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Subliminal Techniques as Propaganda Tools: Review and Critique

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Research on perception without awareness has provoked strong emotional responses from individuals within and outside the scientific community, due in part to the perceived potential for abuse of subliminal techniques. In this paper, four basic issues regarding the use of subliminal techniques for propaganda purposes are discussed: (a) whether exposure to subliminal stimuli can produce significant, predictable changes in affect, cognition and behavior; (b) whether these effects are robust and powerful enough to make the use of subliminal techniques for propaganda purposes feasible; (c) whether the effects of subliminal stimulation are stable over time; and (d) whether subliminal influences can be resisted by unwilling subjects. Research suggests that exposure to simple drive- or affect-related subliminal stimuli can produce ecologically significant, temporally stable changes in attitudes and behavior, and therefore may have potential for use as propaganda tools. Implications of these findings for our understanding of the mechanisms underlying subliminal perception are discussed. Technical problems which would need to be addressed before subliminal propaganda techniques could be employed are also discussed. Ethical issues raised by the use of covert attitude and behavior manipulation techniques are addressed.

Although there has been a great deal of research investigating the effects of stimuli perceived without awareness on perception, cognition, affect, attitudes and behavior, the topic remains extremely controversial. Scientists of different viewpoints engage in emotional—even unscientific, *ad hominem*—debates regarding subliminal perception research. For example, Bernstein (1978) suggests that subliminal advertising research "attracts weirdos" (p. 16), while Dixon (1981) asserts that those who remain convinced of subliminal effects are "closed minded" and "rigid" (p. 200). The intense affect associated

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with this issue is in part a reaction to research on subliminal advertising conducted during the 1950s (see McConnell, Cutler, and McNeil, 1958), which purported to demonstrate that subliminal exposure to certain verbal messages systematically influenced consumer behavior. Although these studies have since proved methodologically unsound (and irreplicable), their findings were both intriguing and frightening, and drew considerable attention from psychological researchers, government officials and the national media.

However, the concept of perception without awareness was not easily accepted by the scientific community. Many psychologists regarded results in this area as experimental artifacts—the product of inappropriate methodologies and measures of awareness (Bevan, 1964; Eriksen, 1960). Interest in subliminal perception declined somewhat during the early 1960s (cf, Spence, 1964, 1966). Although psychologists have since become more open to the concept of perception without awareness, new obstacles to the scientific study of this phenomenon have arisen. Acceptance of this idea by the scientific community has been hindered by the publication of numerous ill-conceived pop-psychology books on subliminal perception (e.g., Key, 1973). The plethora of subliminal self-help audiotapes that have recently appeared color the study of subliminal perception with a kind of sensationalistic, unscientific tinge. Researchers' inability to delineate specific neurological pathways underlying perception without awareness (although several intriguing models have been described in recent years; see Dixon, 1981; Winson, 1984; Zajonc, 1984) has exacerbated the controversy surrounding this topic.

In addition, the perceived inconsistency of subliminal perception with prevailing models of attention and information processing has made many psychologists skeptical regarding research in this area, and has produced calls for more stringent criterion levels in accepting such counterintuitive findings (see Holender, 1986 and commentaries). Of course, subliminal effects are only counterintuitive to those who do not believe in them. Research has demonstrated the importance of automatic, unconscious processes in perception and information processing (Libet, 1985; Posner and Snyder, 1975; Shiffrin and Schneider, 1977), selective attention (Johnston and Dark, 1986), and memory (Hinton and Anderson, 1981; Kihlstrom, 1984). Recent theoretical models of human information-processing are generally consistent with the concept of perception without awareness, and provide a potential link between subliminal perception research and mainstream cognitive psychology (see Kihlstrom, 1987). The importance of unconscious influences in symptom formation, psychopathology and the development of personal constructs and schemas is well-established (Bornstein, Leone, and Galley, 1987; Horowitz, 1988; Silverman, Lachmann, and Milich, 1982). In addition unconscious influences and subtle, unverbalizable social cues demonstrably influence attitudes, attributions and behaviors in a variety of situations and settings (Lewicki, 1986;

Nisbett and Wilson, 1977; Shevrin and Dickman, 1980). Thus, the belief that only stimuli which are recognized and noticed can influence behavior is inconsistent with many relevant empirical findings in cognitive, clinical and social psychology, and a compelling case has been made that that is the truly "counterintuitive" position (Bowers, 1984).

In any case, the concept of perception without awareness is now fairly well-accepted (Dixon, 1971, 1981; Kihlstrom, 1984, 1987; Shevrin and Dickman, 1980), and subliminal techniques have even proved to have applications in scientific, educational and treatment settings (Bornstein, in press; Horowitz, 1988; Saccuzzo and Schubert, 1981; Silverman et al., 1982). However, the ability to manipulate attitudes and behavior subliminally, so that individuals are unaware of the source of influence (or the fact that they are being influenced at all) holds some very disturbing ethical implications. The possibility for misuse of subliminal techniques is so frightening to some people that they have argued this topic should not be investigated at all. For example, Cousins (1957) suggested that we should ". . . take [subliminal perception research] and everything connected with it and attach it to the center of the next nuclear explosive scheduled for testing" (p. 10). While this view represents one of the more extreme reactions to research on subliminal rechniques, strong negative responses to subliminal perception research were—and still are—quite common, both within and outside the scientific community (Dixon, 1981; Vokey and Read, 1985; Zanot, Pincus, and Lamp, 1983). Speculation regarding *Brave New World* and *1984*-type scenarios resulting from abuse of subliminal techniques abounds (Moore, 1982). Attempts to employ subliminal techniques covertly, via public media such as radio or television, have been reported periodically since the 1950s, and are invariably met with public anger and outrage (e.g., Nachman, 1988). Few areas in psychology have generated the emotion and anger that this topic has produced.

Cousins' (1957) suggestion notwithstanding, the solution to minimizing the potential for misuse of subliminal techniques does not lie in turning our attention away from the topic. In a sense, subliminal techniques are akin to Pandora's Box; we have learned too much already, and have gone too far in conducting basic and applied research on this topic to think that we could now lock away our knowledge and findings. Subliminal perception research has tremendous utility in investigating such basic issues in psychology as the etiology and dynamics of psychopathology (Saccuzzo and Schubert, 1981; Silverman et al., 1982), models of attention, memory, and information-processing (Kihlstrom, 1987; Mandler and Nakamura, 1987), and processes involved in social cognition and perception (Nisbett and Wilson, 1977; Uleman, 1987). Like any new technology, subliminal techniques have potential for both use and misuse, but as Bowers (1984) notes, ". . . becoming sophisticated about . . . influences on one's behavior can minimize and may

even entirely disarm the power of such influences to control thought and action—or at least provide the basis for an informed choice regarding whether such potential influences should become influences in fact" (p. 263). The most appropriate approach to dealing with potential uses and misuses of subliminal techniques is to discuss and debate them openly. The purpose of this paper is to contribute to that effort by initiating a dialogue regarding one application of subliminal perception research which has potential for significant misuse: subliminal techniques as propaganda tools.

Despite the obvious potential of subliminal techniques for propaganda purposes (i.e., covert attitude and behavior manipulation), researchers have devoted surprisingly little attention to this topic. Although there have been a number of laboratory and field studies of subliminal advertising effects (e.g., Hawkins, 1970; see also Moore, 1982; Saegert, 1979, 1987), almost no discussion of the possibility that subliminal stimuli could be used for propaganda purposes can be found in Dixon's (1971, 1981) comprehensive reviews of subliminal perception research, nor in recent reviews by Kihlstrom (1984, 1987), Silverman (1983; Silverman et al., 1982) and others (e.g., Bowers, 1984). Even Dixon (1971) and Silverman (1977), strong advocates of the subliminal perception concept, are skeptical regarding the possibility that subliminal techniques could be used for propaganda purposes. However, this skepticism may not be entirely justified. While it is true that the subliminal stimuli used in early advertising studies (i.e., subliminal "commands" such as BUY POPCORN and DRINK COKE) produce negligible effects on behavior, the same may not be true for other subliminal stimuli. The use of subliminal techniques for propaganda purposes need not necessarily involve direct attitude or behavior manipulation. It is possible that subliminal techniques could be used to influence drives, motivational states, anxiety levels, etc., manipulating attitudes and behaviors quite effectively, but by less direct means (Bornstein, 1989, in press; Bornstein et al., 1987).

