings are in agreement with the results of other investigators and follows their approach of accounting for inconsistent SPA effects in terms of personality or individual difference factors (Branscomb, 1988; Silverman et al., 1969). In the present study, an attempt was made to reconceptualize the variable of self-mother differentiation which was originally used by Silverman, and to introduce a more reliable and valid assessment tool than the ones used in Branscomb's study. Although the self-perception findings are statistically significant, and the current approach may thus seem to be helpful in explaining inconsistent SPA effects, there are several limitations of these results that cannot be ignored. First, the multiple regression analysis was performed on data from only 10 subjects, and because of an extremely small sample size, even significant results should be regarded as highly tentative. These findings should be replicated to ensure that they are not a chance occurrence. Second, the reasons as to why high self-perception and positive parental relationships predict susceptibility to the MOMMY stimulus are hypothetical and based purely on conjectures. Following Branscomb and Silverman's reasoning,

it is simply assumed that individuals characterized by low self-evaluations and poor parental relationships are fearful of the supposed activation of the merger fantasies. No one has demonstrated the activation of any kind of unconscious fantasies with the MOMMY stimulus, nor is there any evidence available to intimate that subjects unconsciously realize that fantasies of oneness have been triggered and then evaluate the effects of these fantasies in relation to their low self-concept, and finally decide not to be influenced positively by these fantasies. This sort of hypothesizing requires too many assumptions for which there is no empirical base at present. However, one should not forget why self-perception was examined in this experiment. It was included to see whether personality or individual difference factors could provide a useful way of accounting for inconsistent results obtained with the MOMMY message, and to this end, self-perception may fulfill this desired objective. It is the task of future research, if the validity of these findings is established in subsequent studies, to explain exactly why subjects with high and low self-perception differ in their response to the subliminal presentation of the MOMMY AND I ARE ONE phrase.

A third limitation pertains specifically to the interpretations of the scores on the subscale of Parent Relationships. It is a unified variable which assesses perceived quality of relationships with both parents.

Branscomb's findings on the importance of positive parental relationships were based solely on the perceived quality of maternal relationship. Although present findings are similar to those of Branscomb's they do not take into account the unique contribution of maternal relationship. In future studies, the quality of maternal relationship should be assessed separately and correlated with responsiveness to the MOMMY message. This strategy would allow one to determine whether a favorable response to the MOMMY fantasies is dependent on the perceived quality of attachment bond with one's mother, or with parents in general.

The fact that no significant correlation was found for men between self-perception and responsiveness to the MOMMY message is consistent with Silverman's hypothesis. If one interprets Silverman correctly, males are encouraged to differentiate from their mothers at an early age, and therefore individual factors related to parental bonds should not play a mediating role, at least for normal males. Consequently, when male subjects are stimulated with the MOMMY message, they should not fear a threat to their self-identity and should therefore respond positively. Although a nonsignificant correlation between self-perception and responsivity to the MOMMY message is consistent with this reasoning, the absence of overall effects with the symbiotic stimulus for male subjects leaves open the possibility of

the importance of personality variables which might determine who responds favorably to the message and who does not. Once the issue of individual thresholds has been taken into account, male subjects' responsiveness may be related to the same variables which were found to be of predictive value for female participants.

Finally, it should be pointed out that the subscales of Morality and Romantic Relationships were included in this experiment for exploratory purposes, and they did not reveal significant correlations with the response pattern to the MOMMY message for either male or female participants. Since no specific hypotheses were formulated about the predictive power of these two factors, the nonsignificant findings simply suggest that the variables are not useful in accounting for individual differences in susceptibility to the MOMMY message.

EXPERIMENT 2

In Experiment 1, the main hypothesis tested was not supported. The symbiotic message MOMMY AND I ARE ONE was not significantly different from its neutral anagram control phrase in lowering situationally-induced anxiety. All subliminal messages in Experiment 1 were shown at a standard duration of four ms, instead of presenting them at each participant's threshold of awareness, and this fact may possibly account for the failure to corroborate the experimental hypothesis. Therefore, the primary goal of Experiment 2 was to determine whether the variable of individual thresholds can account for nonsignificant findings of Experiment 1 and to shed more light on the inconsistent pattern of SPA results in general.

While implementing a threshold determination procedure in the SPA method, one must take into account some general points regarding the issue of threshold and some others which relate specifically to the SPA method. As noted earlier, two different types of thresholds have been used in subliminal priming experiments, subjective and objective. The consensus reached after numerous investigations is that priming effects can be demonstrated reliably when stimuli are presented at subjective thresholds, but disagreement prevails as to whether priming effects can be elicited at objective thresholds. The use of subjective thresholds painfully reminds us of the criticisms of subliminal

perception proffered by many critics of unconscious perception research: when objective discriminative responding to stimuli indicates better than chance level performance, subjects may have some conscious awareness of stimuli even though they may deny any phenomenal awareness of them (Eriksen, 1960; Holender, 1986). This disapprobation of subjective thresholds in the context of SPA research may be somewhat attenuated in the light of the argument that SPA effects are predicted to be qualitatively different when conscious awareness of stimuli is severely restricted as compared to when these same stimuli are clearly visible. Thus, even if SPA messages are presented at subjective rather than objective thresholds, as long as their influence on behavior differs under conscious and unconscious conditions, this would be consistent with the notion of perception without awareness and inconsistent with the partial cue hypothesis Bornstein, 1990). Keeping these facts in mind, it was decided to present all stimuli at subjective thresholds in Experiment 2.

Two specific problems arise when considering the issue of thresholds in the context of SPA. First, all stimuli are typically presented in a double-blind fashion and if one uses, for example, the MOMMY message, in the determination of thresholds, the same message cannot be used in the experimental phase. Second, when individual thresholds of awareness are determined, it is possible that they are

applicable only to the stimuli which are employed in the determination of thresholds. It is further possible that prior knowledge of stimulus content in the method of SPA may obliterate any intended effects of the message. Therefore, if the MOMMY phrase is to be presented in the experiment proper, it cannot be used in the determination of thresholds. Any solution to this complex problem would not have been a perfect one and the compromise reached here was as follows: Since five stimuli were included in this study, it was decided to take all the different letters occurring in the five phrases and to construct two new stimuli of equal length to be used in the threshold determination procedure. In this way, an attempt was made to maintain a similarity between the threshold and experimental stimuli as much as possible. The assumption underlying this approach is that thresholds determined with the newly compiled stimuli would closely approximate those which would have resulted had the experimental stimuli been used instead. Of course, this is not an entirely satisfactory or optimal answer to an intricate problem, but under the limiting constraints of the experimental situation, the defects inherent in such a strategy were considered acceptable.

Besides the threshold procedure, a few additional changes were also made to the methodology of Experiment 2. In order to enhance the validity of the current SPA procedure, a new message was included and the stimulus ONE

was eliminated. It was believed that if a message could be found which can potentially increase anxiety levels, it would provide a useful contrast to the anxiety diminishing effects of the MOMMY AND I ARE ONE message. For this purpose a phrase which conveys the opposite of symbiosis, abandonment by mother, would be appropriate. In the SPA literature, the message MOMMY IS LEAVING ME has been used successfully with both female and male subjects (Patton, 1992; Talbot, Duberstein, & Scott, 1991) to produce effects which can be thought of as opposite to those of MOMMY AND I ARE ONE. In these studies, the subliminal presentation of the abandonment message led to increased cracker consumption among college students who were classified as binge eaters (Patton, 1992), and was associated with a reduction in cracker consumption, as well as a decrease in confidence ratings of interpersonal attractiveness, among anaclitic depressed and nondepressed subjects (Talbot et al., 1991). Changes in food consumption and interpersonal attractiveness may have been due to feelings of anxiety arising from the stimulation of unconscious fears of desertion by mother. A variant of the abandonment phrase, MOMMY HAS LEFT ME, was included in Experiment 2, and was expected to produce increased heart rate scores as compared to the control stimulus.

A minor modification was felt desirable to the positively toned nonsymbiotic message of Experiment 1. The

phrase I AM HAPPY WITH MYSELF is somewhat problematic because it contains 17 letters but the messages MOMMY AND I ARE ONE, DADDY AND I ARE ONE, and MYMMO NAD I REA ENO have only 15 letters. In an attempt to keep the stimulus length as similar as possible, a new message was constructed which still conveyed the same meaning of positive affect as before. This newly formed phrase having 15 letters was I AM HAPPY AND CALM.

The hypotheses for Experiment 2 were almost identical to those of Experiment 1. The MOMMY AND I ARE ONE phrase was expected to produce a greater decrement in heart rate for males, and perhaps for females, than the anagram stimulus MYMMO NAD I REA ENO. The statement DADDY AND I ARE ONE was included to see whether female subjects would respond positively to this message instead of the MOMMY phrase, or to both stimuli equally. The message MOMMY HAS LEFT ME was predicted to show increased heart rate when compared with the anagram control. Finally, I AM HAPPY AND CALM was included to determine whether a positively toned, nonsymbiotic phrase could engender the same effects as the MOMMY message. The Self-Perception Profile for College Students was also administered to determine if the significant findings for female participants from Experiment 1 could be replicated and whether these subscales would show any predictive power for male participants. Since in Experiment 1, only two subscales, Parent Relationships and

Global Self-Worth were found to be of importance, and since a rationale for only these two subscales can be provided based on the literature, the subscales of Morality and Romantic Relationships were excluded from Experiment 2.

Method

Subjects, Materials, and Procedure[15]

Fifty male and fifty female subjects between the ages of 17 and 34 years participated in this experiment. The mean age of the male participants was 22.38 years (SD = 4.12) and that of the female subjects, 22.26 years (SD = 3.44). Male and female participants were randomly assigned in equal numbers to each of the five stimulus conditions. The experimental session lasted approximately 60 minutes.

A slight alteration in the study's description offered to the participants was necessitated because of the skeptical and negative feelings expressed by some subjects at the use of the term Subliminal in the experimental instructions of Experiment 1. Accordingly, participants in Experiment 2 were informed that the study was designed to investigate the ability of people to discriminate between messages that are presented extremely quickly on some trials and not so quickly on other trials. The practice of withholding information about subliminal stimuli has been

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[15]For the sake of brevity, only those changes made to the previous experiment's methodology and conditions will be mentioned.

observed before without compromising the results (e.g., Patton, 1992).

Stimuli and exposure conditions. Seven messages, including two threshold stimuli, were used in the experiment. All stimuli were printed via an Apple Laser Writer Pro (600 dots per inch) printer in a 14-point Geneva font. In contrast to all other stimuli which contained five words, there were only four words in the phrase MOMMY HAS LEFT ME. This phrase was printed in such a way that both lines contained two words each. The height of all seven stimuli measured 1 cm and subtended a visual angle of 43′ vertical. The messages MOMMY AND I ARE ONE and MYMMO NAD I REA ENO were 3.20 cm in width, subtending a horizontal visual angle of 2°20′. The width of DADDY AND I ARE ONE was 3.048 cm with a visual angle of 2°13′. The stimuli MOMMY HAS LEFT ME and I AM HAPPY AND CALM were 2.897 and 2.799 cm in width, respectively, subtending visual angles of 2°7′ and 2°2′, respectively. Finally, the threshold messages MY CHAIR IS NOT RED and A PLANE CAN FLY FAR measured 2.896 and 3.20 cm in width, respectively, which subtended visual angles of 2°7′ and 2°20′.

As a result of eliminating the stimulus ONE and replacing it with a new message MOMMY HAS LEFT ME, and reconstructing an older message I AM HAPPY WITH MYSELF to I AM HAPPY AND CALM, some minor changes were necessitated in the recognition lists. The new messages were substituted

for the old ones. One further change was made by discarding the phrase I AM CALM (a shortened version of the now experimental stimulus I AM HAPPY AND CALM) and replacing it with I AM THINKING ABOUT NOTHING.

The luminance level of the laboratory was 50 cd/m², that of the stimulus fields .37 cd/m², and the luminance reading of the field presenting the centering dot was 1.72 cd/m². The background of the stimulus cards gave a luminance reading of .61 cd/m². Finally, the stimulus contrast was 24.4%.

Arithmetic problems and anxiety induction. In Experiment 1, arithmetic problems were administered for two minutes before the presentation of subliminal stimuli. It was noticed during the course of the experiment that some subjects' heart rate decreased during the second minute of the solving of the arithmetic problems as compared to the first minute. It is possible that after failing to complete the first few arithmetic problems in the allotted time, some participants may have decreased the amount of effort spent in trying to solve the remaining problems, leading to a significant lowering of heart rate. To verify this hunch, a t-test was performed to compare the mean heart rate during the first and second minutes. The analysis showed that heart rate during the first minute of arithmetic problems was significantly higher than during the second minute, $t(99) = 10.24$, $p<.0001$. (The mean heart rate during the

first minute was 88.95 beats/min. [SD = 12.98] and during the second minute, it was 82.95 beats/min. [SD = 12.32]). As a consequence of this finding, it was believed that one minute of arithmetic problems would be sufficient to increase heart rate levels substantially.

Participants were asked to complete a subjective rating scale to ascertain whether the increase in heart rate could be attributed to their inability to solve the arithmetic problems, as hypothesized, or whether it could be explained in other ways, for example, by the effort involved in solving the arithmetic problems. Subjects were asked to indicate their level of anxiety on a scale from 1 (NOT AT ALL ANXIOUS) to 10 (VERY ANXIOUS) for the periods of baseline and arithmetic problems. If subjective anxiety ratings are higher during the arithmetic period than during baseline, this will support the premise that an increase in heart rate is indicative of subjective feelings of anxiety, and a rise in heart rate could be attributed to the subjective discomfort caused by the arithmetic problems rather than to the effort expended in the solution of such problems.

The threshold determination procedure. As noted above, two stimuli were constructed from all the different letters occurring in the five experimental stimuli. These letters were A, C, D, E, F, H, I, L, M, N, O, P, R, S, T, and Y. The two threshold messages, MY CHAIR IS NOT RED and A PLANE

CAN FLY FAR, each contained five words and 15 letters as did the four experimental stimuli. The exception to this being the MOMMY HAS LEFT ME phrase which had four words and 14 letters.

The threshold determination procedure[16] used the staircase protocol, (a modification of the method of limits) employing a forced-choice discrimination task. This technique for the establishment of subjective thresholds was adapted partly from the work of Cheesman and Merikle (1986) and Dixon (1990(. Two significant changes were made to Cheesman and Merikle's procedure. First, in contrast to these investigators who presented the threshold stimuli only in a descending series of trials, the stimuli in the present study were shown in both ascending and descending trials. It was believed that this procedure would yield a better

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[16]In the subliminal semantic priming procedure, a pattern mask is typically presented after the prime word is shown in order to prevent continued processing of the prime and to achieve stimulus unawareness. The use of masking was considered for this study but it was not adopted for the following reasons: as previously mentioned, SPA and semantic priming paradigms differ in their predictions about stimulus effects under conscious and unconscious states. It is imperative in the latter paradigm that subliminality is not only achieved but demonstrated quite convincingly because stimulus effects are not necessarily expected to be qualitatively different under conscious and unconscious states. However, since unconscious effects are predicted <u>a priori</u> to be different from conscious ones in SPA, it was decided to follow the approach of demonstrating these conscious/unconscious differences under stimulus conditions that differ with respect to exposure duration (see Experiment 3). If SPA effects are shown to be present under stimulus conditions of decreased time duration (unconscious), and absent under increased time duration (conscious), and converging evidence is provided to demonstrate stimulus unawareness by the two subliminality assessment procedures, the need for masking may not be so cogent.

assessment of thresholds. Second, Cheesman and Merikle required their participants to make a subjective assessment of performance after a block of 24 trials, and there is the possibility that subjects' assessment of their own performance was affected by memory constraints and influenced by the recency effect. Also, on a given trial, subjects may have perceived the stimulus clearly but their overall performance at the end of a block of trials may have been appraised by them to be at chance levels. Both these factors have the potential of contaminating the threshold values. What one needs to know is how participants' evaluate their own performance subjectively on a flash-by-flash basis, whether or not they feel they are consciously aware of the stimuli presented to them. Therefore, participants in this study were asked to give an indication of their subjective perception following each exposure of a stimulus,

The threshold procedure required the presentation of two messages: MY CHAIR IS NOT RED and A PLANE CAN FLY FAR in a random order. Subjects' task was to report which stimulus they saw on a given trial, or to say, "I DON'T KNOW". The latter response option was to be used only when subjects felt they were guessing and could not distinguish between the two phrases. A minimum of five ascending and five descending trials were performed. First, the subjects were shown both threshold stimuli so that they could read them

clearly. The first trial was a descending one and began at a point where the subjects could recognize the stimulus being presented (this point was 50 ms for most participants). On this trial the stimulus presentation duration was decreased in gradations of 10 ms. The trial terminated when the subjects gave an "I DON'T KNOW" response. Each subsequent trial, ascending or descending, was performed in gradations of 1 ms. Ascending trials commenced 2 ms below the limit where the subjects gave an "I DON'T KNOW" response, and the descending trials began 2 ms higher than the point at which the subjects identified a message (correctly or incorrectly). Because the original intention was to establish subjective rather than objective thresholds, it was considered not important whether the subjects' actual responses were correct or incorrect. The point at which subjects themselves thought they could not discriminate reliably between the two stimuli was the point desired. The highest point in ms at or below which a stimulus was never identified, correctly or incorrectly, and where at least one "I DON'T KNOW" response occurred, was defined as that person's subjective threshold (see Appendix J for a sample sheet used in determining thresholds). Some participants gave either a correct or an incorrect response at 1 ms, but since the tachistoscope could not present the stimuli below this limit, 1 ms was taken to be the threshold point for these subjects. However, this practice was

observed only if the subjects also gave an I DON'T KNOW response at 1 ms.

