This paper provides an evaluation of the evidence and arguments advanced in support of the effectiveness of various subliminal advertising techniques. Such practices are purported to influence consumer behavior by subconsciously altering preferences or attitudes toward consumer products. While there is some marginal evidence that subliminal stimuli may influence affective reactions, the marketing relevance of this finding remains to be documented. The notion that subliminal directives can influence motives or actions is contradicted by a large body of research evidence and is incompatible with theoretical conceptions of perception and motivation.

In September 1957 some unwitting theatre audiences in New Jersey were invited to "drink Coca-Cola" and "eat popcorn" in briefly presented messages that were superimposed on the movie in progress. Exposure times were so short that viewers were unaware of any message. The marketing firm responsible reported a dramatic increase in coke and popcorn sales, although they provided no documentation of these alleged effects. Public reaction was, nevertheless, immediate and widespread:

"... the most alarming and outrageous discovery since Mr. Gatling invented his gun." (Nation, 1957 p. 206)

"... take this invention and everything connected with it and attach it to the center of the next nuclear explosive scheduled for testing." (Cousins 1957, p. 20)

Opponents were indignant that unforgivable psychological manipulations would be visited upon innocent and unknowing consumers. Minds had been "broken and entered" according to the New Yorker (1957, p. 33). There was much talk of Brave New World and 1984. But even while laws were being drafted prohibiting the use of subliminal advertising on television, Hollywood was incorporating the idea into two new movies, and a Seattle radio station started broadcasting 'subaudible' messages such as "TV's a bore."

In May 1978 police investigators in an unnamed midwestern city attempted to apprehend a murderer by interspersing subliminal messages among frames of TV news film describing the murder (New York Times 1978, p. c22). Later that year some department stores in Toronto began broadcasting subliminal auditory messages whose intent was to deter shoplifters. The "sinister implications" of such practices worried the Globe and Mail. Could unscrupulous prime ministers deliver political propaganda subliminally? (Globe and Mail 1978, p. 6). In British Columbia the following year, a Ministry of Human Resources policy manual on child abuse was denied inclusion in a government-commissioned publication because the manual's cover contained "sickening and obscene" sexual imagery imbedded in an apparently innocuous photograph of an adult's hand clasping a child's.

Reports of various forms of subliminal manipulation are fairly common. Evidently the practice is still with us, although a few twists have been added since 1957. Given its covert nature and the ethical considerations involved, the prevalence of subliminal advertising is very likely underestimated by reliance
upon published reports. At any rate, such techniques are believed to be widespread by a great many people who can hardly be faulted for vigorously protesting against their use. John Q. Public has his hands full trying to cope with forms of exploitation of which he is fully aware. Should he also be worried that Madison Avenue is sneaking directives into his subconscious through the back door? Such a possibility has pervasive ramifications (Brown 1960). The potential importance of the topic has not escaped those in marketing (Hawkins 1970, Kelly 1979, Saegert 1979); however, all lament the dearth of empirical research.

There are at least three identifiable means of subliminal stimulation for which strong behavioral effects have been claimed. The first of these involves very briefly presented visual stimuli. Presentation is usually by means of a tachistoscope, a device for carefully controlling the exposure duration of a visual stimulus. Directives or instructions are flashed so quickly that the viewer is unaware of their presence. Such stimulation purportedly registers subconsciously and allegedly affects subsequent behavior. This method of stimulus presentation has been used frequently by investigators interested in subliminal perception, although their purposes have usually been quite different. As a result, a body of research literature exists that bears on the claims being made for some kinds of subliminal advertising. Some examples from this literature will be described and some studies analyzed in detail. It should be emphasized that stimulation below the level of conscious awareness can be shown to have measurable effects upon some aspects of behavior. The point at issue is whether these effects are sufficient to warrant the conclusion that goal-directed behavior can be manipulated by such stimulation.

Another means by which behavior control is attempted is through the use of accelerated speech in low volume auditory messages. Here too, the claim is that while the message may be unintelligible and unnoticed at a conscious level, it is nevertheless processed subconsciously and imparts direction to the receiver's behavior.

The third procedure consists of embedding or hiding sexual imagery (or sometimes words) in pictorial advertisements. These are concealed in such a way that they are not available to conscious perusal. They have, however, a subconscious effect or so it is argued.