Thus, in assessing the potential for use of subliminal techniques for propaganda purposes, I will use a rather broad definition of propaganda, which includes any attempt to manipulate attitudes and behaviors, directly or indirectly, via the presentation of material designed for that purpose (Jowett and O'Donnell, 1986). I will discuss possible uses of subliminal propaganda techniques in influencing motivations, emotions, and other variables potentially relevant to attitude and behavior manipulation. Subliminal advertising clearly fits into this category, but the use of subliminal stimuli for propaganda purposes would also include application of these techniques to other areas (e.g., in electoral campaigns, in attempting to influence public opinion regarding a controversial issue or topic). In order to use language consistent with previous research in this area, I will use the term "subliminal" to refer to stimuli perceived without awareness (where awareness is assessed using

various combinations of recall, recognition and discrimination tasks; see Bornstein et al., 1987), recognizing that signal-detection models of perception (e.g., Green and Swets, 1966; Swets, 1988) have in many ways rendered the concept of a perceptual limen obsolete.

Most of my discussion will focus on the use of subliminal visual stimuli. Although numerous studies of subliminal auditory stimuli have been conducted, procedures to assess awareness of these stimuli are not as sophisticated as those used to assess awareness of visual stimuli, and have been criticized on both conceptual and methodological grounds (Holender, 1986). In addition, fewer replications of critical research findings using subliminal auditory stimuli have been reported, so that results in this area are less well established than the central findings in subliminal visual perception research. I will not discuss research examining the influence of embedded stimuli (e.g., phallic imagery hidden in liquor advertisements) on attitudes and behavior, nor the recent speculation regarding claims of subliminal "backward messages" on popular records. Results in this area have been weak, irreplicable, subject to numerous methodological and conceptual criticisms, and generally not very compelling (Moore, 1982; Vokey and Read, 1985).

In assessing the potential for use of subliminal techniques as propaganda tools, several related questions must be addressed. First and most central is the question of whether or not there is solid empirical evidence that stimuli perceived without awareness can systematically and predictably influence affect, cognition and behavior. Second, do stimuli perceived without awareness exert a significant enough influence that it would be practical and realistic to utilize such techniques to induce changes in attitudes and behavior in vivo. Third, if subliminal techniques can be used to influence attitudes and behavior in ecologically (not just statistically) significant ways, how long lasting are the effects of subliminal stimulation? Finally, can attitude and behavior changes resulting from exposure to subliminal stimuli be "resisted" by subjects, or do subliminal influences exert themselves regardless of subjects' willingness to be influenced?

The analysis will proceed in several steps. First, each of the questions posed above will be addressed in turn. Then, I will assess the state of the discipline with respect to subliminal propaganda techniques in the context of these questions and issues. Finally, I will discuss theoretical, practical and ethical issues related to the use of covert attitude and behavior manipulation outside the laboratory.

Do Stimuli Perceived Without Awareness Influence Affect, Cognition and Behavior?

Although the issue remains controversial, and results of different studies are occasionally conflicting, the combined weight of hundreds of experiments

assessing the influence of subliminal stimuli (including numerous replications of critical research findings) is sufficient to respond to this question with a confident and unqualified *sometimes*. That is, certain types of subliminal stimuli can reliably influence affect, cognition and behavior under certain conditions. Much of the controversy in this area concerns methodological issues regarding the assessment of awareness of briefly-presented stimuli (Holender, 1986; Merikle, 1982, 1984). No single operational definition of "awareness" has emerged which satisfies researchers working in different disciplines, so no universally-accepted operational definition of "lack of awareness" has emerged either.

Researchers are increasingly utilizing multiple measures to assess subjects' awareness of briefly-presented stimuli; typically, various combinations of recall, recognition and discrimination tasks are now used to assess stimulus awareness (see Bornstein et al., 1987; Masling, Bornstein, Poynton, Reed, and Katkin, 1988). Recent research on subliminal mere exposure effects (Bornstein et al., 1987) and subliminal psychodynamic activation effects (Masling et al., 1988) fulfill the rigorous criteria for establishing stimulus unawareness described by Merikle (1982, 1984). The use of dependent measures such as response latencies (McCauley, Parmelee, Sperber, and Carr, 1980), electrodermal responses (Masling et al., 1988) and evoked potentials from the occipital cortex (Shevrin and Fritzler, 1968) provides particularly strong evidence of responding to subliminal stimuli independent of verbal reports.

In addition, studies using different subject populations (e.g., normal adults, college students, high school students, hospitalized schizophrenics, clinically depressed subjects, character disordered subjects, etc), and very different paradigms and procedures (e.g., subliminal mere exposure, subliminal psychodynamic activation, subliminal lexical priming) have produced findings that are generally consistent and replicable. There have also been some cross-cultural and cross-language replications of central research findings (Bornstein and Masling, 1984). Even when subjects in typical subliminal perception experiments are offered monetary incentives to correctly identify or discriminate briefly-presented stimuli, recognition and discrimination accuracy remains at chance levels (Silverman, 1983). Thus, Eriksen's (1960) suggestion that demand characteristics of subliminal experiments and subjects' unwillingness to report awareness of partial cues in subliminal perception studies are responsible for positive findings in this area now seems less tenable (see Bowers, 1984 for a detailed critique of Eriksen's position).

Nonetheless, methodological critiques by Eriksen (1960) and others (e.g., Merikle, 1982) resulted in greatly improved procedures in subliminal perception research, and recent studies in this area are methodologically and conceptually stronger than earlier studies. While recent research on perception without awareness provides strong evidence for the existence of subliminal

effects (e.g., Bornstein et al., 1987; Mandler, Nakamura, and Van Zandt, 1987), some critics remain unconvinced that researchers have used adequate procedures to establish unawareness of briefly-presented stimuli. Much of the criticism in this area has focused on subliminal lexical priming studies (e.g., Fowler, Wolford, Slade, and Tassinary, 1981; Marcel, 1983a; McCauley et al., 1980; see Holender, 1986; Merikle, 1982, 1984, for critiques), although some of the same issues have been raised regarding Silverman's subliminal psychodynamic activation paradigm (Bornstein and Masling, 1984; Fudin, 1986). The general points made by critics are that unawareness of briefly-presented stimuli has not been established because of: (a) inappropriate measures of awareness; (b) too few recognition or discrimination trials in tests for stimulus awareness; (c) researchers' failure to establish individual thresholds for stimulus detection or recognition in each subject; (d) lack of evidence that subjects actually use all possible responses in making recognition or discrimination judgments; and/or (e) subjects' unwillingness to report or guess regarding partial cues detected in briefly-presented stimuli.

These arguments all depend on one critical piece of data: if flawed or inappropriate measures of awareness are responsible for apparent "subliminal" effects, then the magnitude of the "subliminal" effect should be that which is theoretically predicted for a briefly-presented, recognized stimulus. This criterion is fulfilled in the case of lexical priming studies. There is no a priori reason to expect that duration of a lexical prime should influence the size of the priming effect (as long as the prime is perceived and encoded), and in fact briefly-presented lexical primes produce facilitation effects comparable to those obtained in typical lexical priming studies (see, e.g., DeGroot, 1983; Fowler et al., 1981; Neely, 1977). Thus, subliminal lexical priming studies are vulnerable to the methodological criticisms of Holender (1986), and Merikle (1982, 1984).

However, in psychodynamic activation studies (Silverman, 1983) and mere exposure experiments (Bornstein, in press), the magnitude of subliminal effects exceeds the magnitude of effects that are obtained when recognizable stimuli are used. While a partial cue hypothesis based on the premise that stimulus awareness has not been adequately assessed can explain comparable effects for stimuli that are briefly-presented and presented for longer exposure durations, it cannot accommodate the consistent finding that when simple drive- or affect-related stimuli are used and drive- or affect-related dependent measures are then taken, the magnitude of effects is substantially *greater* at very brief exposure durations than at longer ones. There is a discontinuity in the exposure duration-effect size relationship in mere exposure and psychodynamic activation studies. In both paradigms, the magnitude of the experimental effect does not change appreciably with diminishing exposure duration, until very brief (presumably subliminal) exposure durations are

employed, at which point the effect size increases significantly. These findings will be discussed in detail later. For now, it is sufficient to note that in mere exposure and psychodynamic activation studies, some psychological process that occurs when longer—but not very brief—exposure durations are used actually inhibits responding. The most parsimonious explanation is that this process is stimulus recognition and the critical analysis of stimulus content associated with awareness and higher-level cognitive processing (see Bornstein, in press; Zajonc, 1980).