The threshold determination procedure was carried out following the baseline heart rate measurement phase. As a result of each subject having a uniquely determined threshold at which the experimental stimulus was shown, the time duration for the message presentation sequence was slightly different for the participants of Experiment 2 in contrast to a fixed time in Experiment 1. The minimum individual threshold was found to be one ms and the maximum 48 ms. Based on these data the total minimum message presentation period lasted 48.61 seconds and the maximum 48.98 seconds (please refer to the procedure section of Experiment 1). It took subjects varying amounts of time to commence looking into the tachistoscope. This time ranged from 3-5 seconds following the termination of arithmetic problems. Therefore, if a participant commenced viewing the message sequence three seconds post-arithmetic problems, the message presentation period lasted for 51.61 seconds (for the minimum threshold of one ms), and 51.98 seconds (for the maximum threshold of 48 ms). On the other hand, if a subject required five seconds after the arithmetic problems to begin the process of stimulus viewing, the message presentation period lasted for 53.61 seconds post-arithmetic problems (when threshold was one ms), and 53.98 seconds (when threshold was 48 ms).

Summary of procedure. The experiment began with the recording of baseline heart rate for 10 minutes, followed by the threshold trials. Next, subjects were asked to solve the arithmetic problems for one minute, and were then exposed to a given subliminal stimulus, to be followed by a postmessage heart rate recording session lasting 65 seconds. The recall and recognition tasks were administered next, to be followed by the subjective anxiety rating scale. The experiment concluded with the completion of the Self-Perception profile. Heart rate was recorded every five seconds during four intervals: baseline (120 readings), arithmetic problems (12 readings), message presentation (11 readings), and postmessage period (13 readings).

Results

Subjective Thresholds

It will be recalled that a minimum number of trials administered to each subject was ten. On the whole, this number was not exceeded by most subjects, but some participants did require more trials to determine their thresholds. The range was 10-26 trials.

The mean number of flashes needed to establish individual thresholds was 33.27 (*SD* = 7.72) with a range of 18 to 55 flashes, reflecting a great deal of individual variability. The mean number of correct responses was 14.30, for incorrect responses the mean was 2.98, and for "I DON'T KNOW" responses the mean was 15.99 responses.

For male participants, the mean subjective threshold was 7.9 ms, (SD = 7.75) and the range was 1 to 48 ms. For female participants, the mean subjective threshold was 6.66 ms, (SD = 4.34) and the range was 1 to 22 ms. No significant difference was found between the subjective thresholds of male and female participants (t[98] = .98, ns).

Subliminality of Stimuli

In marked contrast to the responses on the recall task of Experiment 1 where no subject reported any stimulus content correctly, the pattern of results on this measure was considerably different in Experiment 2. Twenty-five individuals reported seeing only flashes of light and 48 indicated perceiving undiscernible words or letters. Thirteen subjects recalled words or letters that did not occur in the messages shown specifically to them (e.g., the letters F, G, and T; the words YOU, PRO, CREW, ING, AIR, SE, RED, CALL, BACK, and the phrase THE DOG'S HIND PAWS WERE ALL DIRTY). Again, as in Experiment 1, these incorrect reportings may have been due, in part, to the subjects' high level of motivation to secure the $100 reward for being correct on the recall task. There were fourteen subjects who reported seeing words or letters which were contained in the messages shown to them (e.g., the letters A, E, O, and the words ARE, and ONE). These subjects were almost evenly distributed in the five message groups, three in the MOMMY,

four in the DADDY, two in the abandonment, two in the HAPPY, and three in the anagram condition. Of these, only two subjects reported whole words, one person correctly recalled the word ONE while being shown the message DADDY AND I ARE ONE, and the other participant recalled the word ARE from the message MOMMY AND I ARE ONE. However, when asked to identify the stimuli on the recognition lists, both subjects chose phrases that contained neither of these words. The former subject selected the stimulus UNITY and the latter circled MYMMO NAD I REA ENO. In the case of the remaining 12 subjects, their recall was very fragmentary, consisting of one or more letters. Once again, it is possible that some of these subjects reported information based on disjointed perceptions of the stimuli and some were only guessing because of high motivation to obtain the monetary reward. The fact that there were no correct reports of stimuli in Experiment 1, but some subjects in Experiment 2 did recall correctly some parts of the messages shown to them, suggests that the stimuli in the latter study were presented closer to the threshold values than in the former.

There was no systematic pattern of reporting stimulus content in relation to the level of subjective thresholds. For instance, the two subjects with the lowest thresholds, 30 and 48 ms, could report no stimulus content, whereas one participant with a threshold of 3 ms correctly recalled the word ONE from the DADDY phrase.

The second measure of awareness was subjects' responses on two recognition lists. The probability of correct identifications by chance for each list was four responses. On list one two subjects identified the stimuli correctly. This performance was not significantly different from chance (X^2 [1, $\underline{N}$ = 100] = 1.04, $\underline{ns}$). On the second list, no subject was correct in the choice of stimuli. However, the chi-squared test showed that the occurrence of zero correct identifications was significantly below chance (X^2 [1, $\underline{N}$ = 100] = 4.17, $\underline{p}$< .05). One interpretation of the significant chi-squared test would be that subjects were aware of the stimuli presented to them but deliberately chose messages that they knew were not shown to them. There is no rational reason to suspect why subjects would behave in this way. The purpose of the recognition task was to determine if subjects could identify the subliminally shown stimuli at greater than chance levels, but since this did not happen, and although the chi-squared test revealed counter-intuitive results, the fact that no subject identified the stimulus correctly suggests that the participants were not aware of the messages consciously. This line of reasoning is further strengthened by the subjects' chance level performance on list one. Therefore, a significant chi-squared test for list two can safely be regarded as a deviant and chance result which, when considered logically and in the light of other evidence, does not detract from the overall

conclusions. Based on the findings from the recall and recognition tasks, it may be inferred that for the most part subjects were unaware of the messages consciously. There is, however, some evidence to suggest that a few individuals were able to read small parts of the stimuli consciously but this information did not aid them in identifying the phrases correctly on the recognition task. Even those two subjects who reported at least one word correctly could not identify the phrases accurately on the recognition lists, and two subjects who did identify the stimuli correctly on the first recognition list (they saw the message I AM HAPPY AND CALM) could not report any stimulus content on the recall task. Thus, one can conclude with some degree of certainty that the messages in this experiment were presented below conscious awareness.

Arithmetic Problems and Anxiety Induction

In order to determine the efficacy of math problems in producing situational anxiety, heart rate scores during the baseline and arithmetic intervals were compared. The mean heart rate during baseline was 77.19 beats/min. (*SD* = 11.92), and during the arithmetic interval, the mean was 86.68 beats/min. (*SD* = 14.20). A *t*-test indicated that heart rate during arithmetic problems was significantly higher than during baseline ($t[99] = -10.67$, $p < .0001$).

Participants were also asked to rate their subjective feelings of anxiety associated with the baseline and

arithmetic problems periods on a 10-point scale. The mean of anxiety ratings for the baseline period was 3.22 (SD = 1.81), and for the arithmetic problems interval the mean was 7.84 (SD = 1.70). A t-test indicated that participants rated their anxiety levels as significantly higher during arithmetic problems than during baseline ($t[99] = -19.54$, $p < .0001$). From these results it may be concluded that the arithmetic problems were effective in creating situational anxiety as reflected by heart rate scores, and this was accompanied by the participants' own subjective experience of anxiety as well. The concomitant increase in heart rate and subjective anxiety levels alleviates concerns that math problems were effective in increasing heart rate only due to the effort required to solve them and not because the insoluble arithmetic problems made the subjects feel anxious.

Effects of Subliminal Stimuli on Heart Rate

First, to determine whether there were any pre-existing differences in the initial baseline heart rate data, the scores of the ten groups were submitted to a one-way analysis of variance. The results did not reveal any significant group differences ($F < 1$), and thus one can proceed safely to the next step in the analysis.

Table 6 presents means and standard deviations for males and females in the five message conditions during the four recording intervals. A 2 (gender) x 4 (interval) x 5

(message) mixed analysis of variance, in which interval was the within-subjects factor, was carried out to evaluate the effects of subliminal stimuli on heart rate. The analysis revealed no significant main effects or interaction effects except for a significant main effect for the interval variable ($F[3,240] = 101.98$, $p < .0001$). Sheffe's post hoc tests showed the heart rate to be significantly higher during the arithmetic period compared to baseline, and for it to decline significantly during the message and postmessage intervals compared to the arithmetic period (see Appendix I). The nonsignificant message x interval, and the gender x message x interval interaction effects provided no support for any of the experimental hypotheses. Subliminal stimuli did not affect heart rate scores differentially, nor did males and females respond differently to the messages.

As in Experiment 1, a separate 2 x 3 x 5 mixed ANOVA was performed using the combined data for the message and postmessage intervals (see Table 7 for means and standard deviations of the combined scores). The results of this analysis were the same as those for the previous one just reported. Only the interval variable achieved the desired level of significance (see Appendix J). In short, no

Table 6

Heart Rate Means and Standard Deviations Across Recording Intervals and Stimuli Shown

	Interval			
Stimulus	Baseline	Math	Message	Postmessage
MOMMY				
Males	74.82 (14.48)	83.05 (17.41)	76.25 (15.32)	73.13 (15.75)
Females	78.59 (15.70)	86.78 (16.29)	81.47 (13.01)	77.92 (11.75)
DADDY				
Males	78.13 (10.55)	86.05 (14.66)	81.60 (12.44)	78.87 (11.93)
Females	75.69 (7.58)	86.57 (10.29)	78.35 (7.69)	74.00 (7.92)
ABANDONMENT				
Males	70.95 (14.20)	88.26 (17.81)	77.92 (16.85)	71.98 (14.97)
Females	83.60 (10.62)	92.77 (16.00)	85.84 (13.12)	82.92 (13.15)
HAPPY				
Males	78.14 (14.45)	85.18 (18.59)	79.72 (14.84)	75.32 (13.33)
Females	77.91 (9.37)	87.98 (10.99)	79.89 (6.81)	77.98 (5.88)
ANAGRAM				
Males	80.56 (11.41)	85.75 (12.89)	79.41 (12.55)	76.42 (9.84)
Females	73.53 (9.72)	84.43 (8.70)	75.24 (8.03)	73.95 (6.94)

Table 7

Heart Rate Means and Standard Deviations for Five Stimuli During Message and Postmessage Periods Combined

Stimulus	Mean	Standard Deviation
MOMMY		
Males	74.56	15.37
Females	79.55	12.19
DADDY		
Males	80.12	11.91
Females	75.99	7.66
ABANDONMENT		
Males	74.70	15.58
Females	84.29	12.96
HAPPY		
Males	77.34	13.71
Females	78.69	6.10
ANAGRAM		
Males	77.79	10.97
Females	74.54	7.27

support for anxiety reduction for male and female subjects was observed with the MOMMY or DADDY stimuli.

To rule out the possibility that fourteen subjects who reported some part of the subliminal stimuli correctly may

ave been responsible for the nonsignificant findings in some undetermined way, another 2 X 4 X 5 mixed ANOVA was conducted with the data of these fourteen participants discarded. However, the same nonsignificant pattern of results as seen in the previous two analyses was reproduced yet again (see Appendix K). The exclusion of subjects who may have had some partial information about the experimental stimuli did not change the overall trend of statistical findings and did not affect the conclusion that subliminal stimuli had no differential effects on heart rate for either gender.

Finally, as in Experiment 1, twenty-four additional ANOVAs were performed on the heart rate data from each of the five-second intervals of message presentation and postmessage phases. There were no gender X message, or gender X message X interval interaction effects in any of the 24 analyses at the required level of significance, either or both of which would have been necessary to support the hypotheses.

Self-Perception and Responsiveness to MOMMY AND I ARE ONE

Separate multiple regression analyses were performed for male and female subjects using two self-perception subscales, Global Self-Worth and Parent Relationships, as predictor variables and percent change in heart rate scores from baseline to message presentation periods as the dependent variable. Neither for male nor for female

subjects were there any significant effects. The R^2 value for males was 0.0772 and for females the R^2 was 0.0651. The adjusted R^2 values in both instances were 0.00. Both multiple regression coefficients were nonsignificant (both *F*s < 1). The contribution of each subscale considered separately also remained very low and the squared semi-partial correlation values were similarly weak (see Table 8 for a multiple regression report, and Appendix G for descriptive statistics).

Compared to the results of Experiment 1, the pattern of nonsignificant findings did not change for male subjects in this study. However, in sharp contrast to Experiment 1, the findings of this study revealed no predictive power of the two self-perception subscales for female participants. In fact, whereas in the previous study the two subscales accounted for 64.80% of the variance in the heart rate data, their joint contribution was limited only to 6.51% in the present case. Thus, no support for the hypothesis was found which predicted a correlation between responsiveness to the MOMMY message and self-perception scores.

Discussion

Effects of Subliminal Stimuli on Heart Rate

Experiment 2 was a follow-up study from Experiment 1 in which it was suggested that inconsistent SPA effects and failed replications may be accounted for by the use of a fixed, arbitrary exposure duration of four ms. However,

Table 8

Multiple Regression Report Using Two Self-Perception Subscales as Predictors and Percent Change in Heart Rate Scores as a Dependent Variable

Variable	r	r^2	sr_i^2	β	t	p<
Males						
Global	.0030	.0000	.0172	-.150	-.36	
Parent	.2450	.0600	.0772	.317	.77	
Females						
Global	.1639	.0269	.0293	.171	.47	
Parent	-.1892	.0358	.0382	-.196	-.53	

when this strategy was observed in the present experiment, the pattern of findings remained unaltered. As a consequence of a failure to replicate Silverman's original findings in two stringently controlled investigations, one is now in a strong position to challenge the reliability of SPA findings with the MOMMY message. This point was raised in the Discussion section of Experiment 1 but since the threshold question still remained unaddressed, this objection lacked cogency. Following the inclusion of a threshold determination procedure, nonsignificant results can now speak with a greater degree of force. It becomes more than simply entertaining the possibility that SPA effects are unreliable and inconsistent, and their value questionable. The data also challenge the assertion of Silverman that SPA can serve as a worthwhile method for investigating psychodynamic propositions. This criticism should remain limited to the investigation of symbiotic fantasies in normal, psychologically healthy adults and leaves open the possibility of SPA being still useful with clinical populations. (This issue will be discussed at length in the General Discussion section).