The effects attributed to these procedures may consist of either (1) general, nonspecific, affective consequences that are assumed to have some positive but unspecified persuasive influence, or (2) a highly specific, direct impact upon some particular motive or behavior. In what follows, the evidence and arguments put forth in defense of the effectiveness of these procedures will be reviewed and critiqued.

Subliminal Perception

Measurable responses of one kind or another can sometimes be shown to be contingent upon stimulation that the perceiver is unaware of. Pierce and Jastrow (1884) demonstrated that subjects could make reliable discriminations among stimuli differing in weight, even though they reported that the stimuli were not discriminably different. In this classic study, subjects indicated the degree of confidence in their judgments concerning very slight differences in pressure applied to the subjects' fingers. In those instances where no confidence at all in perceived variation of pressure was reported, subjects were nevertheless obliged to say which of the two pressures was greater. Their judgments were correct 60% of the time.

The Threshold Concept

Today, the notion that people can respond to stimuli without being able to report on their existence is accepted and well documented (Bevan 1964a, 1964b; Dixon 1971; Erdelyi 1974). Taken literally, subliminal means “below threshold.” However, there exists no absolute cut-off point for stimulus intensity below which stimulation is imperceptible and above which it is always detected. When stimuli of varying intensities are presented over several trials, the minimum signal strength that is always detected is much higher than the one that is almost never detected. If some absolute threshold existed, then there ought to be a determinable stimulus intensity above which the receiver always responds and below which there is no response. Instead, a particular stimulus is sometimes detected and sometimes goes unnoticed. As a result, an individual’s perceptual threshold is usually defined as that stimulus value that is correctly detected 50% of the time. The threshold, or limen, is, therefore, a statistical abstraction.

For a given individual, this threshold may vary from day to day or from minute to minute. Moreover, thresholds differ rather widely between individuals. Many studies of subliminal perception are flawed because the investigators assumed that some specific exposure duration or stimulus intensity automatically guaranteed that the stimulus would be sufficiently below threshold that its presence would be undetected for all the experimental subjects on all the trials. Often this assumption is unwarranted. Stimuli below the statistical limen (which itself fluctuates) may be noticed as much as 49% of the time. As a result, studies that make little or no effort to determine a threshold for individual subjects are at risk because stimuli are presented that are effectively supraliminal for some subjects on some trials. The results may thus be due to the effects of weak (but not subliminal) stimulation.
Obviously the notion of a perceptual limen is of limited usefulness. For present purposes we may use the term subliminal perception to refer to the following situations (Dixon 1971, p. 12):

(a) The subject responds to stimulation the energy or duration of which falls below that at which he ever reported awareness of the stimulus in some previous threshold determination.

(b) He responds to a stimulus of which he pleads total unawareness.

(c) He reports that he is being stimulated but denies any awareness of what the stimulus was.

In these instances the subject cannot recognize the stimulus. "These situations define subliminal perception, and are to be distinguished from those where the individual, though unaware of the stimulus response contingency, is either not necessarily unaware of the stimulus, or, alternatively, could be made aware of the stimulus if his attention were drawn to it" (Dixon 1971, p. 13). People are often unaware of stimulation or of the processes mediating the effects of a stimulus on a response (Nisbett and Wilson 1977). This is a separate issue from subliminal stimulation, wherein the subject cannot identify the stimulus.

**Some Illustrations of Subliminal Perception**

There is ample evidence that weak stimuli that are not reportable can be demonstrated to influence behavior. For example, a number of studies by Bevan and his associates (Bevan 1964b) have shown that subliminal stimuli can alter judgments of perceived intensity of supraliminal stimuli when the former are interpolated into the presentation series. In one of these studies subjects were asked to judge the intensity of weak electric shocks delivered to their wrists. Between trials subliminal levels of shock were also administered. Careful control procedures ensured that these stimuli were not detected. The effect of these interpolated stimuli was to elevate the judged intensities of the detectable shocks. A control group that received no subliminal stimulation routinely estimated their shocks to be less intense than the experimental group. A similar effect was found for judgments of the perceived loudness of tones. Apparently the subliminal stimuli trigger physiological activity that affects the perception of similar supraliminal stimuli.

Signal detection research provides another example. In a signal detection task, weak stimuli are presented; some are detectable, some are not. If subjects are asked to provide confidence ratings of their judgments about the presence or absence of a signal, their ratings are highly correlated with the stimulus intensity. This is true even for signals that were reportedly not detected (Green and Swets 1966, Swets 1961).