It is beyond the scope of this paper to describe in detail recent neuroanatomical and information-processing models of perception without awareness. Thorough discussions of relevant information-processing models are provided by Erdelyi (1985), Kihlstrom (1984, 1987) and Marcel (1983b), while hypothesized neurological pathways underlying perception without awareness are described by Dixon (1981), Shevrin and Dickman (1980), and Zajonc (1984). As these (and other) reviews demonstrate, the finding that subliminal drive- and affect-related stimuli produce stronger effects on behavior than identical stimuli presented supraliminally is consistent with psychoanalytic theory (Bornstein and Masling, 1984; Silverman, 1983), evolutionary theory (Bornstein, in press; Brown, 1977), neuroanatomical models of perception, arousal and affective responding (Winson, 1984; Zajonc, 1984), research on social cognition (Bornstein et al., 1987; Uleman, 1987), and models of attention, memory and information-processing (Kihlstrom, 1984, 1987).

Thus, while research on perception without awareness is hardly flawless, and many important methodological and conceptual problems related to particular research paradigms remain to be worked out, studies have now demonstrated convincingly that "subliminal" images and messages are, in fact, subliminal. The question remains, of course: What is the nature of the influence that subliminal stimuli exert, and what are the limits of this influence? Detailed reviews of research investigating subliminal influences are provided by Dixon (1971, 1981), Holender (1986) and Silverman (1983). In this section I will describe a few particularly well-designed studies to illustrate the nature of subliminal influences on affect, cognition and observable behavior. In the following section I will discuss the magnitude and limits of these influences.

Subliminal Influences on Affect

Much of the research on subliminal stimulation and affect has investigated Zajonc's (1968) mere exposure effect—the hypothesis that repeated, unreinforced exposure to a stimulus is sufficient for the enhancement of affect toward it. In this context, Kunst-Wilson and Zajonc (1980) investigated the degree to which typical exposure effects could be obtained with subliminal stimuli. They exposed subjects to a series of unmasked 1 millisecond (ms) presenta-

tions of irregular polygon stimuli, following which they presented to subjects the previously-seen polygons along with similar—but unfamiliar— polygons. Subjects made forced-choice preference judgments for a series of these familiar-unfamiliar polygon pairs, and also completed recognition tasks designed to assess whether subjects had consciously detected the subliminal stimuli. Kunst-Wilson and Zajonc found that while recognition judgments of the stimuli were at chance levels (i.e., 50% accuracy), subjects nonetheless preferred previously-exposed over novel polygons about 60% of the time. The subliminal mere exposure effect has been replicated many times under a variety of conditions (e.g., Seamon, Brody, and Kauff, 1983a; Seamon, Marsh, and Brody, 1984), using auditory stimuli (Wilson, 1979), social stimuli (Bornstein et al., 1987), additional response channels (Mandler et al., 1987), and multiple measures of stimulus awareness.

Subliminal Influences on Cognition

Research investigating subliminal influences on cognition has come from several areas, including the assessment of spontaneous trait inferences and attributions (Bargh and Pietromonaco, 1982), and lexical priming effects (Marcel, 1983a). In addition, a number of studies have investigated the extent to which subliminal stimuli presented in conjunction with clearly-recognized pictures or drawings can systematically bias subjects' perceptions and interpretations of these images (see Dixon, 1981).

One very sophisticated study in this area (Fowler et al., 1981) assessed the extent to which subliminal verbal stimuli influence judgments regarding the semantic, phonetic and structural properties of words. Fowler et al. found that, while judgments regarding the structural aspects of subliminally-presented words were at chance levels, semantic and phonetic judgments of these words made by the same subjects were significantly better than chance (e.g., 68% accuracy for semantic judgments and 55% accuracy for phonetic judgments in Experiment 1). In addition, Fowler et al. found that subliminal priming facilitated subsequent lexical decisions regarding words presented for longer exposure durations. Similar findings have been reported by Allport (1977), Balota (1983), DeGroot (1983), Groeger (1986), Marcel (1983a) and McCauley et al. (1980). However, several studies (e.g., Cheesman and Merikle, 1984; Purcell, Stewart, and Stanovich, 1983) have failed to replicate these results when different methodologies and measures of awareness were employed.

While subliminal primes produce facilitation effects on subsequent lexical decisions, some studies (e.g., Marcel, 1983a; Neely, 1977) have found that inhibition effects produced by inconsistent or unrelated primes diminish repaidly with decreasing stimulus onset asynchrony (SOA), disappearing when SOAs approach 250 ms, before recognition accuracy is completely attenuated. This

suggests that while facilitation effects in lexical priming may be a single-step, automatic process requiring neither attention nor effort, inhibition effects are a multi-stage process requiring greater attention and higher-level cognitive processing (DeGroot, 1983; DeGroot, Thomasson, and Hudson, 1982, Lombardi, Higgins, and Bargh, 1987). In any case, research indicates that facilitation effects can be reliably produced by subliminal lexical stimuli while inhibition effects cannot (cf., Holender, 1986).

Other investigations have examined the influence of subliminal primes on trait attributions and social judgments. For example, Bargh and Pietromonaco (1982) found that subliminal verbal stimuli significantly influenced perceptions of persons about whom a subject had little prior information (see also Bornstein et al., 1987). Erdley and D'Agostino (1988) also found that subliminal verbal stimuli influenced subjects' perceptions of unfamiliar people. Subjects in this study were subliminally exposed to either a positive trait word (*honest*), a negative trait word (*mean*), both trait words, or a blank control stimulus. Subjects then rated an imaginary stimulus person on several trait dimensions, including those for which they had received subliminal primes. Erdley and D'Agostino found significant effects of prime content on subsequent ratings. Relative to controls, subjects exposed to the negative prime rated the stimulus person as more "mean," and subjects exposed to the positive prime described her as more "honest." Other researchers have reported similar findings using subliminal primes (see Uleman, 1987, for a review of these studies).

Subliminal Influences on Behavior

Like research assessing subliminal infuences on cognition, investigations of subliminal influences on behavior have come from a variety of areas. Stimuli directed at influencing consumer behavior directly via subliminal presentation of messages such as BUY POPCORN or DRINK COKE have generally produced either nonsignificant effects or weak, irreplicable effects (Saegert, 1979, 1987). Other studies employing subliminal instructions (e.g., Zuckerman, [1960] attempted to influence subjects' writing behavior in the laboratory via subliminal presentation of the messages WRITE MORE and DON'T WRITE) have also produced mixed results, and are plagued by numerous methodological problems (Moore, 1982).

However, in marked contrast to the failure of subliminal "command" stimuli to produce robust effects, subliminal drive-related stimuli designed to activate or gratify unconscious needs have been found to significantly influence smoking frequency (Palmatier and Bornstein, 1980), weight loss during treatment for obesity (Silverman, Martin, Ungaro, and Mendelsohn, 1978), self-disclosure during psychotherapy (Linehan and O'Toole, 1982), electrodermal responding (Masling et al., 1988) and competitive behavior (Silverman, Ross, Adler, and

Lustig, 1978). The general procedure in subliminal psychodynamic activation studies is to expose subjects to several presentations of either an experimental (i.e., drive-related) or control (neutral) message-picture combination, at subliminal (4 ms)—and sometimes also at supraliminal (e.g., 10 sec)—durations. Typically, pre- and post-exposure scores on some relevant measure are compared to examine the influence of stimulus exposures, although in some studies repeated measures are taken over a period of days or weeks during which stimuli are periodically presented. Detailed descriptions of the methodology used in these studies, and reviews of findings in this area are provided by Balay and Shevrin (1988), Bornstein (1989) and Silverman (1983).