It may be argued that previous SPA methodology was so deficient that its results not only remained inconsistent but interpretations based on such findings were of equivocal merit (Fudin, 1986). This point is particularly important because proponents of SPA gleefully cite Hardaway's (1990)

meta-analysis which showed the overall effects with the MOMMY message to be significant across studies, without keeping in mind the methodological pitfalls of experiments on which Hardaway performed his meta-analysis. Some SPA defenders believe that when procedural improvements are made to the SPA paradigm, new results will only confirm previously established findings (Weinberger & Hardaway, 1990). The first two experiments in this series of investigations recount an entirely different tale, not of reassurance and support, but of contradiction and woe.

Perhaps, before discarding SPA entirely and too hastily, one should consider other factors which have not been commented upon so far. One possibility pertains to the use of various types of dependent measures in SPA research. For the present set of studies, heart rate was chosen as a more objective index of anxiety because previous findings with subjective measures had yielded highly inconsistent results. It is possible that SPA effects are not captured optimally by the use of either subjective or objective indices of anxiety, and dependent variables unrelated to the measurement of anxiety may prove to be a more appropriate means of demonstrating the positive properties ascribed to the MOMMY message. One such example is the fine motor task successfully implemented by Gustafson and Kallmen (1990, 1991). The fine motor task consisted of three concentric circles joined together by a line, and the participants were

required to trace this line with their nondominant hands. Deviations from the line while tracing were regarded as errors. Gustafson and Kallmen found that the MOMMY stimulus improved fine motor performance significantly, compared to a meaningful control stimulus, and to a neutral anagram of the MOMMY message, and to the various partial stimuli and their respective anagrams based on the MOMMY message. Either this dependent measure or a similar motor task (e.g., the pursuit rotor task) could be employed in future studies. Other possibilities include cognitive tasks such as academic achievement tests. Examination grades have been used successfully as a dependent variable on several occasions (Ariam & Siller, 1982; Cook, 1985; Hudesman et al., 1992; Parker, 1982), albeit in less than optimally controlled studies.

In the light of nonsignificant findings with the MOMMY message, it is difficult to interpret the negative results obtained with the stimuli I AM HAPPY AND CALM and MOMMY HAS LEFT ME. As in Experiment 1, the HAPPY message was not significantly different from the control phrase in reducing anxiety. It is possible that the HAPPY phrase possesses no anxiety-reducing property and thus its failure to affect heart rate scores. The MOMMY HAS LEFT ME message was expected to lead to an increase in heart rate, but its influence was observed to be nonsignificant. This prediction was based on the work of Patton (1992), Talbot et

al. (1991), and Weinberger and Kelner (1990) who showed that a message conveying themes of abandonment or mother's absence impacts negatively on the individual. The dependent variables employed in these investigations were not designed to measure changes in anxiety levels, and it is possible that the abandonment stimulus produces only negative emotional states and does not necessarily lead to fluctuations in anxiety levels. Alternatively, it is also possible that abandonment stimuli have no real effects. This statement gains credibility when the methodology of the present experiment is compared with that of the other three studies mentioned above. In none of these experiments did the investigators present stimuli at individually determined threshold values, and one of these studies included an inappropriate control stimulus PEOPLE ARE WALKING (Weinberger & Kelner, 1990). Further research will be needed to establish whether messages implying mother's desertion can create negative emotional states.

Self-Perception as a Mediating Factor

To account for inconsistent SPA results the search for moderator variables was also pursued in Experiment 2. In Experiment 1, scores on two subscales of the Self-Perception Profile for College Students, Global Self-Worth and Parent Relationships, were predictive of responsivity to the MOMMY message in female subjects, and it was recommended that these findings be replicated to assess their robustness.

The results of the multiple regression analyses revealed no significant effects for male subjects, and the previously successful findings for females were not reproduced on this occasion. The results of the multiple regression analyses were very weak and revealed not even a trend in the expected direction. Might the use of an individual threshold determination procedure account for the failure to replicate the findings for female subjects? There does not appear to be any credible reason to suspect that this may be the real cause of nonsignificant effects. For this conjecture to be true (i.e., for individual thresholds to interfere with a significant correlation from emerging between self-perception and responsiveness to the MOMMY message), one would have to assume that presenting the symbiotic stimulus at subjective thresholds does not produce the putative salutary effects, a statement the illogicality of which should be apparent without further elaboration.

What then could explain this lack of correlation? One possibility is that the previous experiment's significant findings were a chance observation and only the results of the present experiment are valid. Because of the small sample size (10) on which the significant findings were based in Experiment 1, it called for a tentative acceptance of the significant correlations. Had the same results been reproduced in the present study, their validity would have been strengthened. One could also promote an opposite view:

the nonsignificant findings of the present study are a chance and deviant observation and only the significant results of Experiment 1 are authentic. The argument of insufficient sample size may be put forward to justify this claim in the present experiment. Obviously, one way to settle this controversy would be to increase the sample size and attempt another replication. This approach would help in deciding whether or not self-perception can be used reliably to predict which subjects respond to the maternal symbiotic stimulus. It is always a tenuous position from which to justify nonsignificant results by evoking the argument of small sample sizes. A critic can justifiably ask why this fact was not taken into account while planning the study? The critic will be reminded that the first two experiments in this series included 100 subjects each and the issue of moderator variables was secondary to the main purpose of establishing the validity of SPA effects with the MOMMY message. Now that SPA effects have proven to be elusive in their manifestation using an improved methodology, the need for discovering mediating factors has become far more cogent.

Evaluation of the Threshold Procedure

The major contribution of the present experiment to SPA literature was the introduction of a method to determine individual thresholds. Previous researchers have not granted the attention this very important issue

deserves, and as a result some mainstream psychologists have stayed far clear of the SPA method. The present experiment attempted to close this gap by introducing a threshold technique based primarily on the work of Cheesman & Merikle (1986). It would be instructive to evaluate the efficacy of this procedure in the present study.

The findings from the two subliminality assessment tasks indicated that the five experimental stimuli were not perceived consciously in their entirety. No subject reported the complete content of the message correctly, nor did the number of correct recognitions differ significantly from chance levels (not withstanding the chi-squared test showing below chance performance on List 2). However, there was a small number of subjects who reported perceiving at least some part of the messages consciously. The number of subjects who met this criterion was 14 out of 100. Although this number is small (14%) of the sample, it may suggest that the messages for these individuals were presented at slightly different levels than for other subjects who were unable to report any stimulus content or recounted it incorrectly. One reason for correct, albeit fragmentary, recall of stimuli in the present experiment has already been mentioned, the high motivational level to secure a monetary reward. Even if this factor was responsible for most of the correct citings, in the case of two subjects who reported one whole word each, this was not necessarily the case.

Another reason why some subjects succeeded in reporting the stimulus content correctly may be that an insufficient number of trials and/or overall number of flashes was administered in the establishment of individual thresholds. Because of the already lengthy procedure of the experiment, the present investigator was forced to administer the minimum possible and acceptable number of trials. In pilot testing, this number was assessed to be ten trials per subject.

In final analysis, however, the results of the threshold procedure can be considered satisfactory, for which the performance on two recognition lists provides supporting evidence. Therefore, the same threshold procedure can be recommended for continued use in the next experiment, but the technique may require minor alterations. One suggestion would be to increase the number of threshold trials, which might lower the number of subjects who become consciously aware of even fragments of the stimuli shown.

EXPERIMENT 3

The main purpose of Experiment 3 was to make one final attempt to reproduce SPA effects while employing a dependent variable which has been used successfully by other investigators. This strategy may be fruitful because dependent variables that measure anxiety or autonomic arousal may not be as sensitive or reliable vehicles for demonstrating SPA effects. Accordingly, Gustafson and Kallmen's (1990, 1991) fine motor task was selected which consists of a series of three concentric circles joined together by a line. Subjects are required to trace the line with their nondominant hand and deviations from the line are regarded as errors. According to Gustafson and Kallmen the reason why the fine motor performance is enhanced by the MOMMY message is that the symbiotic stimulus gratifies fantasies of oneness, leading to a state of calmness, a favorable condition for improved performance on fine motor tasks. The authors developed this measure so that it would capture small but measurable fluctuations in performance arising from the effects occasioned by SPA messages (Gustafson, June 1995, personal communication).

Although Gustafson and Kallmen reported positive effects with the MOMMY message using their newly developed dependent variable in a study which observed strict control procedures, there were a number of concerns with this fine motor task which must be addressed before it could be

recommended for continued use. First, the authors did not indicate whether performance on this task improves with practice. Their subjects performed the fine motor task twice in the 1991 study and it would be useful to know if the participants' performance was subject to practice effects. Second, the authors did not report if the scoring was carried out "blindly" and whether or not it could be done reliably as no interrater reliability data were provided. In order to supply answers to these questions, and to assess the appropriateness of the fine motor task as a useful dependent variable for SPA research, the present investigator was obliged to carry out a pilot study on this measure.

Four male and six female subjects participated in the pilot study voluntarily. In the experimental session, subjects were first given a practice trial with the fine motor task, and then their subjective threshold was determined with the threshold stimuli used in Experiment 2. Following this, a 10-minute baseline heart rate recording session took place. In the message presentation period, all subjects were shown the following four stimuli in the same order: I AM HAPPY AND CALM, MOMMY AND I ARE ONE, MYMMO NAD I REA ENO, and DADDY AND I ARE ONE, at the subjective threshold level. After eight exposures of each stimulus, subjects were asked to perform the fine motor task. Participants completed the line tracing exercise with a

black roller point pen held in the nondominant hand. The task was printed on a sheet of white paper and the line to be traced measured approximately 69 cm in length (see Appendix Q). Subjects were asked not to lift the pen at any time and not to backtrack if they veered off the line. An error was defined as any deviation from the line while tracing, which was further specified as any visible white space between the line on the sheet and the line being traced. Two independent raters completed the scoring.

The scores of the two raters had a high degree of association; the correlation was found to be .96. A one-way analysis of variance conducted on the average of the two raters' scores revealed no evidence of practice effects over five trials ($\underline{F}[4,36] = .88$, $\underline{ns}$). Thus, it is clear that Gustafson and Kallmen's fine motor task can be scored reliably and that performance does not appear to improve with repetition (see Table 9 for descriptive statistics). Based on the results of the pilot study, this dependent variable was deemed suitable for inclusion in Experiment 3.

Besides the incorporation of a new dependent variable, several other changes were introduced into the procedure of Experiment 3. Although the threshold procedure employed in Experiment 2 yielded satisfactory results, there were some reasonable concerns about its further use. First, a number of subjects were correct in the recall of fragments of the stimuli shown. To minimize the likelihood of conscious

Table 9

Means and Standard Deviations for the Five Trials on the Fine Motor Task in the Pilot Study

Trial	M	SD
#1	33.85	11.75
#2	31.45	12.50
#3	30.10	7.79
#4	33.00	6.28
#5	30.70	6.16

perception of stimuli, the number of trials was increased from 10 to 40. Second, it was not possible, based on the threshold data from Experiment 2, to ascertain how well the subjects were performing at the level of their subjective thresholds. In other words, there was no independent evidence to indicate whether participants' discrimination performance was at or above chance levels. This concern was dealt with by presenting 40 additional stimulus exposures at the level of subjective threshold. Third, to refine the procedure further, a systematic attempt was made to present the two threshold stimuli an equal number of times which allowed for the assessment of any response bias. Fourth, in Experiment 2, participants were required to say "I DON'T KNOW" when they could not discriminate between the threshold stimuli. This response option was changed to "GUESSING" or "NOT GUESSING". If subjects selected the GUESS alternative, they were asked to state which one of the two stimuli they thought had been presented. This strategy was necessary to permit the further assessment of any response bias, and should also improve the estimation of performance in general. Finally, unlike in Experiment 2 where descending and ascending trials commenced 2 ms below and above the termination of the preceding trial, in Experiment 3 an increment of 1 ms was chosen. This was necessitated by the fact that in Experiment 2 if a descending trial ended at 2 ms, the following ascending trial could only commence at 1

ms, the limiting point of the tachistoscope, rather than at 2-2 = 0 ms. Because the threshold procedure was lengthened considerably, and because the main point of interest was the reproducibility of findings with the MOMMY message, the experimental design was modified. Only three messages, MOMMY AND I ARE ONE, DADDY AND I ARE ONE, and MYMMO NAD I REA ENO were presented. Besides a subliminal condition, a supraliminal condition was added to determine whether qualitative differences, as predicted by Silverman, would be observed when stimuli are shown at different levels of exposure. In addition, a scale designed to evaluate the attachment bond with one's mother was also included (Bailey & Nava, 1989). This instrument was included to clarify the findings from Experiment 1 in which the Parent Relationships subscale, together with the Global Self-Worth, predicted responsiveness to the MOMMY message, but it did not allow the assessment of subjects' perception of the quality of maternal relationships separately.

The hypotheses for Experiment 3 were as follows: (1) In the subliminal condition, the performance of male subjects on the fine motor task would be superior (fewer errors) after exposure to the MOMMY message as compared to the anagram of the same stimulus. (2) Female subjects may respond to the MOMMY message with improved performance, or they may do so to the DADDY message, or to both stimuli. (3) Heart rate was included in Experiment 3 for the sake of

internal consistency across studies; it was not expected to be influenced by the messages differentially in agreement with the results of Experiments 1 and 2, since anxiety related measures may not be the best way of capturing SPA effects. However, if one sets aside the results of the first two studies, based on the SPA literature, heart rate during the message presentation period and/or during the fine motor task should decrease for male subjects following exposure to the MOMMY message. Female subjects may respond with decreased heart rate to either the MOMMY stimulus, or to the DADDY, or to both stimuli. (4) No differential effects were expected with the three experimental messages in the supraliminal condition on either dependent variable. (5) Scores on the Parent Relationships and Global Self-Worth subscales would predict responsiveness to the MOMMY message in female subjects on the fine motor task, and perhaps on heart rate, only during the subliminal condition. (5) Female subjects scoring high on the quality of attachment with mother on the Kinship Scale, and on the Global Self-Worth subscales, would show increased susceptibility to the MOMMY stimulus with fewer errors on the fine motor task, and perhaps with a decreased heart rate, under the subliminal condition.

Method[17]

[17]Unless otherwise noted, assume that all materials used and procedural conditions observed were the same as in Experiments 1 and 2.

Subjects

There were 18 male and 18 female subjects between the ages of 17 to 31 years. The mean age of the male participants was 22.50 years (SD = 4.23) and of the female participants, 21.56 years (SD = 2.31). The experiment was conducted over two sessions, the first lasted approximately 1 hour and 45 minutes and the second lasted about 45 minutes. Because of the lengthy procedure of this study, subjects were offered one of four prizes worth 50$ each to be drawn in a lottery fashion at the end of the study.

Materials

Stimuli. There were three experimental stimuli, MOMMY AND I ARE ONE, DADDY AND I ARE ONE, and MYMMO NAD I REA ENO, and two threshold stimuli, ROMEO AND A MAN NOD, and MONEY MAY A MAN AID, presented tachistoscopically. The threshold stimuli were constructed by using nine different letters that occurred in the experimental phrases (A, D, E, I, M, N, O, R, and Y). Messages were printed directly on 10.16 x 14.478 cm index cards in a 14-point Geneva font. The five phrases contained three words on the top line and two on the bottom line, and followed the word pattern of 5, 3, 1, 3, and 3 letters. The height of all five stimuli was 1 cm which subtended a visual angle of 43′ vertical. The phrases MOMMY AND I ARE ONE and MYMMO NAD I REA ENO were 3.20 cm in width, subtending a horizontal visual angle of 2°20′. The width of DADDY AND I ARE ONE was 3.048 cm with a visual

angle of 2°13′. Both threshold messages were 3.5 cm in width and subtended a visual angle of 2°32′. The luminance level of the laboratory was 50 cd/m² that of the three tachistoscopic fields 9 cd/m², and the background luminance of the stimulus cards was 10.5 cd/m². Finally, the stimulus contrast was 7.7%.