Perceptual defense literature provides yet another sort of illustration. Many studies have shown that taboo or emotionally loaded words have higher recognition thresholds than do neutral words. That is, it takes a longer exposure duration for whore to be identified than for shore. At first this may appear illogical. How can something taboo be defended against unless it is first recognized as being taboo? The paradox is resolved if it is assumed that "perception" is by no means a discrete experiential event that is automatically determined by some particular stimulus pattern. Rather, perception is treated as a multiprocess chain of events that begins with stimulus input and terminates (subjectively) with conscious recognition of an object or event. However, not all input is subjected to the same sequence of mental processing. Stimuli are selectively filtered, transformed and attended to according to a variety of factors that are independent of the particular input. These include memory, expectations, attention, affect and other variables. Perception then, as we conventionally use the term, represents "... the conscious terminus of a sequence of nonconscious prior processes" (Erdelyi 1974). Conscious recognition need not be and often is not the end point for many sorts of input. Some stimuli may initiate mental activity of one sort or another without being available to conscious reflection or report. This is what is typically meant by the term subliminal perception. In the case of taboo items, some kind of defensive selectivity operates to bias the processing of emotionally charged input—such selectivity having its impact prior to a conscious recognition of the input.

Recently Zajonc (1980) has reviewed evidence from several studies showing that under some circumstances, unattended stimuli can be processed to a degree that is sufficient to elicit a subsequent affective reaction (i.e., like/dislike) without being recognized as having been previously encountered. "Affective reactions can occur without extensive perceptual cognitive encoding. Reliable affective discriminations (like/dislike ratings) can be made in the total absence of recognition memory (old-new judgments)" (Zajonc 1980, p. 151). While unattended stimuli are not necessarily subliminal, one study purports to show that affect can be influenced by stimuli that are truly subliminal (Kunst-Wilson and Zajonc 1980). That some behavioral processes may be influenced by stimuli whose presence is not consciously noticeable by the receiver is not at issue here. The preceding examples testify to the validity of subliminal perception as a phenomenon. The important question is whether the subliminal effects obtained justify the claims made for subliminal advertising. This question is critical because what must be posited in order to support such a proposition is not merely an effect, but specific, (relatively) powerful and enduring effects on the buying preferences of the public.
Subliminal Advertising

Could subliminally presented stimuli have a marketing application? Can advertising effectiveness be enhanced through subliminal stimulation? Before reviewing the few laboratory studies that have addressed this question directly, it will be useful to consider what sorts of subliminal influences would be necessary in order to obtain some marketing relevance. At a minimum, we might hypothesize that a subliminal stimulus produces (or increases) some positive affective reaction to that stimulus. Whether or not such an affective response, if obtained, could have any relevant motivating influence is another question. It is probably safe to assume that positive affect would not do any harm and could conceivably influence a product's attractiveness. A much stronger prediction for subliminal effects would be one that hypothesizes some direct behavioral consequence (i.e., purchasing). Since the former prediction does not necessarily entail any interesting marketing implications, and the latter prediction clearly does, these hypotheses will be referred to as weak and strong claims respectively.

Practical Difficulties

Regardless of which claim is under investigation, there are some profound if not insurmountable operational constraints associated with presenting subliminal stimuli in a typical marketing context. One problem has to do with individual differences in threshold. There is no particular stimulus intensity or duration that can guarantee subliminality for all viewers. In order to preclude detection by those with relatively low thresholds, the stimulus would have to be so weak that it would not reach viewers with higher thresholds at all. Lack of control over position and distance from the screen would further complicate matters. Finally, without elaborate precautions, supraliminal material (i.e., the film or commercial in progress) would almost certainly wash out any potential effects of a subliminal stimulus. In order to duplicate the results of laboratory studies that have shown subliminal effects, it is crucial to duplicate the conditions under which the effects were obtained. From a practical standpoint, this is virtually impossible. Nevertheless, it could be argued that if 1% of 10 million viewers are influenced by a subliminal ad that completely misses the other 99%, the subsequent behavior of that 1% might make the exercise cost effective.

Does the relevant research indicate that some positive affect could become associated with a particular product through the use of subliminally presented stimuli? The evidence is not strong. The Kunst-Wilson and Zajonc (1980) study referred to earlier used irregular, randomly constructed octagons as stimuli. The stimuli themselves were first presented at one-millisecond durations and filtered so that recognition was at chance level. Subjects were instructed to pay close attention to the screen, even if nothing was distinguishable. The same stimuli were subsequently presented for one-second intervals, paired with new stimuli. Subjects' recognition of old versus new stimuli was reported to be at chance; however, the old stimuli were judged to be preferable to the new ones 60% of the time. The effect was subtle but statistically reliable (p < .01, 2-tail).