One of the more interesting (and controversial) subliminal psychodynamic activation studies was performed by Silverman, Ross, Adler, and Lustig (1978), who investigated the influence of subliminal Oedipal stimuli on dart-throwing performance. Silverman et al. tested the hypothesis that competitive behavior in such a situation would be influenced by male subjects' unconscious ambivalence regarding direct competition with other males, based on the psychoanalytic hypothesis that attitudes regarding competition and aggression are shaped and influenced largely by unconscious Oedipal dynamics and feelings toward the father (Freud, 1923). In this study, subjects were asked to compete in a dart-throwing competition for $25.00 in prize money. After baseline dart-throwing scores were obtained, subjects were subliminally exposed to either an "Oedipal" message designed to increase anxiety (BEATING DAD IS WRONG), a message designed to decrease anxiety (BEATING DAD IS OK), or a neutral control message (e.g., PEOPLE ARE STANDING). Subjects were then retested on the dart-throwing task, and difference scores in dart-throwing performance were calculated. Subliminal exposure to the anxiety-reducing stimulus resulted in a significant improvement in dart scores, while subliminal exposure to the anxiety-producing stimulus produced a decrement in scores. Exposure to the neutral stimulus had no significant effect.

Although some attempts to replicate this finding have produced nonsignificant results (e.g., Heilbrun, 1980), other replications have supported and extended Silverman et al.'s findings (e.g., Palumbo and Gillman, 1984). A number of serious criticisms of Silverman's methodology and conclusions have been disucssed (Balay and Shevrin, 1988; Bornstein and Masling, 1984; Fudin, 1986), but overall the subliminal psychodynamic activation method has produced fairly robust results. About 75% of all attempts to replicate Silverman's findings have been successful (Bornstein and Masling, 1984), and recent studies provide strong evidence that the stimuli used in subliminal psychodynamic activation experiments cannot be recalled, recognized, or discriminated from other briefly-presented stimuli at better-than-chance levels (Masling et al., 1988).

Certain experiments investigating the subliminal mere exposure effect have

also produced significant changes in observable behavior. In one study (Bornstein et al., 1987), undergraduate male subjects were brought to the laboratory in the guise of participating in a study of the decision-making process. They were introduced to two other male "subjects" (actually confederates of the experimenter), and asked to take part in a 10-minute discussion in which the group was to try to determine the gender of 10 poets, provided only with brief poem excerpts. Prior to participating in the discussion, the actual subject was subliminally exposed (using five repeated 4 ms exposures) to a photo of one of the confederates, or to a blank slide. During the discussion, the confederates disagreed regarding the gender of the majority of poets, placing the actual subject in the position of tie-breaker for these poems. Bornstein et al. found that the subject concurred with the opinion of the previously-seen confederate in the majority of cases (68%), while agreement with each confederate was equal under control conditions in which a blank slide was subliminally exposed. Pittman and Bornstein (1989) obtained similar results in a mock hiring task where subjects selected among job candidates after having been subliminally exposed to a photograph of one of the candidates or a blank slide. Consistent with the findings of Bornstein et al., Pittman and Bornstein found that subjects selected the previously-seen job candidate about 70% of the time, while candidate selection was at chance level (i.e., 50% selection of each candidate) when a blank slide was presented subliminally.

The Nature of Subliminal Effects

Overall, research clearly indicates that subliminal stimuli can produce statistically significant changes in affect, cognition and behavior. However, the stimuli that reliably produce significant subliminal effects are quite different from those originally used by advertising researchers during the 1950s. In those early studies messages typically took the form of instructions or "commands" (e.g., DRINK COKE, BUY POPCORN), designed to manipulate consumer behavior directly (what Moore, 1982, refers to as "strong" subliminal effects). Thirty years of work by advertising and marketing research has demonstrated conclusively that such messages do not systematically influence consumer behavior. In virtually all studies that have obtained robust, reliable subliminal effects, affect, cognition and behavior have been manipulated indirectly, via simple drive- or affect-related stimuli, or by the use of lexical primes (what Moore referes to as "weak" subliminal effects). Thus, the answer to the question posed earlier—Do stimuli perceived without awareness influence affect, cognition and behavior?—is *yes*, but only when certain types of stimuli are employed. Subliminal stimuli can activate or gratify preexisting drive and need states, enhance affect via repeated, unreinforced exposures,

and activate semantic networks which have been previously encoded. There is no evidence that such stimuli can create new drives or motivations, or directly influence behavior via subliminal commands.

However, while studies employing drive- or affect-related stimuli or lexical primes have obtained statistically significant effects on affect, cognition and behavior following subliminal exposures, statistical significance is hardly the same as ecological significance. Subliminal techniques have the *potential* to manipulate subjects' emotions, thoughts and behavior, but the question of whether subliminal effects are powerful enough to be effective propaganda tools remains.

How Powerful Are Subliminal Effects?

There are many routes to persuasion and attitude change, some direct and overt, others more subtle and indirect. Subliminal stimuli are difficult to present to subjects, especially outside the laboratory where numerous distractions and other "noise" may interfere with subjects' exposure to the stimuli. Whether visual or auditory, subliminal stimuli require sophisticated, expensive equipment to ensure that they are presented under proper conditions of exposure duration, volume, illumination, etc. (see Silverman, 1977, for a discussion of technical parameters in subliminal research). Given the difficulty involved in presenting subliminal stimuli—especially to an unwitting and uncooperative group of subjects—the effects would need to be robust and powerful to overcome the problems which would inevitably be encountered when employing subliminal techniques in vivo. In addition, in light of the expenses, risks and technical difficulties associated with covert attitude and behavior manipulation, the effects produced by subliminal stimuli would have to be substantially greater than the effects produced by the same stimuli presented supraliminally for subliminal propaganda techniques to be cost effective. Unfortunately, there are no controlled experiments directly assessing the efficacy of subliminal stimuli in influencing the attitudes or behaviors of naive subjects outside the laboratory. We must therefore rely on laboratory studies of subliminal perception to draw conclusions regarding the strength and robustness of subliminal effects, and their potential for covert use outside the laboratory.

Subliminal vs Supraliminal Mere Exposure Effects

Thirteen experiments using subliminal stimuli have investigated change in affect toward a stimulus following repeated, unreinforced exposures (Barchas and Perlaki, 1986; Bonnano and Stillings, 1986, Experiments 1–3; Bornstein et al., 1987, Experiments 1 and 2; Kunst-Wilson and Zajonc, 1980; Mandler

et al., 1987; Seamon et al., 1983a, Experiments 2 and 3; Seamon, Brody, and Kauff, 1983b; Seamon et al., 1984 [2 and 8 ms exposure conditions]; Wilson, 1979, Experiment 2). Comparison of exposure effects obtained using subliminal stimuli with those obtained using stimuli that are clearly recognized indicates that mere exposure to subliminal stimuli produces attitude enhancement far exceeding that produced by exposure to recognizable stimuli. Using meta-analytic techniques (Rosenthal, 1984) to compare the magnitude of attitude enhancement following repeated, unreinforced stimulus presentations of different exposure durations, Bornstein (in press) assessed the mean effect size (r) in laboratory mere exposure studies using subliminal stimuli and those using stimuli presented for longer exposure durations. A mean effect size of .528 was found for subliminal stimuli, while the mean effect size for stimuli presented for longer exposure durations was .140.

Further information regarding the inhibitory role of stimulus awareness in the mere exposure effect may be obtained by examining the relationship of recognition accuracy to the magnitude of the effect. The laboratory mere exposure studies in Bornstein's (in press) comprehensive review and meta-analysis can be classified into three general categories with respect to recognition accuracy: (a) studies which use clearly-recognized stimuli; (b) studies which use stimuli where recognition accuracy is somewhat—but not completely—attenuated via masking and other procedures (i.e., Bonnano and Stillings, 1986, Experiments 1 and 2 [color conditions]; Moreland and Zajonc, 1979, Experiment 2; Seamon et al., 1983a, Experiments 1 and 4; Seamon et al., 1984 [12 ms and longer exposure conditions]; Wilson, 1979, Experiment 1); and (c) studies where recognition accuracy does not differ from chance level (the experiments using subliminal stimuli listed earlier). All experiments in categories b and c (attenuated recognition and chance recognition) used recognition ratings of familarized and unfamiliarized stimuli to assess recognition accuracy; in each of these studies 50% accuracy represents chance performance.