The Kinship Scale. An instrument designed to assess the degree of attachment bond with others, developed by Bailey and his colleagues was used. This inventory consisted of 10 items on which the subjects rated the quality of maternal relationships on a 5-point scale, where 1 represented NEVER and 5 VERY OFTEN (see Appendix L). The scores could range from a minimum of 10 to a maximum of 50 points. The higher the score the higher the degree of attachment. The Kinship Scale was designed to assess the degree of familial kinship and other types of intimacy (Bailey & Nava, 1989; Nava & Bailey, 1991). The original scale contained 60 items which was administered to 63 undergraduate students. Subsequently, items that did not capture the theme of kinship were excluded and the instrument was shortened to 20 items. In this form, the scale was again administered to 200 undergraduate college students. Bailey and colleagues found a high degree of relationship between their instrument and other measures of intimacy such as the Rubin Love and Liking Scales (Rubin, 1974), and the Adolescent Parent Relations Scale (Atkinson &

Bell, 1986; as cited by Nava & Bailey, 1991). The Kinship Scale was also shown to be susceptible to different instructional sets involving different types of relationships. For example, it could distinguish between high and low levels of intimacy based on whether subjects completed the questionnaire while keeping in mind either their closest parent, boyfriend/girlfriend, or an acquaintance. Nava and Bailey (1991) carried out factor analysis on the 20-item scale and found that the 20 items could be grouped into four factors, and one of these factors labeled as Family Love accounted for 37.7% of the total variance. The new 10-item inventory revealed the same pattern of correlations with other external measures of intimacy as the 20-item version. Additionally, this factor was more strongly associated with other intimacy scales than any of the other three factors. Based on the above evidence, the authors suggested that this shortened form of the instrument could be used reliably to assess kinship with familial and nonfamilial members.

The other materials included were the same heart rate monitor, recall and recognition lists, and the Self-Perception Profile for College Students as in Experiment 2. Finally, Gustafson and Kallmen's fine motor task was also included.

Procedure

The experiment was carried out over two sessions separated by at least one day. In the first session, participants were first given a practice trial with the fine motor task, followed by the administration of the threshold trials, and finally the subliminal condition was completed. In the second session, the supraliminal condition was administered first, following which the participants completed the Self-Perception profile and the Kinship Scale.

Threshold trials. For each participant, subjective threshold was determined by using the staircase method. In all, 40 trials, 20 descending and 20 ascending, were performed. The two threshold stimuli, ROMEO AND A MAN NOD and MONEY MAY A MAN AID, were presented randomly and an equal number of times within a block of 10 flashes, with the constraint that the same stimulus was never shown more than three times consecutively. Subjects were required to indicate which of the two messages was presented on each occasion and then to state whether or not they were guessing which message they had seen. A guess was defined in terms of chance performance. Subjects were told that they should use the guess option when they were forced to flip an imaginary coin in their heads to side with one of the two messages. Subjects were further informed that the two messages would be presented an equal number of times and that they should regard each flash as an independent trial

and should not let previous guesses or not guesses influence their subsequent choices.

At the beginning of the threshold trials, the participants were shown the two stimuli sequentially until they were able to read them out aloud. The first trial was then begun at 50 ms and exposure duration was decreased in steps of five ms until a GUESS response occurred. The second, ascending, trial commenced one ms below the point at which the previous descending trial had ended. Ascending trials always terminated when subjects gave a NOT GUESS response and the following descending trials commenced one ms above this point. Except for the first trial, all subsequent trials proceeded in gradations of one ms. After 20 and 40 trials, subjects were given a short break of about one minute. Prior to each stimulus presentation subjects were shown a centering dot for one second and were asked to fixate their gaze at this position. Before each stimulus exposure, the experimenter said READY to indicate the presentation of the next flash. Once the 40 trials had ended, the subjective threshold was determined by the following rule: the highest point in milliseconds at which a GUESS response occurs, and at or below which no NOT GUESS response occurs. If a subject went as low as one ms at which point he/she made a Guess response, the threshold trials were stopped and the subject's threshold was

considered determined at one ms.[18] To provide some indication of each participant's performance level, an additional series of 40 flashes was administered at each participant's subjective threshold. These trials were conducted in the same manner as the threshold trials.

The subliminal condition. Following the threshold trials, a baseline heart rate recording session took place for 10 minutes. Next, subjects were exposed to one of the three stimuli at the level of their subjective thresholds. The sequence of events for the presentation of the subliminal stimulus was as follows: A fixation dot was shown for 1 second which was proceeded immediately by a subliminal message. Eight such exposures were given with an intertrial interval of 5.7 seconds. Upon termination of the message presentation interval, subjects were asked to perform the fine motor task, and the time required to trace

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[18]During the threshold trials, subjects may have used any of a number of strategies to distinguish between the two phrases. One such strategy might have been to pay attention only to the first letter of each sentence and to ignore the rest of the phrase. Because of fears over influencing subjects' responses adversely, no instructions were given to them as to what tactics to adopt. Relatedly, it should also be pointed out that subjects may have depended upon the perception of single letters to distinguish between stimuli in the threshold trials, which requires some conscious perception or awareness of something in order to provide a verbal report of that perception. In the subliminal condition of experiment proper, registration of a complete phrase is necessary for unconscious perception to take place, but the subjects need not be able to verbalize any part of the phrase since it is not consciously perceived. In short, one should not confuse the occurrence of fragmentary conscious perception and its verbal reporting during the threshold trials, with unconscious perception of an entire phrase in the subliminal condition.

the line was recorded. After this, they were given the recall task which required them to indicate any part of the stimulus that they might have seen consciously. During the message presentation phase, subjects were encouraged to state out loud any part of the stimulus if they perceived it consciously. In this fashion, the procedure was repeated two more times with the remaining two stimuli. Each subject was exposed to all three stimuli in a counterbalanced order. Finally, the recognition task was completed. In contrast to Experiments 1 and 2, each participant was shown all three stimuli in Experiment 3. For this reason, participants were asked to choose only the last stimulus that they believed had been shown to them.[19]

The supraliminal condition. The procedure for the supraliminal condition was the same as that for the subliminal condition with the exception that all stimuli were presented at the consciously perceivable time duration of 500 ms for all subjects. Since all stimuli could be read

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[19]If participants had been asked to complete the recognition lists after the presentation of each of the three stimuli, this might have influenced their response to the subsequent message. Also, it would have placed undue demands on the subjects' perceptual and memorial capacity if they had been required to select three different stimuli at the end of the message presentation phase, based on three different message exposure plus fine motor task periods, lasting 15 minutes or more. The practice of offering a monetary reward for the correct recall of stimuli was not observed in Experiment 3, because subjects in the previous two studies expressed a strong disbelief about the possibility of anyone being able to win the promised reward. Since each participant in the present experiment was shown all three messages, it was felt inappropriate to offer a reward which most subjects would consider unattainable after being exposed to the first message.

clearly, subjects were told not to divulge the content of the stimuli to the experimenters to ensure that the latter remained unaware of the stimulus content. All stimuli were shown in a counterbalanced order but the sequencing was different from that used in the subliminal condition. To equate the subliminal and supraliminal conditions with respect to the length of message presentation period and the number of heart rate readings, subjects were asked to look into the tachistoscope for 52 seconds in both conditions. This ensured that eight exposures of each stimulus were presented and the same number of heart rate recordings were obtained in each condition.

Results

Subjective Thresholds

Before proceeding to evaluate the effects of subliminal and supraliminal stimuli on heart rate and fine motor performance, it is crucial to determine whether the procedure used to establish subjective thresholds was successful in achieving the desired aims. Therefore, the issue of thresholds will be considered in detail.

The mean subjective threshold of male participants was 6.78 ms, (SD = 4.18) and the range was 1 to 14 ms. For female participants, the mean subjective threshold was 5.06 ms (SD = 3.0) and the range was 1 to 10 ms. There were no significant differences between the thresholds of the two genders (t [34] = 1.19, p > .05). The total number of

flashes presented to the subjects was 3996. Of these, 2917 (73%) were correct and 1079 were incorrect responses. A chi-squared test revealed that there were significantly more correct than incorrect responses (X^2 [1, N = 36] = 845.41, p < .001). The total number of GUESS responses was 1863 (46.62%) and Not Guess responses was 2133. Thus, subjects gave more NOT GUESS than GUESS responses (X^2 [1, N = 36] = 18.24, p < .001). These two findings are not surprising since a large majority of stimulus presentations would have occurred above the threshold point and therefore they would have been perceived consciously.

Considering the total number of GUESS responses, 57.91% were correct, which represented a greater than chance level performance (X^2 [1, N = 36] = 47.70, p < .001). Thus, when participants indicated that they were guessing, they were performing at better than chance levels. When participants indicated they were not guessing, 98.75 % of their responses were correct, (X^2 [1, N = 36] = 1121, p < .001). This is not a surprising result since conscious awareness of stimuli would be expected to lead to an increase in the number of correct identifications and should also correlate highly with increased confidence in the perception of stimuli.

Next, participants' responses on the two threshold stimuli were analyzed to check for any response bias. In total, there were 2188 (54.75%) MONEY MAY A MAN AID responses and 1808 ROMEO AND A MAN NOD responses. The MONEY

stimulus was chosen significantly more often than the ROMEO phrase, reflecting a response bias in favor of the former message (X^2 [1, N = 36] = 36.02, p < .001). It is not clear why such a response bias should have existed, but one possible explanation for this may be conceptualized as follows: At the outset, participants were informed that the two threshold stimuli would be presented an equal number of times and that they should consider each flash as a separate trial, and they were asked to judge each stimulus presentation without reference to their previous responses. Despite this admonition, participants may have adopted some strategy for responding in a particular way. For example, the threshold procedure included both ascending and descending trials during which the subjects could see the stimuli clearly only part of the time. When a given stimulus was completely outside of awareness, subjects may have relied on preceding flashes for their choice when the stimuli were partially or completely visible. Consider the sequence of stimuli on a descending trial: ROMEO, MONEY, ROMEO, ROMEO. If the next flash was not visible, and since subjects were aware that the stimuli were being presented equally often, a good bet would have been to say MONEY. However, this stimulus could easily have been ROMEO instead. In this way, subjects may have chosen or favored one of the two alternatives thereby contributing to a response bias. Of course, this reasoning is purely hypothetical and does

not explain why a response bias occurred in favor of the MONEY message rather than the ROMEO stimulus. There may very likely be other possible explanations for the observed response bias. Data from the 40 flashes condition do suggest, however, that some sort of strategy was operative, due to partial visibility of stimuli, in the threshold trials (see below).

In the 40-flash condition, the total number of stimulus presentations was 1440. Of these, 766 (53.19%) were correct and 674 were incorrect responses. A chi-squared test showed that the number of correct responses was significantly higher than the number of incorrect responses (X^2 [1, N = 36] = 5.88, $p < .05$). This finding is consistent with Cheesman and Merikle's (1986) prediction of a greater than chance level performance at the point of subjective threshold.

The total number of GUESS responses was 1217 (84.51%) and NOT GUESS responses was 223. Analysis of these data revealed that subjects gave more GUESS responses than NOT GUESS responses (X^2 [1, N = 36] = 686.58, $p < .001$). This result was expected since the stimuli were presented at individually determined threshold values, and subjects could not consciously perceive the messages on most occasions and would therefore have been forced into guessing.

Considering the GUESS responses, 51.2% of them were correct. This performance was not significantly different

from chance (X^2 [1, $\underline{N}$ = 36) = .69, $\underline{ns}$). Thus, when subjects stated that they were guessing, their objective performance confirmed this supposition.

When subjects indicated they were not guessing, 64.13% of their responses were correct. This performance was significantly better than chance levels (X^2 [1, $\underline{N}$ = 36] = 17.82, $\underline{p}$ < .001). Thus, when subjects claimed to be not guessing, their objective performance agreed with this hunch.

The data reveal that there was no response bias in the 40-flash condition. There were 718 MONEY responses and 722 ROMEO responses, which represented a chance level performance (X^2 [1, $\underline{N}$ = 36] = .012, $\underline{ns}$). This finding is in contrast to an overall response bias observed in the threshold condition. The absence of a response bias in the 40-flash condition may be explained by considering the fact that during the 40 flashes, stimuli were presented at the subjects' threshold values and one would not expect them to be influenced by their own preceding choices to the same degree as in the threshold condition because, they would be, for the most part, unaware of the stimulus content.

The subjective threshold is the point at which participants claim to be unable to make forced choice judgments at better than chance levels, but their objective performance does exceed this point. Subjects' overall performance was found to surpass chance levels, which

indicates that a subjective threshold was established. It is important to note that subjects were required to make a forced choice discrimination response on every flash even when they claimed they were guessing. This proved to be a crucial point since subjects' responses indicated that on most of the flashes they were guessing, which makes sense since the stimuli were presented at the threshold point. However, the small number of not guess responses were interspersed with guess responses, and the former were more likely to be correct than incorrect. This pattern of results underscores the importance of requiring a flash by flash report and provides a better assessment of subjective thresholds than the procedure of Cheesman and Merikle (1986), who required participants to evaluate their own performance only after a certain number of stimulus presentations had been completed within a block of trials.

Subliminality of Stimuli

Each of the 36 participants completed three recall tasks, resulting in a total of 108 responses. There were thirty-five responses of perceiving nothing, 11 of flashes of light, 21 reports of indiscernible writing, nine of various images and patterns (e.g., a line, a chicken, a lamb, the French flag), 13 of letters that did not occur in the messages shown (e.g., B, G, V), and 19 reports of letters that did occur in the messages (e.g., M, O, Y). The participants failed to recall correctly even a single word

contained in the stimuli presented. Thus, in contrast to Experiment 2, the correct perceptions in Experiment 3 were very fragmentary, which suggests that in comparison to the earlier study, the threshold procedure of this experiment was more effective in preventing the correct reporting of stimuli. In the supraliminal condition, all participants successfully recalled all three messages; however, some errors did occur in the reporting of the nonsense control phrase such as juxtaposition or deletion of letters.

On the recognition lists, the probability of a correct identification was one in 25 (4%) for each list. Since 36 subjects were tested, 1.44 correct recognitions would be expected to occur by chance alone. Two participants, one on each list, correctly chose the stimulus presented to them. This was not significantly different from chance (X^2 [1, $\underline{N}$ = 36] = 0.14, $\underline{ns}$). Based on the two tests of awareness, the messages can be considered to have been presented subliminally. In the supraliminal condition, all subjects correctly chose the presented stimuli on both recognition lists.

Effects of Subliminal and Supraliminal Stimuli on Heart Rate

First, to assess any possible preexisting group differences in the baseline heart rate scores, a 2 (gender) X 2 (liminality) mixed analysis of variance was performed. There was no main effect of gender, nor gender X liminality interaction effects, but a significant main effect was found

for the liminality variable ($F[1,34] = 29.81$, $p < .0001$). Heart rate during the supraliminal condition was higher than during the subliminal condition. For male subjects the means during the subliminal and supraliminal conditions were 65.81 beat/min. ($SD = 10.27$) and 71.04 ($SD = 10.98$), respectively. For female subjects the two means were 69.26 beat/min. ($SD = 12.00$) and 77.17 ($SD = 10.73$). It is not clear why a difference in the baseline scores of the two conditions existed, but because of this discrepancy the effects of experimental stimuli were analyzed separately in each condition.

For every subject, heart rate in each condition was recorded under two intervals, message presentation (11 readings) and during the fine motor task (readings varied across subjects), for all three stimuli. Since there was only one measure of baseline in each condition, percent change scores from baseline to message presentation, and from baseline to fine motor task interval were computed for each stimulus (see Tables 10 and 11 for descriptive statistics).