It is tempting to speculate that repeated subliminal exposures could bring about an increasingly stronger affective reaction, with the stimuli themselves remaining unrecognized. A study by Shevrin and Fritzler (1968) does not support such a notion. These authors demonstrated a differential effect of two different subliminal stimuli upon evoked potentials (EEG) and free word associations in the absence of a conscious discrimination between the stimuli. The effect was a fleeting one; however: "the subliminal verbal effects appeared only in the first .001-second condition, suggesting that, beyond a certain point, multiple exposures of stimuli work against subliminal influences" (Shevrin and Fritzler 1968, p. 298). Two points about the Kunst-Wilson and Zajonc study are worth emphasizing.

First, the stimuli themselves, consisting of (relatively) meaningless geometric shapes, were subjected to subliminal exposure levels; this exposure seems to have had a subsequent effect upon preference. Second, the experimental subjects were actively attending to the stimuli throughout the subliminal viewing condition; during this time, no other stimulation was present that could distract attention or mask the subliminal stimuli.

Could this procedure be utilized in an advertising context? It is possible that a display's attractiveness could be subliminally enhanced by having that same display exposed for subliminal durations prior to its supraliminal presentation. Whether the magnitude of the resultant effect could have any practical importance is not known. Moreover, it is not obvious how the subliminal exposure could be accomplished. Superimposing the subliminal display on top of supraliminal material is not a good bet:

"... Ongoing supraliminal stimulation to which attention may be directed almost certainly will swamp any effect by a simultaneous stimulus below the awareness threshold... at a peripheral level, lateral inhibition and contour suppressing mechanisms could well block any neural transmission from the weaker of two stimulus arrays... a similar effect of restricted channel capacity would almost certainly operate centrally as well. The potential effects of one stimulus may be completely negated by the presence of another" (Dixon 1971, p. 175-76).
Splicing or somehow integrating the subliminal stimulus into ongoing supraliminal material (even if technologically possible) is not too promising either, because unless a sufficient blank interval is included before and after the insert, supraliminal material will mask the subliminal stimulus (Kahneman 1968). If such intervals are provided, the viewer will most probably be aware of an interruption, even though the stimulus itself may not be detectable. At least 100 milliseconds of "clean" background on either side of the target stimulus would be necessary to preclude a masking effect. As a result, subjects could infer the presence of a stimulus. If complete unobtrusiveness is a priority, the stimulus and surrounding interval would have to be carefully located at naturally occurring breaks or cut points. Even then, completely disguising the fact of stimulation may not be possible.

**Evidence Involving the Weak Claim**

In addition to Kunst-Wilson and Zajonc (1980), two other studies report subliminal effects relevant to the weak claim. Byrne (1959) flashed the word "beef" for successive five millisecond intervals during a sixteen-minute movie. Experimental and control subjects did not differ in their verbal references to beef, as measured by word association tests. Nor did experimental subjects report a higher preference for beef sandwiches, when given a list of five alternatives. Experimental subjects did, however, rate themselves as hungrier than control subjects. This difference held up when ratings were co-varied with hours of food deprivation. Byrne offered no explanation for this finding. It is not obvious why the word "beef" should induce hunger particularly when it failed to influence semantic associates. Moreover, the method of presentation involved superimposing the stimulus on the movie. For reasons outlined earlier, such a procedure is likely to interfere with rather than enhance any potential subliminal affects.

In a similar study, Hawkins (1970) flashed the word "coke" for 2.7 millisecond-intervals during the presentation of other supraliminal material. Subjective thirst ratings were higher for the "coke" group than for a control group that received a subliminal nonsense syllable. Hawkins concludes that "a simple subliminal stimulus can serve to arouse a basic drive such as thirst." (p. 324). As Saegert (1979) has pointed out, "Hawkin's results may simply be a Type I error, especially in view of the fact that other tries have been made" (p. 55). The fact that Hawkins performed five independent 1-tail statistical tests where one analysis would have sufficed lends support to Saegert's position. There are methodological shortcomings in both of these studies. Even if the results are taken at face value, their relevance to advertising is minimal.