Mean recognition accuracy in subliminal mere exposure studies is 49.54% (SD = 2.26, Range = 44–53), and as noted, the mean effect size (r) for these studies is .528. Mean recognition accuracy for exposure studies in which stimulus recognition was attentuated is 65.50% (SD = 8.42, Range = 56–87), and the mean effect size in these studies is .470. Although only a few mere exposure experiments which used clearly-recognized stimuli assess stimulus recognition directly, these studies typically find that recognition accuracy approaches 100% (e.g., Matlin, 1971). Mean effect size in these studies is .121.

The implications of these data are clear: there is an inverse relationship between recognition accuracy and the magnitude of the mere exposure effect. Thus, meta-analysis of the magnitude of the exposure effect as a function of stimulus exposure duration, and an analysis of the magnitude of the

exposure effect as a function of stimulus recognition accuracy both suggest that stimulus awareness inhibits affective responding to repeated unreinforced stimulus exposures. In the area of mere exposure effects, the potential for use of subliminal techniques for propaganda purposes seems significant: supraliminal exposure effects have proven to significantly influence election outcomes as well as attitudes toward political candidates (Grush, McKeogh, and Aherling, 1978), and results of the meta-analysis suggest that subliminal exposure effects are even more powerful.

Subliminal vs Supraliminal Psychodynamic Activation Effects

Relatively few psychodynamic activation studies examine directly the magnitude of behavior change in response to recognized vs unrecognized stimuli. In the majority of these studies, stimulus content (experimental vs control) is included as an independent variable, but differences in subjects' responses to subliminal vs supraliminal stimulus presentations are not examined. However, in psychodynamic activation studies where exposure duration is also manipulated, significantly stronger effects are generally obtained for subliminal than supraliminal stimuli (Cox, 1974; Lomangino, 1969; Masling et al., 1988; Moriarty, 1968; Rutstein and Goldberger, 1973; Silverman and Candell, 1970; Silverman and Goldweber, 1966; Silverman and Grabowski, 1982; Silverman and Spiro, 1968; cf., Haspel and Harris, 1982; Heilbrun, 1980). Drive-related stimuli presented for 4 ms (and not recognized or discriminated from other 4 ms stimuli at better-than-chance levels) produce stronger effects on behavior than identical stimuli presented for 10 sec (Rutstein and Goldberger, 1973), 5 sec (Silverman and Candell, 1970) or 200 ms (Masling et al., 1988). No studies in this area (including those that fail to obtain significant subliminal effects; i.e., Haspel and Harris, 1982; Heilbrun, 1980) have obtained stronger effects for recognized than unrecognized drive-related stimuli.

Consistent with this, meta-analytic comparison of the magnitude of behavior change produced by subliminal vs supraliminal drive-related stimuli for all psychodynamic activation studies that used both types of stimuli (N of studies [listed earlier] = 11; N of subliminal-supraliminal comparisons = 43), confirms that subliminal presentations of drive-related stimuli produce significantly stronger effects on behavior than supraliminal presentations of the same stimuli (Bornstein, 1989). Overall, subliminal drive-related stimuli produce changes in behavior that exceed the changes produced by supraliminal drive-related stimuli by about .2 standard deviations (d = .196, combined z = 4.00, p = .00003; see Bornstein, 1989, for a detailed discussion of these findings). In addition, while the magnitude of behavior change produced by supraliminal drive-related stimuli did not differ from the behavior change produced by neutral control stimuli in these studies (d = .022), subliminal drive-related

stimuli produced significantly stronger effects than did control stimuli (d = .111).

Studies by Silverman and others (see Silverman, 1983, Silverman et al., 1982) further indicate that behavioral changes in response to subliminal drive-related stimuli are not only greater than behavioral changes in response to identical supraliminal stimuli, these effects are also ecologically significant (e.g., substantial symptom reduction in clinical subjects; noticeable changes in verbal and nonverbal responses during psychotherapy and projective testing; changes in smoking, drinking and eating behavior). Consistent with research on the mere exposure effect, examination of psychodynamic activation research suggests that stimulus awareness actually inhibits responding to drive-related stimuli.

Subliminal vs Supraliminal Lexical Priming Effects

There have been few lexical priming studies which assess directly the magnitude of priming effects produced by recognized vs unrecognized stimuli. However, DeGroot (1983) and Fowler et al. (1981) found no significant differences in facilitation of lexical decisions for subliminal vs supraliminal primes (see also Balota, 1983; Marcel, 1983a). Similarly, comparison of the magnitude of facilitation effects obtained in studies using subliminal primes with the magnitude of facilitation effects obtained when supraliminal primes are used (e.g., Meyer and Schvaneveldt, 1971; Meyer, Schvaneveldt, and Ruddy, 1975) also indicates that stimulus recognition is unrelated to the magnitude of positive (facilitating) priming effects.

Consciousness and Control

Subliminal priming, mere exposure and drive-activation effects all have qualities characteristic of automatic information processing (Shiffrin and Schneider, 1977). They do not require conscious attention, deliberate effort or higher-level cognitive processing of stimulus content in order to occur. As Shiffrin and Schneider (p. 156) note, certain automatic processes take place entirely outside conscious awareness. Subliminal priming, mere exposure and drive-activation effects are examples of such automatic, unconscious processes.

Still, the question remains: How can the influence of subliminal stimuli on behavior be significantly *greater* than the influence of clearly-recognized stimuli in certain situations? After reviewing the literature on subliminal perception and preconscious processing, Kihlstrom (1987) concluded that subliminal stimuli activate automatized procedural knowledge, and suggested that: "the magnitude of these effects may even be increased because preconscious processing obviates the possibility of conscious countercontrol

over these effects" (p. 1448). There is substantial evidence that such procedural knowledge need never have been in conscious awareness in order to influence subsequent responding (Lewicki, 1986; Lewicki, Hill, and Bizot, 1988). Thus, as Bornstein (in press) and others (e.g., Uleman, 1987) note, semantic priming, mere exposure and drive-activation effects may be elicited regardless of whether a stimulus is consciously perceived, but in the absence of conscious detection and higher-level processing of stimulus content, certain cognitive processes which restrict, diminish or counteract the influence of the stimuli are not employed (e.g., attributional biases, ego defenses such as rationalization, etc; see Bornstein, in press; Kihlstrom, 1987).

Marcel (1983b) offers a constructivist interpretation of this issue, suggesting that conscious experience is in fact a focused, restricted derivative of unconscious experience (see Mandler and Nakamura, 1987, for a review of other theoretical approaches to the conscious-unconscious relationship). The constructivist model argues that in the course of selecting unconscious material worthy of attention and controlled, strategic processing, transformations of unconscious material occur which distort its meaning in an attempt to formulate a coherent, logical stream of conscious experience (Horowitz, 1988; Kihlstrom and Cantor, 1984). Spence (1964, 1966) has referred to this process as the "restricting effect of awareness" on cognitive and affective responding. Zajonc (1980, 1984) suggests that such findings support the notion that affective responding may take place in the absence of higher-level cognitive processing (cf. Mandler et al., 1987). In this context, Bornstein (in press), and Zajonc (1984) have discussed the adaptive value of an organism's ability to respond to stimuli that are not recognized.

Not surprisingly, conscious countercontrol strategies (e.g., defenses such as rationalization, denial and intellectualization; attributional biases and distortions, etc.) are quickly invoked when recognizable drive- or affect-related stimuli are employed, so that the magnitude of effects produced by consciously recognized drive- or affect-related stimuli are diminished relative to the effects produced by the same stimuli presented subliminally. Lexical primes have less personal relevance to the perceiver, so fewer countercontrol strategies are invoked to minimize the impact of the stimulus, and the subliminal-supraliminal effect size difference disappears. However, while the magnitude of subliminal and supraliminal priming effects are comparable, qualitative differences in subjects' responses to recognized and unrecognized primes support the hypothesis that countercontrol strategies are invoked only when primes are consciously perceived and remembered (Groeger, 1986, 1988; Lombardi et al., 1987).

Overall, results of mere exposure and drive-activation studies not only suggest that ecologically significant affective and behavioral changes can be induced via stimuli perceived without awareness, these results also indicate that

in both paradigms, subliminal stimulus presentations produce substantially stronger effects than supraliminal stimulus presentations. Lexical priming studies produce mixed results in this area; subliminal primes produce facilitation effects, but not inhibition effects. Unlike affect- and drive-related stimuli, however, the magnitude of facilitation effects produced by subliminal primes is similar to the magnitude of facilitation effects produced by clearly-recognized primes. In contrast, when attempts are made to manipulate behavior directly via instructions or commands (as in early subliminal advertising research), subliminal stimulus presentations produce negligible effects (Moore, 1982; Saegert, 1987), far weaker than the effects of direct advertising strategies which present clearly-recognized messages and information about a product.