First, a 2 (gender) X 2 (interval) X 3 (message) mixed analysis of variance, in which gender was a between-subjects variable, was performed on the data from the subliminal condition. The only significant finding to emerge was a

Table 10

Heart Rate Means and Standard Deviations during Two Intervals in the Subliminal and Supraliminal Conditions

	Subliminal		Supraliminal	
	Message Duration	Fine Motor Task	Message Duration	Fine Motor Task
MOMMY				
Males	66.60	68.58	68.12	70.48
	(10.38)	(10.37)	(8.94)	(9.13)
Females	70.71	74.31	74.77	78.73
	(11.55)	(10.79)	(10.14)	(9.64)
DADDY				
Males	65.68	67.90	68.44	70.11
	(10.58)	(10.42)	(8.84)	(8.97)
Females	71.48	75.31	74.87	79.04
	(12.67)	(11.98)	(11.87)	(9.94)
ANAGRAM				
Males	65.50	68.97	69.98	71.05
	(9.34)	(10.60)	(9.58)	(8.99)
Females	70.51	74.56	78.26	80.49
	(11.17)	(11.64)	(12.19)	(9.99)

Table 11

Means and Standard Deviations of Percent Change in Heart Rate during Two Intervals in the Subliminal and Supraliminal Conditions

	Subliminal		Supraliminal	
	Message Duration	Fine Motor Task	Message Duration	Fine Motor Task
MOMMY				
Males	-1.26	-4.37	3.60	0.28
	(3.71)	(4.40)	(6.10)	(6.13)
Females	-2.36	-8.01	2.99	-2.41
	(5.04)	(8.87)	(4.16)	(7.04)
DADDY				
Males	0.10	-3.33	3.17	0.76
	(5.45)	(4.70)	(5.10)	(6.12)
Females	-3.42	-9.36	3.08	-2.81
	(7.48)	(10.12)	(5.97)	(7.44)
ANAGRAM				
Males	0.17	-5.16	1.06	-0.61
	(4.60)	(7.55)	(5.87)	(6.16)
Females	-2.15	-8.13	-1.47	-4.73
	(4.99)	(7.21)	(7.84)	(7.77)

Note. Negative scores indicate an increase and positive scores reflect a decrease in heart rate.

main effect for the interval factor ($F[1,34] = 23.11$, $p < .0001$), indicating, not surprisingly, that heart rate during the fine motor task was higher than during the message presentation interval. To confirm any of the experimental hypotheses, one or more of the following terms would have to be significant: either a main effect for the message variable, or an interaction between gender and message factors, or among gender, message, and interval variables. Since none of these terms was significant, the hypotheses received no support (see Appendix M for a summary source table).

In the same way as above, another three-way analysis of variance was carried out on the data from the supraliminal condition. The analysis revealed a significant main effect for the interval variable ($F[1,34] = 23.22$, $p < .0001$), which indicated that heart rate during the fine motor task was higher than during the message presentation period (Appendix N). At the same time, the message variable reached significance ($F[2,68] = 14.91$, $p < .0001$), and the message X interval interaction term was also significant ($F[2,68[= 3.13$, $p < .05$). Sheffe's post hoc analyses on the message factor revealed that, compared to the MOMMY and DADDY stimuli, the anagram control phrase produced increased heart rate scores. The interaction between the message and interval variables was analyzed by performing simple effects tests and simple comparison tests (Keppel, 1991). These

analyses showed that the control stimulus had higher heart rate scores than the other two stimuli during the message presentation interval, and no significant differences existed among the stimuli during the fine motor task interval (Geisser-Greenhouse correction applied; Keppel, 1991). These results were unexpected and, if anything, contradict the hypotheses, because no differences among the stimuli were expected during the supraliminal condition. One plausible explanation for an increased heart rate with the anagram message is provided by the reactions of some subjects following exposure to this phrase. As will be remembered, subjects were asked to recall each stimulus after having completed the fine motor task. Many of them expressed difficulty remembering the nonsense phrase in its entirety whereas no such hesitation was expressed following the MOMMY or DADDY stimulus. Thus, since they knew that they would be called upon to remember a meaningless phrase later, subjects may have exerted more effort in committing the message to memory and may have felt anxious lest they could not recall it accurately. This strategy would have raised heart rate more than the other two meaningful stimuli which were easier to remember.

A number of subsidiary analyses were also performed. First, to determine whether the nonsignificant results in the subliminal condition would disappear if the data from those subjects who reported some content of the stimuli

correctly were removed, a 2 (gender) X 2 (interval) X 3 (message) mixed ANOVA was carried out with the data of 12 participants excluded. (These 12 subjects were responsible for the 19 correct recall reports). The results of this analysis did not change when compared with those of the complete analysis reported above. Second, in keeping with the earlier 2 experiments, the heart rate scores associated with each of the 5-second intervals from the subliminal condition were analyzed. For this purpose, eleven, 2 (gender) X 3 (message) mixed ANOVAs were performed on the percent change scores from the subliminal condition at every 5-second interval during the message presentation phase.[20] None of these analyses revealed significant effects.

To determine whether there were any order effects present between the six message sequences and the message effect, eight separate, 3 (order) X 6 (sequence) mixed ANOVAs were performed. In these analyses, the message effect was also calculated and its sum of squares was subtracted from the sum of squares for the AB interaction term, and 2 degrees of freedom associated with the former

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[20]In Experiments 1 and 2 there were 24 heart rate readings for every subject from the two intervals of message presentation and post message, allowing one to perform 24 ANOVAs. In contrast, during the fine motor task phase of Experiment 3, subjects varied in the amount of time required to complete the task, and thus had different numbers of heart rate readings. Consequently, only 11 analyses associated with each of the 11 intervals during the message presentation phase could be performed meaningfully. For similar reasons, a separate ANOVA in which the data from the two heart rate recording intervals were collapsed in the previous two studies, was not performed here.

were also subtracted from the total degrees of freedom (10) for the latter term. The new interaction expression was then evaluated for significance. Four analyses were conducted for each gender, 2 each in the subliminal and supraliminal conditions, during each of the two intervals, message presentation and fine motor task. Since 8 ANOVAs were performed in all, the probability level was set at 0.01. None of the analyses reached significance, thus revealing no order effects for the three messages during either of the two intervals in either condition (see Appendix O for a sample summary table).

Finally, correlations were performed between subjective thresholds and percent change in heart rate for the MOMMY message, in each of the two recording intervals, for males and females in the subliminal condition. None of the correlation values was significant, indicating that responsiveness to the symbiotic message was not dependent on the level of subjective threshold.

Effects of Subliminal and Supraliminal Stimuli on Fine Motor Performance

Two raters scored the fine motor task for the number of errors. The correlation between the scores of the two raters was .91, indicating a high degree of agreement. No practice effect was observed over the six trials on the task ($F[2,70] = 1.67$, $p > .05$). There was no correlation between the number of errors on the fine motor task and the time

taken to complete the task (r = -.13, p > .05). A 2 (gender) X 2 (liminality) X 3 (message) mixed analysis of variance, in which gender was a between-subjects variable, was performed. To support the experimental hypotheses, one would have required a significant interaction between the liminality and message factors, and/or among gender, liminality, and message variables. Neither of these terms was significant. The only significance to emerge was the interaction between the gender and liminality variables (F[1,34] = 4.57, p < .05), indicating that errors of male and female subjects on the fine motor task differed as a function of liminality (see Table 12 for descriptive statistics, and Appendix O for a summary source table). The simple effects tests showed that, whereas the performance of male subjects did not change from the subliminal to the supraliminal condition, female subjects' performance declined (increased errors) in the supraliminal than the subliminal condition. It is not clear why this trend in the data existed, but it does not bear directly on the main hypotheses under consideration, especially since the messages were counterbalanced. In summary, the results did not reveal a differential effect of stimuli for either male or female subjects as a function of liminality.

As in the case of heart rate, a number of supplementary analyses were also performed on the errors of the fine motor

Table 12

Means and Standard Deviations for the Errors on the Fine Motor Task in The Subliminal and Supraliminal Conditions

Stimulus	Subliminal	Supraliminal
MOMMY		
Males	43.81 (15.55)	41.78 (12.29)
Females	44.47 (9.32)	47.69 (9.08)
DADDY		
Males	44.03 (13.11)	41.06 (13.00)
Females	44.25 (8.69)	44.78 (10.58)
ANAGRAM		
Males	46.53 (16.54)	43.78 (14.79)
Females	42.25 (8.82)	45.31 (8.89)

task. First, the scores of 12 subjects who reported some stimulus content correctly were excluded, and another 2 (gender) X 2 (liminality) X 3 (message) ANOVA was carried out. The results of this analysis remained the same as those in the main ANOVA for this measure. Second, to look for any possible order effects, four separate 3 (order) X 6 (sequence) ANOVAs were conducted, two for each gender, one in the subliminal and one in the supraliminal condition. The rules that applied to the analyses of heart rate data were also applicable here. The results revealed no order effects for male or female subjects in either condition. Finally, the correlation values between subjective thresholds and errors on the fine motor task following the MOMMY message in the subliminal condition were not significant for either male or female participants.

Self-Perception, Kinship, and Responsiveness to MOMMY AND I ARE ONE

Four different multiple regression analyses were carried out for each gender. As in Experiments 1 and 2, percent change scores of heart rate from baseline to message presentation for the MOMMY message were used as a dependent variable, and errors on the fine motor task served as a second dependent variable. The Global Self-Worth and Parent Relationships subscales were entered as independent variables in the first analysis, and Global Self-Worth and Kinship with mother scores served as independent variables

for the second analysis. It is interesting to note that for male subjects there was a significant correlation between the scores of the Parent Relationships subscale and the Kinship Scale ($r[18] = .79$, $p < .05$), but for female subjects this was not the case ($r[18] = .092$, $p > .05$). These findings suggest that it is important to assess maternal relationship separately from overall parental relationship.

Using heart rate as the first dependent variable, and the two Self-Perception subscales as independent variables, the regression coefficient R^2 for male subjects was found to be .1158 and for female subjects .1545 (the adjusted R^2 values were 0.00 and .0418, respectively). Both coefficients were nonsignificant. When errors on the fine motor task were substituted for heart rate, the multiple regression coefficients were similarly nonsignificant. For males the R^2 was .0276 and for females .0248 (the adjusted R^2 being 0.00 in both instances).

In the second type of analysis, Global Self-Worth and Kinship scores were the predictor variables and heart rate served as the first dependent variable. The respective R^2 values for male and female subjects were .1711 and .0379 (the adjusted R^2 being .061 and 0.00, respectively). Using fine motor performance as the dependent variable, the two R^2 coefficients were .0075 and .2462 (adjusted R^2 values being

0.00 and .1457). All four coefficients failed to reach significance.

Considering the contribution of each independent variable separately, the predictor with the largest value was Kinship ratings for female subjects when fine motor performance was the dependent variable. It accounted for 24.24% of the variance in the data. The t value which tests for significance of ß almost reached significance ($p < .06$). However, when one looks at the pattern of correlation between this predictor and fine motor performance, one notices that the correlation is positive, whereas the hypothesis predicted an inverse relationship. The contribution of other factors in the various analyses reported was very small and ranged from a minimum of .15% for male subjects with the Kinship scale using fine motor performance, to a maximum of 15.4% also for male subjects with the Kinship ratings using heart rate as the dependent variable. In conclusion, none of the regression models approached overall significance and thus failed to support the postulated link between individual difference factors and responsivity to the MOMMY message (see Tables 13-16 for multiple regression reports).

Table 13

Multiple Regression Report Using Two Self-Perception Subscales as Predictors and Percent Change in Heart Rate Scores as a Dependent Variable

Variable	*r*	r^2	sr_i^2	β	*t*	*p*<
Males						
Global	-.270	.07	.106	-.36	-1.36	
Parent	.086	.01	.046	.22	.85	
Females						
Global	.135	.018	.014	-.144	-.48	
Parent	.376	.141	.137	.463	1.56	

Table 14

Multiple Regression Report Using Two Self-Perception Subscales as Predictors and Errors on the Fine Motor Task as a Dependent Variable

Variable	r	r^2	sr_i^2	β	t	p<
Males						
Global	-.039	.002	.0007	.029	.11	
Parent	-.164	.027	.0261	-.175	-.63	
Females						
Global	.155	.024	.0198	.176	.55	
Parent	.071	.005	.0008	-.035	-.11	

Table 15

Multiple Regression Report Using One Self-Perception Subscale and Kinship Scale as Predictors, and Percent Change in Heart Rate Scores as a Dependent Variable

Variable	r	r^2	sr_i^2	β	t	p<
Males						
Global	-.27	.073	.0171	-.14	-.55	
Kinship	-.393	.154	.0981	-.334	1.33	
Females						
Global	.135	.018	.0109	.107	.41	
Kinship	.164	.027	.0199	.143	.56	

Table 16

Multiple Regression Report Using One Self-Perception Subscale and Kinship Scale as Predictors, and Errors on the Fine Motor Task as a Dependent Variable

Variable	r	r^2	sr_i^2	β	t	p<
Males						
Global	-.039	.0015	.0001	-.007	-.02	
Kinship	-.086	.0074	.006	-.084	-.30	
Females						
Global	.155	.024	.0035	.061	.23	
Kinship	.4926	.2427	.2222	.481	2.10	.06

Discussion

Experiment 3 was a follow-up investigation from the previous two studies, primarily to determine whether a dependent variable previously used with success in the SPA literature would yield significant results when new methodological improvements are introduced into the method. Unfortunately, the findings of this final experiment remained unaltered when compared with those observed on earlier occasions. Three findings from the present experiment are noteworthy: (1) heart rate was unaffected by the subliminal stimuli differentially; (2) Gustafson and Kallmen's (1990, 1991) fine motor task proved intransigent to the impact of the MOMMY message; and (3) no relationship was observed between self-perception, or attachment with mother, and susceptibility to the MOMMY phrase.

The fine motor task was chosen because it had been shown to be influenced by the subliminal presentation of the MOMMY phrase in one of the more sophisticated methodologies in SPA. Gustafson and Kallmen (1991) presented ten different stimuli which included the MOMMY phrase, its various partial component words, and the corresponding nonsense control phrases. They reported that only the complete MOMMY message reduced errors significantly on the fine motor task compared with other stimuli. Their two experiments had been hailed as a model for future studies in the area (Fudin & Benjamin, 1992). However, despite the

strength of Gustafson and Kallmen's methodology, numerous shortcomings still remained: (1) their findings were accumulated over two separate experiments in which different stimuli were presented; (2) all stimuli were shown at the standard exposure duration of four ms.; (3) a supraliminal comparison condition was not included; (4) no information was provided as to whether the fine motor task was scored "blindly" and no information regarding reliability of the scoring was given. When all these factors were taken into account in Experiment 3, it was found that the fine motor task could be scored reliably by two independent raters, but most important, when SPA stimuli were presented at the threshold point, no significant effects with the MOMMY message were obtained. Thus, Gustafson and Kallmen's results, like those of other SPA investigators, become highly suspect and may have arisen due to methodological impurities.

Experiment 1 demonstrated a significant relationship between Global Self-Worth and Parent Relationships subscales and responsiveness to the MOMMY message in female subjects, but Experiment 2 failed to replicate these results. Even after almost doubling the sample size in Experiment 3, the findings of Experiment 1 could not be replicated. At the same time, the degree of attachment with mother was also included in order to clarify whether this variable has any mediating role to play in the response to the maternal

symbiotic message. Again, the results were nonsignificant. Based on two failures to reproduce the self-perception findings, one can now regard the significant results of Experiment 1 as a chance occurrence, especially since those findings were based on a small sample of ten subjects. Although the self-perception findings did not prove to be reliable over three experiments, this exercise nevertheless underscores the importance of continued attempts at replication. Silverman was criticized because he ignored exact replications and unnecessarily broadened his research program without establishing whether previous effects could be regarded as reliable (Balay & Shevrin, 1988). This charge of carelessness cannot be labeled against the self-perception approach in the present set of studies, and the same can be said for the dependent variable of heart rate.