**Evidence Involving the Strong Claim**

The strong claim for subliminal advertising postulates specific behavioral consequences as a result of a subliminal directive. A study by Zuckerman (1960) requiring student nurses to write stories describing the contents of a series of pictures that were projected onto a screen in front of them is pertinent to this issue. Unknown to the subjects, the instructions "write more" and "don't write" were tachistoscopically superimposed on the pictures at successive points during the presentations. A control group was treated in a similar fashion but received blank slides in place of those containing the subliminal directives.

The study was composed of three successive conditions: (1) baseline, during which no subliminal messages were presented, (2) "write more," during which subjects in the experimental group received a "write more" instruction for .02 seconds, concurrently with the picture they were asked to describe, and (3) "don't write," during which the experimental subjects received a "don't write" directive, again superimposed for .02 seconds on the picture being projected. During each condition, pictures were presented for 10 trials each. After each trial, subjects wrote a description of what they had seen. Zuckerman found that nurses in the experimental group wrote more during condition 2 ("write more") than they had during baseline. Furthermore, he noted a slight drop in output between condition 3 ("don't write") and condition 2, and interpreted this as evidence that the subliminal instructions were effective.

Unfortunately, there is a strong possibility that these results were due to a methodological artifact which psychologists call a "ceiling effect." This occurs when performance reaches an asymptote and cannot be further improved upon. The slight drop that Zuckerman observed may not have been a real decrease in performance but rather, a levelling off. This interpretation is supported by a comparison of the performances of experimental and control subjects. For some reason the students in the experimental group were enthusiastic writers. They wrote much more during baseline than did the controls. They wrote still more during condition 2 ("write more") and condition 2, and interpreted this as evidence that the subliminal instructions were effective.

Because of time constraints (and possibly writer's cramp), experimental subjects may already have been writing as much as could reasonably be expected by the end of condition 2. The slight drop during condition 3 may be due to statistical artifact. When variability is possible in only one direction (in this case down), a slight decrease in performance is predict-
able. Controls were still increasing their output during condition 3 and by the end, their output had barely surpassed that of the experimental subjects' performance during baseline. When differences between groups are large prior to any experimental manipulation, it is risky to attribute some subsequently observed differences to that manipulation. In this study, the preexisting difference between experimental and control subjects was as great or greater than any other subsequently observed difference between or within groups. Zuckerman has little to say by way of explaining the finding, but submits that "the subject's operant behavior is supposedly brought under control by suggestive cues of which he is not aware" (p. 404). This is not an explanation but rather a description of the outcome couched in operant terminology.

Dixon (1971), commenting on Zuckerman's results, speculates that "it may be impossible to resist instructions which are not consciously experienced" (p. 177). Again, this is more an assertion than an explanation, but it does reflect an apparently prevalent (although not articulated) notion that instructions, directives and/or slogans are intrinsically compelling. When the instruction is delivered supraliminally the receiver can counter-argue or derogate the source, thereby diminishing the stimulus' influence. However, if the instruction is presented subliminally, the recipient is unaware of its presence and is consequently unable to counter-argue.

Several researchers have investigated and described some of the cognitive processes that may mediate acceptance of advertising claims (Harris et al. 1979, Wright 1973). Wright analyzed the responses of 160 women who were exposed to a target ad embedded in other surrounding material, and subsequently queried about their reactions to the arguments contained in the advertising message. Counter-arguing by the receiver was identified as an important processing strategy. Neither the reliability nor validity of this finding is being disputed. However, it would be a mistake to assume that "resistive cognitions" are an inevitable consequence of advertising. Such a position is reminiscent of a behavioristic view of people as passive receivers of inputs to which they respond in automatic and stereotyped ways.

Perhaps the single most important lesson to be learned from cognitive psychology in the last decade is that the meaning of a stimulus does not reside in the stimulus itself. Meaning is constructed by the receiver in active, complex and often specialized ways. With respect to advertising the selectivity of attention and the active control over subsequent processing of the input means that stimulation is not a sufficient condition for any response at all, let alone some particular response. We are constantly subjected to a barrage of external and internal stimuli, of which only a fraction acquire phenomenal representation. Some neural activity is no doubt provoked by stimuli that are not consciously processed. But to attribute to a subliminal stimulus a strong influence, which it cannot be shown to have when supraliminal, is not justified by any theoretical rationale. For this reason it is appropriate to insist on especially clear well-replicated empirical evidence before accepting such a proposition. To the author's knowledge, Zuckerman's (1960) finding has not been replicated, and the study itself is vulnerable to an important methodological criticism.