How Stable Are Subliminal Effects?

The temporal stability of subliminal influences is important in terms of the procedures which could be employed to present subliminal stimuli for propaganda purposes. If, for example, one were attempting to influence attitudes toward a candidate for election, it would be possible (albeit difficult) to present subliminal auditory stimuli to voters during the balloting process. It would be far easier, however, if attitudes toward the candidate could be manipulated prior to the balloting (see Mullen et al., 1986). This would require that subliminal influences be relatively stable over time, so that stimulus exposures could be presented hours—or better, days—before the actual election. These same considerations would be salient, of course, for individuals interested in employing subliminal advertising techniques.

Seamon et al. (1983b) assessed the temporal stability of subliminal mere exposure effects over several delay periods. The methodology of this study was derived from that of Kunst-Wilson and Zajonc (1980). Subjects were exposed to five repeated 5 ms presentations of several polygon stimuli, following which forced-choice preference ratings between the subliminally-exposed and matched unfamiliar polygons were collected. Ratings were obtained immediately following exposures, 1 day later, and after a 1-week delay period. Seamon et al. found that affect toward the subliminally-exposed polygons became slightly more positive with increasing delay between exposures and ratings. Previously-exposed stimuli were selected about 60% of the time in immediate ratings, and in ratings made after 1-day delay. However, after 1 week of delay, previously-seen polygons were selected 65% of the time. Not only did the effects of subliminal stimulus exposures remain stable over a 1-week period in this study, an enhancement in attitude toward the stimuli occurred between the 1-day and 1-week post-exposure periods.

No studies have examined directly the temporary stability of subliminal lexical priming effects over a broad range of delay periods. SOAs in lexical

priming studies rarely exceed a few seconds, which does not permit a strong test of the temporal stability of priming effects. While subliminal primes produce significant changes in lexical decisions (Fowler et al., 1981) and trait attributions (Erdley and D'Agostino, 1988), it seems likely that priming effects dissipate rapidly (Neely, 1977; Uleman, 1987), and do not produce changes in attitudes and behavior that are stable over time. As Kihlstrom (1987) notes, "[semantic] activation dissipates as fast as it spreads" (p. 1449), making it unlikely that subliminal priming effects could influence long-term behavior. However, the temporal stability of subliminal lexical priming effects will remain uncertain until studies assessing these effects over a range of delay times are conducted.

A number of Silverman's studies support the notion that subliminal psychodynamic activation effects are stable over time. Although Silverman and his colleagues are not concerned with the temporal stability of subliminal effects per se, the design of certain studies allows us to draw some tentative conclusions in this area. In numerous experiments, Silverman and his colleagues present subliminal drive-related stimuli as an adjunct to treatment for depression, alcoholism, smoking, test anxiety, obesity, and other psychopathologies (Silverman, 1983). While stimulus "dosage" is a critical (and inadequately studied) variable in these experiments (Bornstein and Masling, 1984), there is some evidence that periodic exposure to subliminal drive-related stimuli produces significant symptom reduction that is stable over a period of several days (Silverman et al., 1982; cf., Bornstein, 1989). Silverman (1977) also described some unintended negative long-term effects of subliminal stimulus exposures on normal subjects (e.g., free floating anxiety and preoccupation with troubling thoughts and feelings related to the content of the subliminal stimuli, persisting for several days following stimulus exposures).

Although the effects of periodic subliminal presentations of drive-related stimuli seem stable over time, two important qualifications regarding this conclusion must be noted. First, the majority of these studies involve clinical populations, and generalizing from clinical subjects to the population at large must always be done cautiously. Second, the clinical subjects in these studies were motivated to change their behavior. In most cases, they were undergoing voluntary treatment for the disorders in question. Generalization of findings from samples of highly motivated subjects to samples of naive, unmotivated (or uncooperative) subjects must also be done with caution (see Bornstein, 1989, for a discussion of patient-normal differences in psychodynamic activation effects). Nonetheless, the results of studies by Silverman and his colleagues are generally consistent with the findings of Seamon et al. (1983b) regarding the stability of affect changes following repeated, unreinforced stimulus presentations, and with findings regarding the temporal stability of unconscious influences on social cognitions and behaviors (Lewicki and Hill, 1987).

Overall, only drive- and affect-related stimuli fulfill the three criteria considered so far (statistical significance, ecological significance and temporal stability) that would be minimally required for a subliminal stimulus to have potential for use as a propaganda tool. While subliminal lexical primes clearly fulfill the first criterion, and may fulfill the second (although additional research is needed to address this issue directly), the rapid dissipation of priming effects may limit their potential for use as propaganda tools.

Can Subliminal Influences be Resisted?

Unlike other areas of research in which suggestibility and unconscious influence are central issues (e.g., hypnotism), there have been no studies of the extent to which subliminal effects can be resisted by unwilling subjects. Such an experiment would be relatively east to conduct in a laboratory setting under controlled conditions. Procedures to examine this phenomenon could be borrowed from studies of hypnosis-resistability (e.g., Orne and Evans, 1965; Udolf, 1981). To conduct a strong test of the resistability of subliminal effects in vivo would be far more difficult, and would involve some questionable ethical practices. That is unfortunate for two reasons. First, many individuals within and outside the scientific community have accepted uncritically the idea that subliminal influences are somehow "irresistable" (see Dixon, 1971, p. 177). Second, the belief that subliminal effects are irresistable has provoked much of the strong, negative public reaction to this research (Zanot et al., 1983).

Results to date suggest only that when subjects are exposed to subliminal stimuli that have previously proven effective, a certain proportion will show the predicted changes. Of course, the same is true of other persuasion and attitude manipulation techniques (see Petty, Ostrom, and Brock, 1981). However, the undetectability of subliminal stimuli may diminish their resistability relative to other persuasion techniques. Subliminal effects typically are fairly subtle (e.g., changes in affect, anxiety level, etc.), and it is doubtful that naive subjects could detect these effects once exposures have occurred (Silverman, 1977; Uleman, 1987). If a change in affect, cognition or behavior was noticed by the subject, it would not be possible to attribute this reaction to a stimulus which is genuinely undetectable. Because subliminal stimuli can activate unconscious procedural knowledge, bypassing the restricting effects of awareness, responses induced by such stimuli are phenomenologically similar to innate, reflexive, "gut" reactions (Bornstein et al., 1987). In constrast, when the source of influence is readily apparent (i.e., when clearly-recognized stimuli are used to manipulate attitudes and behavior), various strategies may be invoked after perception and encoding have occurred to alter and reduce the impact of the message. Conscious awareness is a prerequisite for conscious control. Perceivers may use various defensive and at-

tributional strategies to counter the impact of a message that is consciously perceived. Such countercontrol strategies are not available when stimuli are perceived without awareness (Kihlstrom, 1987; Silverman et al., 1982).

The most effective and reliable way to resist the influence of a subliminal stimulus is to avoid being exposed to the stimulus in the first place. Strategies must be employed to prevent perception or encoding of stimulus content (e.g., refusing to attend to stimuli). However, deliberate avoidance requires knowledge that stimulus exposures are (or might be) taking place, which may not be the case when subliminal stimuli are presented covertly outside the laboratory. Thus, in at least two respects, perceivers' ability to resist subliminal influences may be diminished relative to their ability to resist the influence of stimuli that are consciously perceived: (a) fewer conscious countercontrol strategies are available when stimuli are perceived without awareness; and (b) when stimuli are genuinely undetectable, perceivers' ability to avoid stimulus exposures is significantly diminished. This does not mean that subliminal influences are in any sense "irresistable"; in all studies of subliminal perception and attitude or behavior change where significant effects are obtained, some subjects respond to the stimuli and others do not. This is also true for research on other persuasion and attitude manipulation techniques (Petty et al., 1981). What we can conclude at this point is that fewer strategies to minimize the impact of stimulus presentations are available to subjects exposed to subliminal stimuli than are available to subjects exposed to stimuli that are recognized.