GENERAL DISCUSSION

Empirical testing of psychoanalysis has long been advocated by experimental psychologists, but real attempts to validate the theory have been few and far between. Silverman's SPA method was eagerly welcomed as a breath of fresh air in a climate of stagnation, intransigence, and reluctance among dynamically oriented clinicians to demonstrate empirical support for their clinical principles. In early years, SPA achieved resounding success and Silverman quickly amassed abundant evidence to claim overwhelming support for psychoanalysis. In a modern era typified by cognitive-behavioral attitudes, such avowals were bound to arouse close scrutiny of scientific claims for psychodynamic theories, and several critiques of Silverman's work subsequently emerged in the literature. Because of many failed attempts to replicate SPA findings, and due to numerous extant methodological defects, one could not pronounce a verdict of either soundness or insolvency against SPA. Thus, there was an urgent need for a systematic research program to overcome these lacunae, and the present series of studies was a step in this direction.

In three separate but interrelated experiments which followed Silverman's original procedure and also incorporated a number of important methodological changes, no support was found for the claim that the subliminal presentation of the phrase MOMMY AND I ARE ONE is capable of

producing positive behavioral changes, such as anxiety reduction and improvement in fine motor performance. These results challenge the statements of many researchers who claimed that even when methodological refinements are made to the SPA procedure (Weinberger & Hardaway, 1990), the basic findings with the MOMMY message will not be altered. At the same time, these results are inconsistent with Hardaway's meta-analysis which lent strong support to SPA effects. The results, however, are in agreement with those who failed to demonstrate support for SPA (Clark & Procidano, 1987; Greenberg, 1990, 1992; Holmes, 1991; Snodgrass, 1988). The question now becomes: what verdict must one pronounce regarding the validity of SPA? Simply and succinctly put, SPA is not a reliable or effective means for studying the role of unconscious oneness fantasies in producing positive behavioral changes in nonclinical populations.[21] This pronouncement may seem overly harsh to some, but in the light of mounting negative evidence one has

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[21]One might contend that this far-reaching conclusion is unwarranted because the statistical power of the experiments reported herein is inadequate. Perhaps it is true that in Experiments 1 and 2, the sample size of 10 subjects per cell (or 20 per cell if gender is disregarded) is lower than one would have desired, but this was not necessarily the case in Experiment 3, which was partly undertaken to address this concern, and which had 18 subjects per cell (or 36 per cell if gender is disregarded). Since a number of important hypotheses were being tested in the first two studies, a compromise had to be struck between what was practical and what was optimal. Thus, although one could possibly raise the argument of an insufficient sample size in the first two experiments to challenge their results, this was not of serious concern in the final study, and the overall conclusions can be defended in the light of nonsupportive data from all three experiments.

to raise serious questions regarding the further usefulness of this experimental technique. After all, three decades have gone by since the birth of SPA and the scientific community has been left wondering all this time whether SPA could serve as a viable procedure in the service of psychoanalysis. Of course, SPA proponents can proffer the suggestion that other dependent measures and personality variables should be examined in continued research, but this overused immunizing strategy can always be relied upon to defend any experimental method and one can go on testing other variables ad infinitum. Hence, one might very reasonably pose the following question: Based on the current state of knowledge, can one still continue to lean on the SPA method to test psychodynamic propositions?

Does SPA Still Have a Future?

After having raised serious misgivings regarding the effectuality of the SPA method, two cautionary caveats must be added at once. The first is that the verdict of nonviability should be restricted to the exploration of oneness fantasies in normal or nonclinical populations, and the procedure may yet prove to be of use in studying merger fantasies with clinical populations. (This point also applies to the studies designed to enhance student grades in educational settings). It will be recalled that Silverman began the investigation of unconscious oneness fantasies with schizophrenic patients, based on his own clinical

experience and that of other dynamic practitioners. Many analysts have noted the ubiquity of oneness-type wishes in the reports of their patients and have emphasized the necessity to encourage oneness-type relationships with their clients in order to produce therapeutic benefit (Limentani, 1956; Nacht, 1964). Symbiosis has been claimed to be a fundamental part of the human infant's psychological development (Mahler et al., 1975), and failure to navigate successfully through the stages of symbiosis and/or separation/individuation phases can, it is believed, result in psychopathology.

According to many psychoanalysts, the symptoms of schizophrenia signify patients' difficulty in maintaining distinct and separate representations of self and object, and the pathology is presumed to express a need for unconscious wish to re-obtain merger (Silverman et al., 1982). For these reasons, Silverman claimed that the wish for merger with mother could decrease the intensity of schizophrenic symptoms, if, simultaneously, a sense of self is preserved. This is supposedly the function of the phrase MOMMY AND I ARE ONE (Silverman et al., 1982). Similarly, in the treatment setting, it has been observed by some analysts that the patient often tries to create a relationship of oneness with the therapist. Silverman has referred to the work of many clinicians (e.g., Bandler & Grinder 1975; Little, 1960) who emphasize the importance of fostering such

a connection in order to achieve therapeutic success. This strategy, it is hypothesized, aids in bringing the patient to a state of basic unity where he/she is in a position to repair damage that was done at an earlier time. The MOMMY message has been claimed to be of therapeutic import in treating alcohol, tobacco, and heroin addiction, as well as obesity, depression, and phobias.

Silverman et al. (1982) have outlined eight different needs that the MOMMY message could possibly gratify: (1) fulfilling the wish for oral gratification and nurturing all needs; (2) engendering feelings of safety, protection and imperviousness to environmental threats; (3) avoiding the fear of losing mother; (4) helping to repair poorly defined self images; (5) strengthening the individual to deal with irrational thinking, impulsiveness and poor judgement; (6) substituting the desire to harm mother by gratifying merging needs; (7) reducing the guilt for any real or imagined wrongs perpetrated against the mother; and (8) defending against oedipal wishes. It is certainly plausible that these presumed needs are present more strongly in clinical populations than in nonclinical college students, and may be of greater relevance to the former. Thus, fulfillment of any of these needs with the MOMMY message may produce more reliable behavioral changes in clinical populations. In several studies in which clinical patients have served as subjects, positive treatment outcome has been reported.

However, failed replications also mar this type of research (Condon & Allen, 1980; Porterfield & Golding, 1985; Oliver & Burkham, 1982). Despite this shortcoming, it is still justified and worthwhile to explore the effects of stimulating fantasies of oneness in clinical populations. In recent years, research involving clinical samples has not received the same kind of attention as that involving nonclinical subjects. There is yet another reason for guarded optimism. In a meta-analytic review of 11 studies, SPA effects were found to be more robust with clinical than with nonclinical subjects (Bornstein, 1990). But even here, one encounters a vast array of methodological problems inherent in the studies of Bornstein's meta-analysis, which dampens the momentousness of his conclusions.

The second caveat regarding a negative verdict passed against SPA concerns the use of this procedure to investigate psychodynamic hypotheses that are unrelated to the issue of oneness fantasies. There exists a small number of studies in which the focus of enquiry has been to demonstrate postulated links between specific unconscious conflicts and particular behavioral manifestations (Silverman et al., 1976). For instance, conflicts over anal matters in stuttering (Silverman et al., 1972), incest related themes in homosexuality (Silverman et al., 1973), and aggressive wishes in depression (Rutstein & Goldberger, 1973) have been examined with the SPA method. One example

of an ingenious use of the SPA procedure comes from a study in which two differing claims about narcissistic personality disorder were put to test (Shulman & Ferguson, 1988).

Currently, the major topic of discussion in psychodynamic circles is the etiology and treatment of narcissistic personality disorder, and numerous differing accounts of this condition have been proposed. Shulman and Ferguson (1988) used the SPA method to test empirically the views of Kernberg and Kohut (two of the most influential psychodynamic thinkers in the last few decades) regarding narcissism. According to Kernberg (1975) the issue of importance in the development of narcissism pertains to oral rage, and the haughty, grandiose, and controlling behavioral pattern typical of narcissistic personality is a defense against paranoid traits. The potent dependency needs, defenses against such needs, and powerful aggressive tendencies play a central role in the etiology of narcissistic personality disorder. On the other hand, according to Kohut (1984) narcissism is characterized by a weak and fragmented self, whose origins lie in early childhood, a failure in the mirroring process and/or idealizing functions of the parental figures. The role of therapy is, therefore, to strengthen the self. Based on these theoretical considerations, Shulman and Ferguson (1988) derived the following two stimuli: I AM NEEDY AND HATEFUL to represent Kernberg's position, and I AM NOT A

COMPLETE PERSON to represent Kohut's views. In a double-blind fashion, 13 college students who were selected on the basis of scoring high on the dimension of narcissism, were shown a control stimulus PEOPLE WALKING DOWN THE STREET and the two experimental messages subliminally (at four ms) on three separate days. Results showed that the Kernberg stimulus I AM NEEDY AND HATEFUL significantly increased narcissism and egocentricity, as measured by the Narcissism Projective and the Self Focus Sentence Completion tests (see Shulman & Ferguson, 1988), compared to both the Kohut and control stimuli. No significant effects were found with the phrase representing Kohut's theoretical position. Thus, only Kernberg's conjecture that narcissistic personality disorder is characterized by oral rage and dependency needs was supported. But, as the authors note, lack of support for Kohut's stance on narcissism does not necessarily mean that his theory is incorrect; it may not have been captured adequately by the stimulus chosen for the study. Also, the participants in the experiment were not selected on the basis of having a clinical condition of narcissistic personality disorder. Nonetheless, Shulman and Ferguson's findings are intriguing and their use of the SPA method in an artful manner is praiseworthy.

Thus, there may yet be some life left in the SPA method to study psychodynamic hypotheses that are unrelated to oneness fantasies, and this hope is kept alive by a small

number of studies showing positive results. However, these supportive findings were gathered with the same defective methodology which has plagued the research on symbiotic fantasies. Once procedural refinements are made and replication attempts made, there is no guarantee that psychodynamic hypotheses will be confirmed. On the basis of present state of knowledge, one can only express an attitude of skepticism. Findings concerning the oneness hypothesis were once exclaimed as firmly established, and yet they proved to be quite elusive. Thus, one cannot help but wonder: might: not other psychodynamic hypotheses meet a similar bleak fate, leading to an indubitable demise of SPA? Indeed, if this scenario does transpire, what then are the prospects for testing psychodynamic propositions empirically without SPA to show the way in dense fog?[22]

Can Psychodynamic Theories be Tested Empirically in the Absence of SPA?

If one is ready to proclaim the final collapse of SPA as an investigative tool for studying psychodynamic theories, are there any other ways of testing them scientifically? The following discussion will attempt to outline some experimental tests which have been proposed as

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[22]It is also noteworthy that using the SPA method with nonclinical subjects, Silverman attempted to validate another psychoanalytic hypothesis concerned with the Oedipal conflict (Silverman et al., 1978). However, in subsequent replication endeavors, his original positive findings were met with more failures than successes (see Fudin & Benjamin, 1992), and thus the SPA method failed yet again to uphold a cherished psychoanalytic principle.

possible ways of putting dynamic hypotheses to scientific scrutiny. The discourse will be devoted exclusively to the Freudian version of psychodynamics for two reasons: First, a clear and concise critique of Freud's psychoanalytic theory has been provided recently by Adolf Grunbaum (1984, 1993), who has delineated some possible empirical tests to examine his clinical theory. Second, later transformations of psychoanalysis are too numerous and often consist of conflicting and unclear statements regarding the unconscious processes and personality development. Hence, it would not only be difficult but unproductive to examine them as a unitary body of work. Moreover, Grunbaum's criticisms of the Freudian corpus apply with equal force to the neo-revisionist theories (Eagle, 1987; Erwin, 1996; Grunbaum, 1984), which must be taken into account while developing any empirical tests of psychodynamic hypotheses, be they Freudian, Kohutian, Kernbergian, or any others.

Grunbaum (1979, 1984, 1993) first dispels the myth of unfalsifiability of Freud's theory of personality (Popper, 1962), and then turns his attention to outlining some examples of empirically validating Freudian claims. According to Grunbaum, Freud proclaimed natural science status for his theory and asserted that free association was both a therapeutic tool and a method for investigating psychoanalytic tenets. The main aim of therapy is to lift the early childhood repressions presumed to be causally

responsible for the patients' neurotic symptoms. Freud was confident that both pursuits, clinical cure and scientific investigation, could be carried out effectively on the couch in the clinical setting without resort to experimental testing. But as Grunbaum argues persuasively, patients' alleged free associations are not truly unfettered; they are hopelessly contaminated by the analyst's suggestions and interpretations proffered to a receptive and vulnerable analysand. The suggestions made by the analyst not only influence a somewhat biased reconstruction of the past events which the patient shares with the therapist, they also play a decisive, prejudicial role in what the analysand will elect to report in the future. The analysand might report only those events and emotions that correspond to the expectations of, and which elicit approval from, the analyst. To illustrate, it would be appropriate to quote the solemn words of one psychoanalyst at this juncture: "Depending upon the point of view of the analyst, the patients of each (psychoanalytic) school seem to bring up precisely the kind of phenomenological data which confirm the theories and interpretations of their analysts. Thus each theory tends to be self-validating. Freudians elicit material about the Oedipus complex and castration anxiety, Jungians about archetypes, Rankians about separation anxiety, Adlerians about masculine strivings and feelings of inferiority, Horneyites about idealized images, Sullivanians

about disturbed interpersonal relationships, etc" (Marmor, 1962, p. 289. Hence, Freud's causal hypotheses which require a link between repressed childhood events and particular neurotic conditions cannot be tested retrospectively in the clinical arena. Even if, Grunbaum further posits, clinical data could be accepted as prima facie evidence to establish the genuine occurrence of specific repressed memories, which Freud held to be causally necessary for the development of specific neurotic symptoms, such evidence still cannot authenticate the claim that these childhood repressions were responsible for the formation of neurotic symptoms in the first place. The only legitimate way of corroborating Freud's propositions is by undertaking prospective longitudinal studies or epidemiological investigations.[23]

To muster support for his clinical propositions, Freud's strategy was to show that patients who manifested certain neurotic disorders were also found to harbor unconscious repressed memories of events from early childhood, and based on this evidence he deduced causal

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[23]One very important statement must be inserted into this discussion before proceeding any further. Freud considered repression to be the cornerstone of the psychoanalytic enterprise. Experimental psychologists who present evidence to show that a mechanism for repression exists (e.g., Erdelyi & Goldberg, 1979; Kline, 1981) cannot hope to support the Freudian concept of repression (Erwin, 1996; Grunbaum, 1984). This is because, in psychoanalysis the act of repressing memories is held to be causally linked with particular neurotic dysfunctions, and the mere demonstration of the occurrence of repression does not qualify as genuine Freudian repression.

connections between particular neurotic dysfunctions and their distal antecedents. However, to claim a causal relationship between repressed memories and the subsequent development of symptoms, even a large number of patients who can be shown to have both the right sort of repressions and symptoms does not suffice, because just as many patients may develop a particular neurosis without being exposed to the hypothesized pathogen.

At this stage, it should be mentioned that Freud was extremely careful while delineating his causal hypotheses to explain psychopathology, and he added the following important codicil: a pathogen P is causally necessary for a neurosis N; however, exposure to P does not necessarily mean the occurrence of N. Thus, P is causally necessary, but not sufficient for the genesis of N. In short, Freud's causal hypotheses predict that anyone not subjected to P will not suffer from N. This proposition can be disconfirmed by: (1) showing cases of N in which P was absent, or (2) finding cases of N in which P, was present but not repressed (Grunbaum, 1984).

Freud's causal hypotheses can only be tested in well-planned, long-term prospective studies and not, as some psychoanalysts claim, in the consulting room (Edelson, 1984), by relying upon data collected from patients' free associations. Consider the following example which,

Grunbaum affirms, can serve as a concrete empirical test of Freud's hypothesis concerning delusional neurosis.

Freud (1915/1957) declared repressed homosexuality to be a necessary, but not sufficient, causal condition for the development of paranoid delusions (delusions of persecution, jealousy, grandeur). The disorder seemingly arises from a conflict between homosexual desires and the strong need to obliterate them from consciousness in order to avoid anxiety. Delusions serve as an unconscious defense against the conscious outpouring of the proscribed homosexual cravings. Thus, if a person does not repress his/her homosexual impulses, he/she will not develop paranoia. Any openly practicing homosexual who is also paranoid will run counter to Freudian predictions. Grunbaum (1979, 1984) suggests that Freud's hypothesis could be tested in an epidemiological study.