There is an additional problem with procedures that attempt subliminal persuasion through the use of written directives. In order for a subliminal message to exert a behavioral effect (the "strong" claim), the full and precise meaning of the message would have to be extracted from it. Dixon (1971) has reviewed many subliminal perception studies showing that when words are used as stimuli, "the stimulus tends to elicit responses from the same sphere of meaning" (p. 102). Since competitors' products may well be contained in this sphere, it would be essential that the full meaning of the stimulus words be identified. An effusion of mere semantic associates would be insufficient. There are no published studies that demonstrate that people would consider the full meaning of a subliminal word stimulus, and there are at least two studies casting some doubt on the possibility (Heilbrun 1980, Severance and Dyer 1973). For this reason, it is difficult to construe a subliminal directive as an argument that cannot be consciously resisted.

Summary
Before turning to other methods that attempt subliminal persuasion, it will be useful to summarize the evidence reviewed. Research supporting the null hypothesis is much less likely to find its way into print than that which demonstrates some potential influence. The paucity of evidence may simply be a reflection of its lack of availability. On the basis of what little data are available, one could tentatively conclude that subliminal presentation of a stimulus may produce a positive affective response to that stimulus (Kunst-Wilson and Zajonc 1980). This positive affective response was obtained with subjects who were attending only to the subliminal stimuli. Whether this finding could be utilized successfully in a marketing context remains to be seen. Apart from the question of the magnitude of the effect, not to mention its validity (Birnbaum 1981, Mellers 1981), there are some practical difficulties associated with achieving a real-world application.

The evidence that subliminal directives can exert any control over behavior is much less compelling (Zuckerman 1960), although there has been ample...
opportunity for replication. Moreover, this strong claim for subliminal influence is not accompanied by a coherent explanatory rationale. Previous reviews of the strong claim have reached similar conclusions. One of the first rigorous scrutinies of this issue was described by McConnell et al. (1958), no doubt precipitated by the furor generated by the popcorn ad in New Jersey. These authors were sceptical that any but the simplest forms of behavior could be affected by stimulation below the level of conscious awareness. Bevan (1964a) concluded that the "influences of subliminal stimulation upon preference and choice, if they occur at all, are highly subtle, and the possibility that they could constitute an effective means of controlling consumer behavior or political opinion is highly unlikely" (p. 91). Equally strong misgivings were expressed by Goldiamond (1966) and Anastasi (1964). Empirical documentation has remained elusive: "all things considered . . . secret attempts to manipulate people's minds have yielded results as subliminal as the stimuli used" (McConnell 1977, p. 231).

**Subaudible Messages**

The eye is capable of receiving far more information in a short period of time than is the ear. Thus most studies of subliminal perception have involved visual stimulation because the investigator can attempt to determine what particular features of a display are responsible for various sorts of neural activity that may occur below the level of conscious awareness. In contrast, studies addressing auditory reception have been concerned primarily with signal detection—determining the presence versus absence of a weak signal. Because auditory information is, in general, temporally extended, it is particularly vulnerable to loss through lack of attention or auditory masking.

This probably accounts for the total absence of published studies investigating possible effects of subaudible messages. While the eye is sensitive primarily to spatial information, the ear is basically a processor of temporal information, especially in the case of speech perception. The difference is an important one. A great deal of information can be presented simultaneously in a visual display. An auditory stimulus is more extended in time; information arrives in consecutive bits. A speech stimulus may be thought of as a sound pattern whose acoustic features fluctuate over time. Consequently, there is no procedure for creating tachistoscopic-like auditory stimuli. Controlling the exposure duration of a visual stimulus does not change the stimulus itself; it merely limits the time available for processing it.