Discussion

The results of numerous studies suggest that certain subliminal techniques have potential for use as propaganda tools, while other techniques clearly do not. Subliminal mere exposure and psychodynamic activation effects produce ecologically significant, temporally stable changes in a variety of areas related to behavior change and attitude manipulation. Although these stimuli influence attitudes and behavior indirectly (i.e., by repeated, unreinforced exposures, or by activating or gratifying unconscious drives and needs), they do so reliably and predictably. While subliminal lexical primes also produce robust facilitation effects, there is no evidence that these effects are stable over time, so subliminal priming probably has less value as a propaganda tool. The strongest and most consistent results in subliminal perception research have come from studies which employ relatively simple, drive- or affect-related stimuli. There is little evidence that effects such as those described by subliminal advertising researchers during the 1950s are robust and replicable.

The results of the present review help to resolve a long-standing controversy regarding the effects of stimuli perceived without awareness. One widely-held

view of subliminal effects is summarized by Bevan (1964), who suggested that the influences of subliminal stimuli ". . . if they occur at all, are highly subtle" (p. 91). Similarly, McConnell (1977) concluded that studies of perception without awareness ". . . have yielded results as subliminal as the stimuli used" (p. 231). In other words, many psychologists argue that there is a positive relationship between stimulus "dosage" (duration and frequency of exposure, etc.) and the magnitude of the elicited response. Other researchers have suggested that certain stimuli presented subliminally will exert stronger effects than the same stimuli presented supraliminally, because subliminal exposures bypass ego defenses (Silverman, 1983), conscious countercontrol strategies (Kihlstrom, 1987), critical analysis of stimulus content (Zajonc, 1980, 1984), and the "restricting effects of awareness" (Spence, 1964, 1966). The present results indicate that both positions are correct: it depends on the nature of the stimuli and dependent measures used. When researchers attempt to induce behavior change directly, via subliminal instructions like DRINK COKE, and then assess changes in behavior related to these instructions, weak effects are obtained. When cognitions are manipulated and assessed (as in lexical priming studies), subliminal and supraliminal stimuli produce comparable effects. However, when researchers employ simple drive- or affect-related stimuli—as in mere exposure and psychodynamic activation studies—and then assess preferences (Bornstein, in press), or drive-related behavior (Bornstein, 1989), stronger effects are obtained for subliminal than supraliminal stimuli. In other words, stimulus recognition accuracy is inversely related to the magnitude of mere exposure and psychodynamic activation effects, unrelated to the magnitude of lexical priming effects, and positively related to the magnitude of effects obtained when instructions or "commands" are used to manipulate behavior.

These results allow us to draw some tentative conclusions regarding the processes underlying perception without awareness. Kihlstrom (1987, p. 1447) argues that ". . . complex analyses, once routinized, take on many of the properties of preattentive feature detection and pattern recognition. Accordingly, it may be possible to perform meaning analysis on information which is not itself accessible to conscious awareness, by means of automatized procedural knowledge." It is not surprising, in this context, that stimulus awareness inhibits responding to drive- or affect-related stimuli. Just as controlled information processing is subject to interference from ongoing cognitive activities which require conscious attention while automatic processing is relatively free from such interference (Shiffrin and Schneider, 1977), conscious processing of drive- or affect-related stimuli is subject to interference from concomitant cognitive activities (e.g., defensive strategies, attributional biases) while the same stimuli presented subliminally are not.

Consistent with this hypothesis, Zajonc (1984) suggests that, on a

neurological level, drives and emotions may be influenced by exopsure to external stimuli via the retinohypothalamic tract. Only if a stimulus is of sufficient intensity, however, will cortical areas associated with conscious awareness and higher-level cognitive processing also be activated. This does not preclude the possibility that rudimentary mental representations of stimuli are encoded and elaborated during subliminal exposures (Mandler and Nakamura, 1987). Rather, it seems likely that information conveyed via the retinohypothalamic tract and its associated structures is sufficient to influence affect (Zajonc, 1984), facilitate encoding of unconscious mental representations of stimuli (Bornstein, in press), and activate automatized (i.e., reflexive) procedural knowledge (Goodale, 1982).

If the activation of cortical structures associated with higher-level cognitive processing exerts an inhibitory effect on retinohypothalamic transduction, affective responding to stimuli that are consciously perceived will be diminished. Stimulation of the ascending reticular activating system may inhibit retinohypothalamic transduction (see Dixon, 1981). Other cortical structures might also be involved in inhibition of impulses along this pathway (Brown, 1977; Winson, 1984). While this (admittedly speculative) model clearly requires a great deal of additional research to assess its predictive validity, it is consistent with the range of findings in this area (Dixon, 1981; Kihlstrom, 1987; Silverman, 1983; Zajonc, 1984), and in particular with the pattern of results obtained for different types of subliminal stimuli.

Given the nature and limitations of subliminal effects produced by different paradigms and procedures, the only real possibilities for use of subliminal techniques for propaganda purposes are the presentation of repeated, unreinforced stimulus exposures to influence attitudes toward a stimulus object or person (subliminal mere exposure effects); and the use of drive-related stimuli to influence drives and motivations, indirectly altering perceivers' behavior (subliminal psychodynamic activation effects). However, while subliminal mere exposure and psychodynamic activation have the potential for use as propaganda tools, a great deal of research remains to be done before these techniques could be applied outside the laboratory, and it is not at all clear that the effects induced via these procedures could overcome the practical and technical problems which would be encountered in vivo. If the same effects could be achieved as reliably, but more easily and less expensively, subliminal propaganda techniques would lose much of their appeal. It makes no sense, for example, for Gorbachev to rely on subliminal exposure effects to enhance American citizens' attitudes toward him when he's doing a fine job of that using a more direct approach. Thus, a brief discussion of advantages and disadvantages of subliminal techniques as propaganda tools in relation to other persuasion techniques is warranted.

Subliminal mere exposure and psychodynamic activation effects have at

least four significant advantages over other, more direct methods of attitude and behavior manipulation. First, because stimuli are not consciously detected, the source of influence is unknown to the individual(s) being manipulated. This may be an important consideration if the source of influence is an unpopular one, or one regarded with suspicion. Second, it is impossible to deliberately avoid being exposed to stimuli that are genuinely undetectable. Third, because the stimuli circumvent certain conscious processes (e.g., critical analysis and evaluation of stimulus content), the possibility for conscious countercontrol over subliminal effects is minimized. Fourth—and perhaps most important in the realm of propaganda techniques—because subliminal mere exposure and psychodynamic activation effects induce attitude and behavior change without providing information regarding the source of the influence, individuals are forced to create post-hoc explanations for their attitudes and behaviors, justifying and rationalizing these attitudes and behaviors to themselves and others. Such post-hoc rationalizations are associated with commitment to the newly-adopted attitude or belief, so that the attitude and behavior change is actually reinforced by the subject and becomes, in a sense, self-perpetuating: the more a subject observes him or herself feeling or acting a certain way, the more they are compelled to rationalize and justify the behavior (see Cooper and Fazio, 1984; Nisbett and Wilson, 1977). It is likely that if subliminal stimuli could be used to reliably induce affect or behavior change outside the laboratory, the subjects themselves will provide the necessary cognitions (justifications, rationalizations, attributions, etc.) to explain their manipulated behavior or affect.

Subliminal propaganda techniques also have significant limitations and disadvantages. While the omnipresence of media such as television—which are already in the vast majority of American homes—would seem to provide a ready technology for the presentation of both visual and auditory subliminal stimuli, some practical limitations make the use of this technology for subliminal propaganda purposes difficult. For example, it is not clear that television sets can present visual stimuli for the very brief exposure durations required to ensure undetectability. In addition, thresholds for stimulus awareness—both between subjects, and within an individual subject over time—vary widely, so that stimuli that are not consciously detected by some people would be clearly recognized by others. Furthermore, television sets are adjusted to different screen illuminations, and the background (room) illumination differs significantly from household to household. In addition, televisions are set at different volumes, differ markedly in size, and are viewed from different positions, so that stimulus dimensions and visual angles vary markedly from household to household. All of these are critical parameters which, if not taken into account, would interfere with the use of television as a medium for the large-scale presentation of subliminal propaganda. Clearly,

a considerable number of technical problems would have to be overcome before subliminal stimuli could be presented to the public on a wide scale via a medium such as television. Similar difficulties would be encountered in attempting to present subliminal messages via media such as radio, motion pictures, or commercial audio- or videotapes.