Since the taboo against homosexuality in Western societies has lessened in recent years, this should issue in a diminished need to repress homosexual desires which, in turn, should lead to a decreased incidence of paranoia. There are many communities (e.g. San Francisco) in which the homosexual life-style is practiced relatively freely. In such locations, one would expect to find, if Freud is correct, a decreased rate of paranoid delusions as compared to, perhaps, a more conservative American urban center, or another society altogether where strict proscriptions

against homosexual relations prevail. By following such a research design, it should not be too difficult to gather evidence which would eventually support or disconfirm the psychoanalytic postulation of a causal link between repressed homosexuality and paranoia. Of course, this strategy can only confirm Freud's hypothesis indirectly. For a more direct causal etiological nexus to be established, a prospective longitudinal study, requiring follow-up of individuals from infancy into adulthood would be necessary. One would then try to establish whether individuals first develop homosexual interests and whether or not they subsequently repress them.

There are yet two further claims regarding the pattern of delusional disorder which yield statistically testable predictions. Freud asserted that, generally speaking, the main object of persecutory delusions is of the same sex as the individual experiencing the paranoia. Further, if in some instances, the persecutor turns out to be of the opposite sex, this individual will be found to be in collusion, and thus secondary to a same-sex primary persecutor. Hence, in the class of paranoid persons, there should be a greater number of imagined same-sex tormentors than those of the opposite gender. Also, if the tormentors are of the opposite sex, failure to find original same-sex conspiratorial oppressors would be inconsistent with the theory of paranoia (Grunbaum, 1993).

Grunbaum (1979) furnishes another testable example from Freud's theory of personality development. According to Grunbaum, Freud linked two distinct personality character types, the oral and the anal, with infantile events. Whereas the oral personality type is believed to be preoccupied with oral satisfactions and possesses the traits of dependency, submissiveness, need for approval, and pessimism, the anal personality character is linked with a constellation of traits consisting of orderliness, parsimony, and obstinacy. Further, these two personality types are believed to originate causally in childhood events of premature weaning and fierce toilet training, respectively. Again, this hypothesis is testable, but its most convincing appraisal is possible only in a prospective longitudinal research design.

The above examples illustrate quite persuasively that psychoanalysis is indeed testable. Freud made specific causal predictions, and although difficult, empirical studies to verify them can be designed. It becomes evident from the illustrations given above that even if one regards SPA as defunct, experimental testing of psychodynamic theories need not stop; it can still proceed unimpeded. However, this exercise is entirely dependent on the willingness and preparedness of psychodynamicians to put their theories to test and to examine them under close scrutiny. These workers must follow up on Grunbaum's

research suggestions and outline other hypotheses similar to those of Grunbaum's, and they must be willing to face the successes or failures which would emerge from their scientific endeavors. If clinicians are willing to observe this strategy, psychodynamic principles may yet lead long and profitable experimental lives. At present, though, "... while psychoanalysis may ... be said to be scientifically alive, it is currently hardly well" (Grunbaum, 1984, p. 278). Based on his evaluation of the clinical studies (e.g., Luborsky, 1986) and empirical work (e.g., Fisher & Greenberg, 1977) which have been cited as evidence to claim support for some aspects of psychodynamic theories, Grunbaum (1984, 1986) pronounced a rather negative verdict. He asserted that current data do not qualify as confirmatory evidence to buttress the major pillars of psychoanalysis, and that the proper testing of psychoanalysis is largely a task for the future.

The Study of Unconscious Perception in the Absence of SPA

Ellenberger (1970) has demonstrated convincingly that the concept of the unconscious had been conceived of by philosophers and other intellectuals before Freud. Freud's unique contribution was to link causally, the repressed unconscious material with psychological dysfunctions, dreams, and parapraxes. The SPA method was designed to investigate this dynamic view of the unconscious, and if one sees the procedure as unreliable and inefficacious, what

further prospects are there for the study of the unconscious? In recent years, the territory of unconscious perception has been claimed by cognitive psychologists, and the concept has been investigated in a variety of different procedural paradigms. Two such methods, the subliminal semantic priming and the subliminal mere exposure procedures, have already been mentioned. Research findings from these and other areas have been interpreted as showing that the unconscious is far less sophisticated, and has a considerably narrower scope compared to the psychoanalytic version which ascribed a much greater role to it than the conscious mind (Greenwald, 1992). New terms such as perception without awareness (Merikle, 1992), and implicit perception (Kihlstrom, Barnhardt, & Tataryn, 1992), which stand for unconscious perception, are fast coming into vogue in cognitive psychology. Implicit perception occurs when any change in thought, experience, or action is attributed to an event which is not consciously perceived. Implicit perception is contrasted with explicit perception, which simply refers to the conscious perception of a given stimulus (Kihlstrom et al., 1992). The validation of the concept of implicit perception comes from a wide range of studies. To cite but one example, consider the experiments in which investigators present auditory material to anesthetized patients undergoing surgery, and evaluate post-operatively whether this material is perceived in any way.

In one exemplar experiment, Kihlstrom, Schacter, Cork, Hurt, & Behr (1990) presented 15 audio-taped paired associates, such as BREAD-KNIFE, to adequately anesthetized patients. Forty-eight hours following surgery, the experimenters administered two different recall tests to gauge the patients' awareness of the verbal material presented during surgery. On an explicit test, patient's performance was found to be at chance levels. On the other hand, on an implicit test in which subjects were presented with the cue terms and were asked to report the first word that came to mind, there was a significant priming effect; subjects recalled more of the cued target terms. Hence, this study showed that information can be processed in the absence of conscious awareness, the effects of which can be assessed by utilizing relevant sensitive measures.

Currently, the topic of unconscious cognition is an active area of research and many unanswered questions are being explored with vigor. For example, it is not clear exactly how narrowly the unconscious should be conceived. Stated another way, is the unconscious capable of processing complex, multi-word sentences, or is it limited to the processing of only single words? One can study this question with either the subliminal semantic priming method or the general anesthesia procedure. While operating within the latter experimental approach, Caseley-Rondi, Merikle, and Bowers (1994) showed that patients who received

audiotaped therapeutic suggestions during surgery used significantly less morphine to control pain than those who did not receive such suggestions. Although this study points to the far-reaching practical and curative benefits of unconsciously perceived information, what is not known is whether the unconscious is truly capable of processing syntactically complex language. As the authors rightfully cautioned, patients in their study may have been responding to the soothing voice on the tape or to single words such as RELAX.

Other issues that require further clarification include the delineation of differences between conscious and unconscious processes. Is the unconscious capable of certain functions that the conscious mind is not able to perform, and vice versa? Research using the mere exposure procedure suggests that attitudes can be affected by stimuli that are not perceived (Kunst-Wilson & Zajonc, 1980), but it is not clear whether this influence can translate into actual effects on behavior (Kihlstrom et al., 1992). It is also becoming evident that subliminal self-help tapes, and subliminal messages used in commercial advertisements have little value (Kihlstrom et al., 1992). The question then arises, to what extent is unconsciously perceived information capable of influencing behavior? Much empirical research is needed to address these important issues.

Summary and Concluding Remarks

Using the SPA method, the present series of experiments failed to corroborate the psychodynamic proposition that stimulating unconscious fantasies of oneness with mother by the subliminal presentation of the phrase MOMMY AND I ARE ONE can lead to positive behavioral changes. These and other negative findings in the area question the validity of SPA as a method for studying psychodynamic theories. The possibility still exists that this procedure will turn out to be efficacious when clinical populations are examined, using stricter methodological controls, similar to the ones implemented here. One must, however, express serious doubts as to whether such an enterprise will be successful because stimulation of unconscious oneness fantasies were once believed to be of great salutary value for both clinical and nonclinical individuals, but when rigorous controls were observed with nonclinical subjects, no supportive evidence could be unearthed. Even if SPA is ultimately found wanting, the study of psychoanalysis and unconscious perception need not stop; it can proceed independently, and is by no means, subject to the fortunes of one particular experimental method.

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APPENDIX A

Arithmetic Problems

Please complete the following problems from left to right. You will be given 2 minutes to solve these problems, 10 seconds per problem. Please try to solve these problems as accurately as you can.

1. 63 ÷ 7 X 83 - 26 + 84 = _____
2. 74 X 39 + 58 - 12 ÷ 13 = _____
3. 49 X 24 - 12 X 64 = _____
4. 96 ÷ 4 X 73 - 29 + 99 = _____
5. 56 + 94 X 12 - 48 = _____
6. 49 - 24 X 75 ÷ 5 + 8 = _____
7. 11 X 92 ÷ 2 - 27 + 38 = _____
8. 68 X 19 + 28 ÷ 12 = _____
9. 92 ÷ 4 X 78 + 86 - 23 = _____
10. 65 X 53 - 6 ÷ 8 + 83 = _____
11. 37 X 94 - 16 + 45 ÷ 16 = _____
12. 34 X 63 - 68 ÷ 2 = _____
13. 46 X 34 - 29 + 67 ÷ 7 = _____
14. 50 ÷ 5 + 88 X 16 - 9 = _____

APPENDIX B

Recognition Lists

List 1

Please circle the item that you believe was shown to you during the experiment.

MATH PROBLEMS ARE HARD

MOMMY AND I ARE APART

I AM NERVOUS

I AM SURE OF MYSELF

MYMMO NAD I REA ENO

THIS IS AN EXPERIMENT

DADDY AND I ARE TOGETHER

THESE WORDS MAKE NO SENSE

UNITY

DGAHY LIJ G CLR SKU

DADDY LOVES ME

ONE

MOMMY AND I ARE TOGETHER

I AM HAPPY WITH MYSELF

DADDY AND I ARE APART

DMNOA NIM Y ERO EMA

THIS STUDY MAKES ME NERVOUS

MOMMY AND I ARE ONE

THESE WORDS MAKE SENSE

DADDY AND I ARE ONE

I AM CALM

MOMMY LOVES ME

I AM ANGRY WITH MYSELF

TWO

THIS STUDY IS BORING

List 2

Please try again to circle the item that you believe was shown to you during the experiment.

MOMMY AND I ARE APART

MYMMO NAD I REA ENO

UNITY

I AM HAPPY WITH MYSELF

I AM CALM

MATH PROBLEMS ARE HARD

THIS IS AN EXPERIMENT

DADDY LOVES ME

MOMMY AND I ARE ONE

I AM ANGRY WITH MYSELF

DADDY AND I ARE TOGETHER

DMNOA NIM Y ERO EMA

ONE

MOMMY LOVES ME

THIS STUDY IS BORING

DADDY AND I ARE APART

THESE WORDS MAKE SENSE

TWO

DADDY AND I ARE ONE

THIS STUDY MAKES ME NERVOUS

DGAHY LIJ G CLR SKU

THESE WORDS MAKE NO SENSE

MOMMY AND I ARE TOGETHER

I AM SURE OF MYSELF

I AM NERVOUS

APPENDIX C

The Self-Perception Profile for College Students

WHAT I AM LIKE

Age_____ Subject Number_____

Male____ Female____ Name_____

The following are statements which allow college students to describe themselves. There are no right or wrong answers since students differ markedly. Please read the entire sentence across. First decide which one of the two parts of each statement best describes you; then go to that side of the statement and check whether that is just sort of true for you or really true for you. You will just check one of the four boxes for each statement. Think about what you are like in the college environment as you read and answer each one.

	Really True For Me	**Sort of True For Me**		**Sort of True For Me**	**Really True For Me**
1.	☐	☐	Some students like the kind of person they are	BUT	☐ ☐ Other students wish that they were different.
2.	☐	☐	Some students like the way they act when they are around their parents	BUT	☐ ☐ Other students wish they acted differently around their parents.

	Really True For Me	Sort of True For Me		Sort of True For Me	Really True For Me	
3.	☐	☐	Some students often question the morality of their behavior	BUT	☐ ☐	Other students feel their behavior is usually moral.
4.	☐	☐	Some students feel that people they like romantically will be attracted to them	BUT	☐ ☐	Other students worry about whether people they like romantically will be attracted to them.
5.	☐	☐	Some students are often disappointed with themselves	BUT	☐ ☐	Other students are usually quite pleased with themselves.
6.	☐	☐	Some students find it hard to act naturally when they are around their parents	BUT	☐ ☐	Other students find it easy to act naturally around their parents.

	Really True For Me	Sort of True For Me		Sort of True For Me	Really True For Me
7.	☐	☐		☐	☐
	Some students usually do what is morally right		BUT	Other students sometimes don't do what they know is morally right.	
8.	☐	☐		☐	☐
	Some students find it hard to establish Romantic Relationships		BUT	Other students don't have difficulty establishing Romantic Relationships.	
9.	☐	☐		☐	☐
	Some students usually like themselves as a person		BUT	Other students often don't like themselves as a person.	
10.	☐	☐		☐	☐
	Some students feel comfortable being themselves around their parents		BUT	Other students have difficulty being themselves around their parents.	

	Really True For Me	Sort of True For Me		Sort of True For Me	Really True For Me
11.	☐	☐	Some students would like to be a better person morally	BUT	☐ ☐ Other students think they are quite moral.
12.	☐	☐	Some students have the ability to develop Romantic Relationships	BUT	☐ ☐ Other students do not find it easy to develop Romantic Relationships.
13.	☐	☐	Some students really like the way they are leading their lives	BUT	☐ ☐ Other students often don't like the way they are leading their lives.
14.	☐	☐	Some students find that they are unable to get along with their parents	BUT	☐ ☐ Other students get along with their parents quite well.
15.	☐	☐	Some students would really rather be different	BUT	☐ ☐ Other students are very happy being the way they are.

	Really True For Me	Sort of True For Me		Sort of True For Me	Really True For Me
16.	☐	☐	Some students live up to their own moral standards	BUT	☐ ☐ Other students have trouble living up to their moral standards.
17.	☐	☐	Some students worry that when they like someone romantically, that person won't like them back	BUT	☐ ☐ Other students feel that when they are romantically interested in someone, that person will like them back.
18.	☐	☐	Some students are often dissatisfied with themselves	BUT	☐ ☐ Other students are usually satisfied with themselves.

APPENDIX D

Consent Form

This is to state that I agree to participate in a program of research being conducted by Dr. H. W. Ladd of the Department of Psychology at Concordia University.

1. PURPOSE

I have been informed that the purpose of the research is to study the effects of subliminal stimuli on behavior.

2. PROCEDURES

I understand that I will be asked to solve some difficult arithmetical problems, look at briefly flashed stimuli, complete a questionnaire, and answer some questions about the experiment. I also understand that my heart rate will be measured by placing an electrode belt around my chest. I have been informed that the experiment will take place at Concordia University and will last approximately 45 minutes. I have been informed that the experimental procedure is entirely safe and I will be given a full briefing as to the content of the stimuli and the nature of the experiment once the study is completed.

3. CONDITIONS OF PARTICIPATION

I understand that I am free to withdraw my consent and to discontinue my participation at any time without negative consequences.

I understand that my participation in the study is voluntary.

I understand that my identity will remain anonymous and all information about me will be kept confidential.

I understand that the data from this study may be published.

I understand that I am participating in this research solely in order to advance scientific knowledge.

I HAVE CAREFULLY STUDIED AND I UNDERSTAND THIS AGREEMENT, AND THEREFORE, I FREELY CONSENT AND AGREE TO PARTICIPATE IN THE STUDY.