If speech is compressed or telescoped in time, the signal itself is altered. While the speech stream can be subjected to a surprising amount of mutilation without intelligibility being affected (Licklider and Miller 1951), there is a limit to the amount of distortion that can be tolerated without a loss in comprehension. Information is transmitted at the rate of about 150 words per minute in normal speech. Studies have shown (Foulke and Sticht 1969) that comprehension declines fairly rapidly at rates beyond 300 words per minute. There are two reasons for this. The first involves signal degradation. When playback speed is increased, component frequencies and pitch are both altered. The intelligibility of the signal consequently suffers. Secondly, channel capacity is taxed when a critical word rate is reached. Speech comprehension requires the continuous registration, encoding and storage of information. These operations take time. When the word rate is too fast, not all the input can be processed as it is received. The result is that some speech information is lost. Reducing the volume of accelerated speech will only compound these difficulties. Mass media accounts of subaudible messages report presentation rates of greater than 2,300 words per minute (Toronto Star 1978, p. c1; Washington Post 1979, p. c4; Time 1979, p. 15). The message is simply repeated 8- or 9,000 times an hour. Because of the fast rate, what may once have been a message is rendered an unintelligible scratching sound. That such stimuli could have any influence on behavior (except to annoy) is a claim totally lacking empirical support. Since the stimulus has no apparent meaning, presenting it at a supposedly subaudible level does not thereby confer any added significance.

The accelerated nature of subaudible messages is perhaps a tangential issue. Could such messages have an influence if the presentation rate were normal, but the volume at a subthreshold level? Relevant evidence mitigates against such a notion. Weak auditory stimuli are very susceptible to auditory masking. Moreover, there is some experimental evidence that attentional focus can effectively prevent weak auditory stimuli from receiving any processing at all (Broadbent 1958, Eriksen and Johnson 1964, Peterson and Kroener 1964). Studies in dichotic listening reveal that very little of the content of an unattended message is processed when attention is focussed on another concurrent message (Kahneman 1973, Moray 1969, Treisman and Geffen 1967). Moreover the unattended stimuli used in these investigations are by no means subliminal in strength.

Speech sounds are different in principle from other auditory inputs (Liberman et al. 1967). Because of speech's temporal dimension, a certain minimal amount of attention may be essential for comprehension. This would make subliminal presentation of auditory messages not just difficult but impossible. In fact, it is difficult to conceive of a means by which speech could be rendered subliminal according to the con-
The Ritz crackers, in fact, are reported to taste better embedded upside down. None of these are visible to the naked eye. In fact, a Gilbey's Gin ad is full of microscopic erotica. The assumption that behavior can be automatically triggered by the presentation of some particular stimulus is as unwarranted for auditory messages as it is for visual ones.

**Embedded Stimuli**

A different kind of procedure for achieving subliminal effects has been described by Key (1973, 1976, 1980). In these books the author alleges that various erotic images or words have been surreptitiously concealed in magazine, newspaper and television advertisements. High-speed photography and airbrushing are among the techniques whereby subtle appeals to subconscious sex drives are hidden. Their use is ubiquitous. Ritz crackers have the word sex baked into them; a Gilbey’s Gin ad is full of microscopic erotica. None of these are visible to the naked eye. In fact, it apparently requires weeks of analysis for many of them to be discovered, and sometimes they are embedded upside down.

According to Key, “. . . humans can be assumed to have at least two sensory input systems, one encoding data at the conscious level and a second operating at a level below conscious awareness” (Key 1973). A concealed word or symbol, “. . . usually invisible to consciousness appears instantly perceivable at the unconscious level” (Key 1976). He goes on to claim that visual or auditory stimulation whose speed and/or intensity are beyond the range for normal sensory reception can nevertheless be transmitted directly into the unconscious, whence subsequent behavior is manipulated. Precisely how these implanted cues affect a given product’s desirability is not too clear, but Key assures us that they are very effective. The Ritz crackers, in fact, are reported to taste better because they have the word sex stamped onto them. Key provides no documentation for the effects that he attributes to embedded stimuli. For this reason, his assertions should be regarded as hypotheses awaiting empirical investigation. Key also describes some psychological mechanisms through which embedded stimuli purportedly operate. These latter claims involving perception, memory and the subconscious have probably rendered his speculations quite unpalatable to research psychologists. Man’s sensory apparatus has been studied extensively for many years. There is no evidence for more than one class of sensory input systems, as Key claims, nor is there evidence of unconscious perception of stimuli that fall outside the functional range of our receptor organs. Key appears to invent whatever features of perception and memory would be necessary to achieve the results imputed to embedded stimuli. The notion of a separate super-powerful sensory system serving the subconscious (exclusively) cannot be accommodated by any theory of perception, past or present. It is not surprising that Key’s books have not been favorably reviewed by the scientific community (Schulman 1981). They are mentioned here because while they contain the least scientific substance, these books are probably largely responsible for the promulgation of a belief in the power of subliminal manipulation.