These problems are exacerbated by the fact that when subliminal techniques are applied covertly to an unwilling population, it is critical that they remain undetected. Thus, a very brief exposure duration and low illumination (for visual stimuli) or very low volume (for auditory stimuli) are necessary. A tradeoff between undetectability and stimulus potency then becomes salient. The most effective subliminal stimuli are those that are undetectable, but barely so; stimuli just outside conscious awareness (Bornstein and Masling, 1984; Seamon et al., 1984). To the extent that illumination, volume or exposure duration is decreased more than is absolutely necessary to ensure undetectability, the possibility of achieving strong subliminal effects diminishes.

Assuming that technical problems hindering the wide-scale presentation of subliminal stimuli were eventually overcome, it is worthwhile to speculate: How might subliminal stimuli be employed for propaganda purposes? Because there is probably a limit on the degree to which affect can be manipulated using mere exposures (few exposure studies report attitude or behavior change greater than approximately 20%) the most effective use of subliminal stimuli in this area may be as an adjunct to other persuasion techniques. It is doubtful that subliminal mere exposure effects alone could elect a candidate who is completely unknown or extremely unpopular. However, they could well influence the outcome of an election by enhancing attitudes toward a candidate who, in addition to using subliminal techniques, actively campaigns and thereby reduces the margin of popular vote between herself and the opposing candidate to the 10% or so typically found even in rather one-sided elections. In such an instance, subliminal exposure effects presented to a large proportion of the potential voters might well swing the election (see Grush et al., 1978; Mullen et al., 1986). Similarly, subliminal exposure effects might be utilized to enhance attitudes toward a public figure for propaganda purposes.

Subliminal techniques could also be used to alter attitudes toward a controversial issue or topic. Repeated, unreinforced exposures to a name or image enhance attitudes toward the object associated with the name or image. Subliminal presentations of BUY CIGARETTES would not turn the United States into a nation of heavy smokers, but repeated, unreinforced subliminal presentation of a cigarette name or image might well enhance attitudes toward the product in at least some people, and could thereby induce those people who are considering trying cigarettes to actually sample the product. Along different lines, subliminal drive-related stimuli designed to activate certain

unconscious needs and anxieties could well affect smoking behavior by increasing peoples' desire for cigarettes (Bornstein and Masling, 1984). Similarly, alcohol consumption in the general population could—at least in theory—be increased (or decreased) via subliminal presentation of relevant drive-related stimuli (Silverman et al., 1982).

Application of subliminal techniques outside the laboratory clearly has some disturbing implications. Manipulating attitudes and behaviors in unsuspecting people is unethical. Yet all propaganda—whether subliminally presented or clearly recognized—by definition involves attitude and behavior manipulation. Advertising seeks to manipulate attitudes and behaviors, sometimes via direct approaches (e.g., presenting information regarding the positive qualities of a product or service), but at other times using less direct techniques (e.g., juxtaposing or interspersing images of a product with scenes of youthful, attractive people enjoying the product). The intentions of such "indirect" advertising techniques are clear: to create an association between a product and the positive (often sexual) images presented alongside it. Such advertisements rely on what Lewicki (1986) refers to as nonconscious biasing effects. By juxtaposing or interspersing product images with suggestive scenes, and minimizing the amount of critical attention that the viewer may direct at the scene (e.g., via the use of brief, quickly-changing images and a distracting song or jingle in television commercials), the affect- and drive-related messages that are central to the advertisement are perceived and encoded, but not analyzed critically (see Comstock, Chaffer, Katzman, McCombe, and Roberts, 1978). The vast quantity of research on implicit learning and modeling illustrates the ubiquitousness of subtle, often unverbalizable media-derived influences on attitudes, beliefs and behaviors (e.g., Bandura, 1977). As Bowers (1984) notes, stimuli which are consciously perceived, but where the connection between the stimulus and its influence on thought or behavior is not noticed or appreciated are, in a very real sense, unconscious influences. Bowers goes on to suggest that ". . . simply noticing a stimulus feature or event in no way guarantees appreciation of its influence on thought and action. Such an appreciation requries comprehension (i.e., awareness) of cause-effect sequences" (pp. 244–245). Thus, while attitude and behavior manipulation using typical advertising and propaganda techniques is not subliminal in the strict (perceptual) sense of being inaccessable to awareness under the most stringent laboratory conditions, these techniques nonetheless constitute unconscious influences on attitudes and behavior (see, e.g., Natsoulas' 1981 discussion of consciousness and intentionality).

In fact, forms of advertising (and other propaganda) which employ indirect, drive-based stimuli influence behavior so effectively precisely because the perceiver is unaware of the relationship between stimulus exposures and subsequent responses. Consequently, fewer conscious countercontrol strategies are

available to examine critically the advertisement's message and to minimize its influence. Nisbett and Wilson (1977) and others (e.g., Zajonc and Marcus, 1982) have demonstrated that consumers often cannot report accurately the reasoning underlying their product preferences and buying behaviors. When attitudes, beliefs or behaviors are influenced by repeated stimulus exposures (Zajonc and Marcus, 1982), by activation of drive or need states (Silverman et al., 1982) or even by direct reinforcement of particular responses (Bowers, 1984), subjects continue to attribute their reactions to properties of the stimulus itself (Nisbett and Wilson, 1977; see also Bowers, 1975, for a particularly graphic illustration of this process). Furthermore, individuals typically overestimate the influence of conscious choices and decisions in the formation of attributions, attitudes, preferences and beliefs (Crocker, 1981; Langer, 1975; Miller and Ross, 1975). Thus, while perceivers' ability to resist the influence of subliminal manipulations may be less than their ability to resist the influence of other persuasion and manipulation techniques, this difference is probably insignificant in the context of the general lack of control that individuals have when being persuaded and manipulated in various social settings. Public outrage over subliminal manipulation both reflects and reinforces the individual's illusion of control over other persuasion techniques. As long as an identifiable manipulation technique which is perceived as "irresistable" exists, it is easy to believe that we have considerable control over other, more obvious propaganda techniques to which we are subjected every day. Whether attempts to manipulate attitudes and behavior using recognizable stimuli—but bypassing the restricting effects of awareness and conscious countercontrol strategies—are any easier for perceivers to resist than subliminal techniques, or are a more ethical form of manipulation, is really a matter for debate.

Conclusion

Research to date leaves little doubt that subliminal techniques have potential for use in many areas, including use as propaganda tools. The robustness of subliminal mere exposure effects and subliminal psychodynamic activation effects is great enough that the main obstacles to the use of these techniques in vivo are no longer scientific ones. Simply put, we know how to manipulate attitudes and behavior, significantly and predictably, using these techniques. However, a number of practical and technical issues (e.g., potential problems and limitations of different media which could be used for the presentation of subliminal material) would need to be addressed before such techniques could be implemented outside the laboratory. Given these problems and limitations, along with the relatively small advantages in persuasion likely to be gained via subliminal techniques over more direct approaches,

the danger of such manipulations being utilized on a large scale are not great at present. The actual risk of covert manipulation via subliminal techniques lies somewhere between the smug skepticism of many psychologists (e.g., Saegert, 1987), and the panicky proclamations of members of the public (Vokey and Read, 1985).

Nonetheless, the ethical issues raised by covert attitude and behavior manipulation are significant and troubling. Advertising and other forms of propaganda already present in society use various techniques to distract the perceiver, bypass as much as possible the restricting effects of awareness, and reduce perceivers' critical analysis of drive-related stimulus content. Whether messages presented this way, rendered "phenomenologically subliminal," are any more ethical or less manipulative than messages rendered "perceptually subliminal" in the strictest sense of the term is unclear. At any rate, it is fair to say that while subliminal techniques offer many potential benefits in scientific, educational and treatment settings, they also involve risks and threats. Such is the case with virtually any technology. The solution is not to disregard research on subliminal phenomena. Rather, researchers investigating subliminal techniques, and those who would apply the results of this research, must be sensitive to the possibilities for misuse of these findings and ideas, or the potential for abuse of subliminal techniques will outweigh their potential benefits.

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