NAME (Please Print) _____

SIGNATURE _____

PHONE NUMBER _____

DATE _____

APPENDIX E

Summary Source Table for a Three-Way Analysis Of Variance Using Heart Rate Scores

Source	DF	SS	MS	F
	Between subjects			
Gender (A)	1	11.958	11.958	0.03
Message (B)	4	1545.409	386.352	0.83
A x B	4	3491.679	872.920	1.87
Error between Ss	90	72085.71	467.619	
	Within subjects			
Interval (C)	3	4351.321	1450.44	86.06*
A x C	3	113.479	37.826	2.24
B x C	12	190.945	15.912	0.94
A x B x C	12	244.478	20.373	1.21
Error SS x C	270	4550.279	16.85	
Total	399	56585.26		

Note. Ss = Subjects

*$p < .0001$

APPENDIX F

Summary Source Table for a Three-Way Analysis of Variance Using Averaged Heart Rate Scores

Source	df	SS	MS	F
	Between subjects			
Gender (A)	1	.345	.345	0.00
Message (B)	4	1221.529	305.382	0.85
A x B	4	2612.273	653.068	1.82
Error between Ss	90	32211.16	357.902	
	Within subjects			
Interval (C)	2	3545.199	1772.60	103.53*
A x C	2	88.684	44.342	2.59
B x C	8	121.337	15.167	0.89
A x B x C	8	145.718	18.215	1.06
Error Ss x C	180	3081.769	17.121	
Total	299	43028.01		

Note. Ss = Subjects

*$p < .0001$

APPENDIX G

Descriptive Statistics for the Self-Perception Profile for College Students

	Males		Females	
	M	SD	M	SD
Experiment 1				
Global	20.0	2.7	18.8	2.0
Parent	13.0	3.2	13.9	3.2
Morality	12.9	2.0	14.2	2.1
Romantic	9.9	2.8	8.6	2.5
Experiment 2				
Global	18.0	3.3	20.5	3.6
Parent	12.9	2.4	12.8	2.5
Experiment 3				
Global	20.0	3.7	18.3	3.9
Parent	13.3	3.0	12.3	3.2

APPENDIX H

Threshold Determination Sheet

1 **D** 100 90 80 70 60 50 40 30 20 10 1

2 **A** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

3 **D** 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

4. **A** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

5. **D** 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

6. **A** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

7. **D** 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

8. **A** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

9. **D** 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

10. **A** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

11. **D** 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

When descending, use a C to indicate a Correct Response, an I to indicate an Incorrect Response, and a D to

indicate an I Don't Know Response. Terminate the trial when a D response occurs. Begin an ascending trial by subtracting 2 ms from where the subject indicates an I DON'T KNOW Response. In the ascending series, use D to indicate an I Don't Know Response and stop the trial when the subject reports the message, correctly or incorrectly. Indicate correct and incorrect responses as before. When an ascending trial comes to an end, begin the next descending trial by adding 2 ms to the point where the subject identifies the message.

Begin the first trial at 50 and stop when subject makes an I Don't Know Response. Begin trial 2 by subtracting 2 ms from the point where an I Don't Know Response is made.

Note: D = descending; A = ascending.

Message 1 = A PLANE CAN FLY FAR

Message 2 = MY CHAIR IS NOT RED

APPENDIX I

Summary Source Table for a Three-Way Analysis Of Variance Using Heart Rate Scores

Source	df	SS	MS	F
	Between subjects			
Gender (A)	1	283.197	283.197	0.48
Message (B)	4	480.507	120.127	0.21
A x B	4	2166.015	541.504	0.92
Error between Ss	90	52707.09	585.634	
	Within subjects			
Interval (C)	3	6693.454	2231.15	101.98*
A x B	3	18.274	6.091	0.28
B x C	12	237.222	19.768	0.90
A x B x C	12	386.768	32.231	1.47
Error Ss x C	270	5907.328	21.87	
Total	399	68879.85		

Note. Ss = Subjects

*$p < .0001$

APPENDIX J

Summary Source Table for a Three-Way Analysis of Variance Using Averaged Heart Rate Scores

Source	df	SS	MS	F
	Between subjects			
Gender (A)	1	216.999	216.999	0.48
Message (B)	4	352.328	88.082	0.20
A x B	4	1545.470	386.368	0.86
Error between Ss	90	40492.88	449.921	
	Within subjects			
Interval (C)	2	5667.175	2833.59	113.48*
A x C	2	6.154	3.077	0.12
B x C	8	202.291	25.286	1.01
A x B x C	8	330.330	41.291	1.65
Error Ss x C	180	4494.426	24.969	
Total	299	53308.06		

Note. Ss = Subjects

*$p < .0001$

APPENDIX K

Summary Source Table for a Three-Way Analysis of Variance Using Restricted Data

Source	df	SS	MS	F
	Between subjects			
Gender (A)	1	.0385	.0385	0.00
Message (B)	4	260.250	65.063	0.11
A x B	4	2125.481	531.379	0.92
Error between Ss	76	44085.50	580.072	
	Within subjects			
Interval (C)	3	5709.650	1903.22	88.02*
A x C	3	27.000	9.000	0.42
B x C	12	114.538	9.545	0.44
A x B x C	12	330.002	25.250	1.17
Error Ss x C	228	4929.941	21.623	
Total	343	57596.23		

Note. Ss = Subjects

*$p < .0001$

APPENDIX L

The Kinship Scale

INSTRUCTIONS

This is a questionnaire about your relations with your parents. THINK ABOUT YOUR MOTHER OR FATHER (AS THE CASE MAY BE).

Now consider the following practice item in relation to the parent you are considering.

MY FATHER/MOTHER:

1. Is enthusiastic and energetic. 1 2 3 4 5

-If very often is correct, fill in the "5" on the answer sheet.

-If often is correct, fill in the "4" on the answer sheet.

-If sometimes is correct, fill in the "3" on the answer sheet.

-If almost never is correct, fill in the "2" on the answer sheet.

-If never is correct, fill in the "1" on the answer sheet.

PLEASE BE AS HONEST AND STRAIGHTFORWARD IN YOUR ANSWERS AS POSSIBLE. BE SURE TO KEEP A CLEAR IMAGE IN MIND OF YOUR FATHER/MOTHER (AS THE CASE MAY BE) AS YOU ANSWER THE ITEMS.

INTERPERSONAL RELATIONS INVENTORY

My Mother

1. Hugs me when I need it.	1	2	3	4	5
2. Feels love for me.	1	2	3	4	5
3. Will remember me ten years from now.	1	2	3	4	5
4. Will still like me even if I do something wrong.	1	2	3	4	5
5. Is available when I need him/her.	1	2	3	4	5
6. Treats me like a member of the family.	1	2	3	4	5
7. Is a loving person.	1	2	3	4	5
8. Feels that I am important in his/her life.	1	2	3	4	5
9. Thinks of me as a "loved one."	1	2	3	4	5
10. Shares a strong feeling of "kinship" with me.	1	2	3	4	5

APPENDIX M

Summary Source Table for a Three-Way Analysis Of Variance Using Heart Rate Scores in the Subliminal Condition

Source	df	SS	MS	F
	Between subjects			
Gender (A)	1	575.67	575.67	3.71
Error between Ss	34	5273.09	155.09	
	Within subjects			
Message (B)	2	1.66	.828	0.06
A x B	2	63.10	31.55	2.30
Error Ss X B	68	930.78	13.69	
Interval (C)	1	1301.69	1301.69	23.11*
A x C	1	49.14	49.14	0.87
Error Ss X C	34	1914.88	56.32	
B x C	2	15.67	7.83	1.30
A x B x C	2	10.66	5.33	0.89
Error Ss X B X C	68	409.27	6.02	
Total	215	10545.6		

Note. Ss = Subjects

*$p < .0001$

APPENDIX N

Summary Source Table for a Three-Way Analysis Of Variance Using Heart Rate Scores in the Supraliminal Condition

Source	df	SS	MS	F
	Between subjects			
Gender (A)	1	277.98	277.98	1.53
Error between Ss	34	6162.63	181.25	
	Within subjects			
Message (B)	2	304.486	152.243	14.91**
A x B	2	30.46	15.23	1.49
Error Ss X B	68	694.30	10.21	
Interval (C)	1	723.40	723.40	23.22**
A x C	1	76.91	76.91	2.47
Error Ss X C	34	1059.268	31.155	
B x C	2	38.818	19.409	3.13*
A x B x C	2	8.551	4.276	0.69
Error Ss X B X C	68	421.17	6.194	
Total	215	9797.971		

Note. Ss = Subjects

*$p < .05$. **$p < .0001$.

APPENDIX O

Summary Source Table for Analysis of Variance on the Percent Change Heart Rate Scores for Female Subjects in the Subliminal Condition during the Message Presentation Phase

Source	df	SS	MS	F
	Between subjects			
Sequence (A)	5	586.98	117.40	1.66
Error between Ss	12	848.60	70.72	
	Within subjects			
Order (B)	2	21.16	10.58	1.01
A x B	8	97.78	12.22	1.16
Error within Ss	24	252.00	10.50	
Message (C)	2	16.62	8.31	0.79
Total	53	1823.14		

Note. Ss = Subjects

APPENDIX P

Summary Source Table for a Three-Way Analysis Of Variance on the Errors of the Fine Motor Task

Source	df	SS	MS	F
	Between subjects			
Gender (A)	1	78.241	78.241	0.11
Error between Ss	34	23320.23	685.89	
	Within subjects			
Liminality (B)	1	.2269	.2269	0.00
A x B	1	294	294	4.57*
Error Ss X B	34	2186.857	64.319	
Message (C)	2	47.78	23.89	0.64
A x C	2	189.308	94.654	2.54
Error Ss X C	68	2530.663	37.216	
B x C	2	40.863	20.432	0.93
A x B x C	2	11.965	5.983	0.97
Error Ss X B X C	68	1491.587	21.935	
Total	215	30191.72		

Note. Ss = Subjects

*$p < .05$

APPENDIX Q

The Fine Motor Task

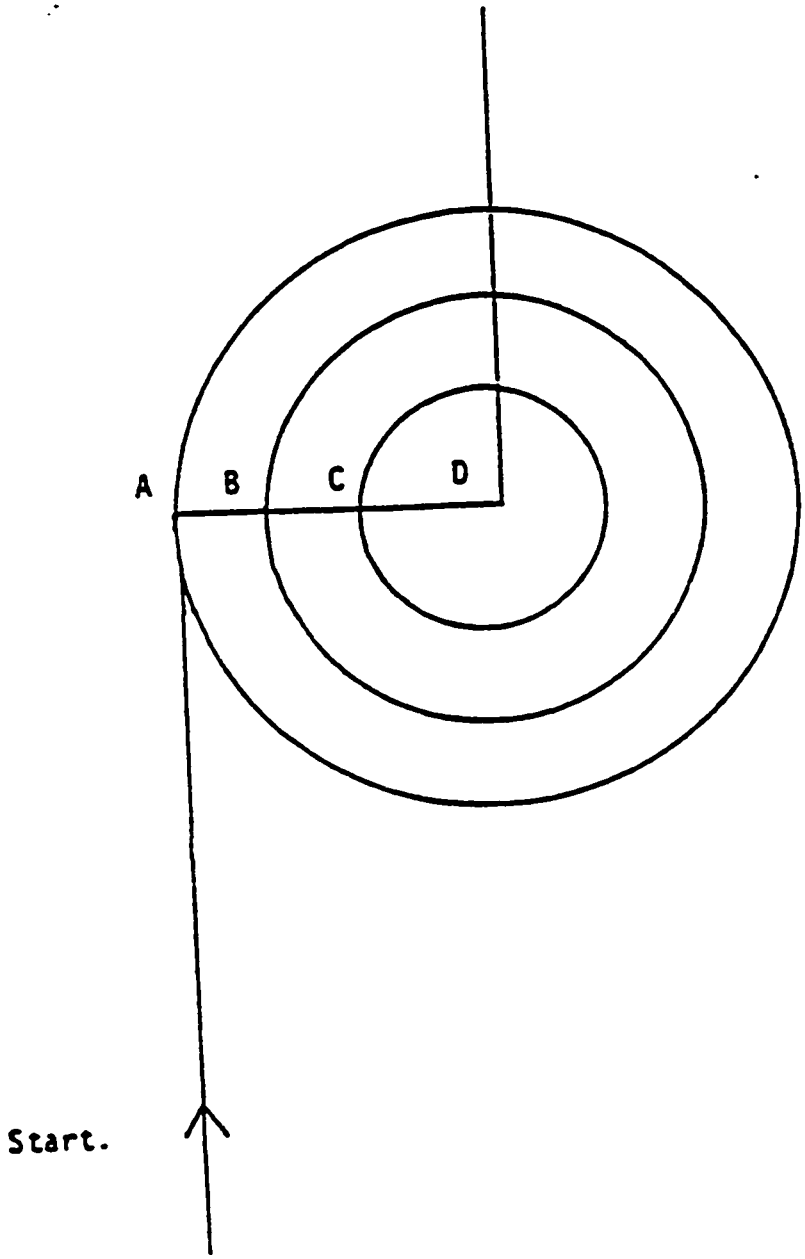
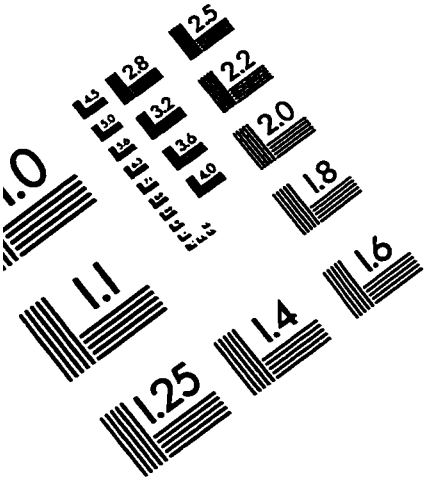
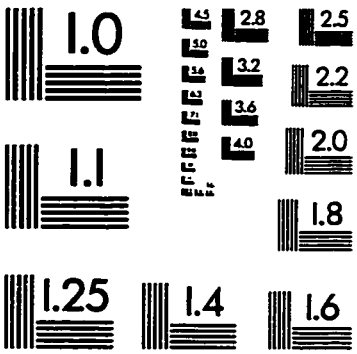
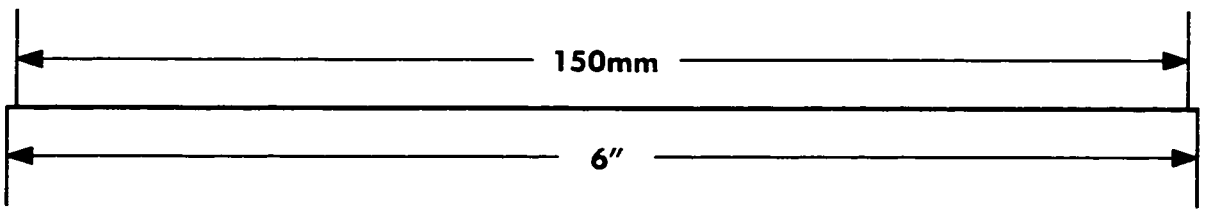
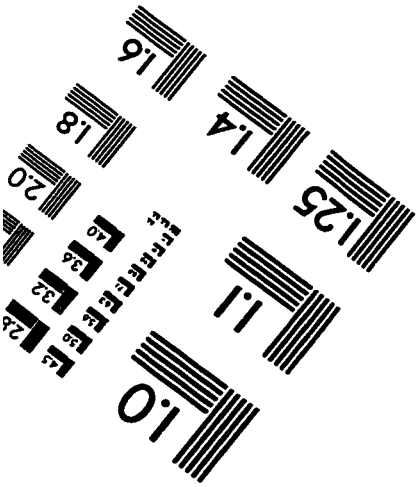


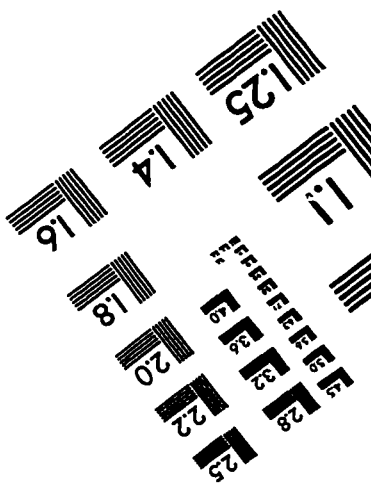
IMAGE EVALUATION
TEST TARGET (QA-3)











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