Whether or not erotic imagery has been deliberately planted is not relevant to a consideration of the imagery’s alleged effects. A diligent search for a phallic symbol will probably be successful. How its presence and relationship to an advertised product might be interpreted is another matter, but the consequence is by no means predictable. The amount of information available from a purposeful scrutiny of a display is limited only by the viewer’s imagination. Holding advertisers responsible for one’s erotic musings is analogous to accusing Rorschach of insinuating particular themes into the inkblots. A cursory glance yields far less information than a careful inspection. Under typical circumstances, the ad’s most salient characteristics will receive the lion’s share of perceptual activity (Hochberg 1978), if they receive any attention at all. Completely ignoring a stimulus is an option that people frequently exercise. If you do not actively search for hidden extras, what you see is what you get, and there is nothing subliminal about such perusal. The fine print near the bottom of an ad is likely to be far more important than any concealed genitalia could be.

While Key appears to have misjudged the efficacy of embedded stimuli, it would be a mistake to dismiss out of hand all of his remarks concerning the latent effects of advertising. Ads may influence us in some ways which have nothing to do with consumer behavior per se. For example, ads help to transmit various cultural stereotypes. If women are consistently portrayed in insignificant or demeaning roles, the viewer may develop an attitude towards them that is ultimately prejudicial and harmful to women as a group. Moreover, these attitudes are not consciously formed. The rich literature on observational learning investigates how such learning takes place (Comstock...
et al. 1978). While the acquisition of such attitudes may occur subconsciously, there is nothing subliminal about the presentation of the role models. On the contrary, they are distressingly conspicuous. This kind of implicit learning can have important and pervasive consequences (Poe 1976; Rush 1980; Walstedt, Geis and Brown 1980).

Conclusion
A century of psychological research substantiates the general principle that more intense stimuli have a greater influence on people's behavior than weaker ones. While subliminal perception is a bona fide phenomenon, the effects obtained are subtle and obtaining them typically requires a carefully structured context. Subliminal stimuli are usually so weak that the recipient is not just unaware of the stimulus but is also oblivious to the fact that he/she is being stimulated. As a result, the potential effects of subliminal stimuli are easily nullified by other ongoing stimulation in the same sensory channel or by attention being focussed on another modality. These factors pose serious difficulties for any possible marketing application.

A second major problem pertains to the psychological mechanism through which a subliminal stimulus could in principle influence behavior. The proposition is appropriate only if one characterizes a person as a static organism who processes stimuli input passively and responds in automatic predictable ways. In fact, psychological research has generated a large body of evidence that such a characterization would be false. There is substantial evidence for the importance of centralized control and mediating processes and good reason to believe that humans have highly mobile selective attention. The sheer volume of constant sensory stimulation implicates a constructive, synthetic model of focal attention and perception rather than a purely receptive one. As Broadbent (1973) said, "... the brain is made of unreliable components, so that it is very unlikely that any particular impulses in any particular nerve cells will occur predictably and consistently whenever a particular stimulus strikes our senses. In addition, we are being bombarded all the time by a very large quantity of information; and in relation to this large quantity of information we are all, like Winnie the Pooh, bear of very little brain" (p. 31).

Empirical support for subliminal influences of a pragmatic nature is neither plentiful nor compelling. On the basis of research evidence accumulated to date, the most one could hope for, in terms of marketing application, would be a potential positive affective response to a subliminal stimulus. Whether such an effect could actually be obtained in a realistic viewing situation, and whether the magnitude of the effect would make the exercise worthwhile is still an empirical question. There is no empirical documentation for stronger subliminal effects, such as inducing particular behaviors or changing motivation. Moreover, such a notion is contradicted by a substantial amount of research and is incompatible with experimentally based conceptions of information processing, learning and motivation.

None of this is to deny the existence of motives of which one may be unaware, nor to deny that subliminal stimulation can be used to investigate differences between unconscious and conscious processes (Carr and Bacharach 1976, McCauley et al. 1980, Shevrin and Dickman 1980). The point is simply that subliminal directives have not been shown to have the power ascribed to them by advocates of subliminal advertising. In general, the literature on subliminal perception shows that the most clearly documented effects are obtained only in highly contrived and artificial situations. These effects, when present, are brief and of small magnitude. The result is perhaps best construed as an epiphenomenon—a subtle and fleeting by-product of the complexities of human cognitive activity. These processes have no apparent relevance to the goals of advertising.

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