

DEL HAWKINS*

This article reviews and clarifies the main concepts associated with subliminal research and develops and tests a theoretical explanation of the effects of subliminal stimulation. Basic drive arousal was predicted and achieved but attempts to form subliminal associations with behavioral consequences proved futile.

The Effects of Subliminal Stimulation on Drive Level and Brand Preference

With a few exceptions, interest and experimentation by the marketing profession in the field of subliminal stimulation has been virtually nonexistent since the brief flurry of publicity and experiments in 1957-59. However, the field of marketing should maintain an *active* interest in this area. The potential utilization of subliminal stimulation as an advertising technique has not been completely eliminated, although both procedural and ethical considerations make such an approach unlikely at the present time. Furthermore, there is the untested possibility that many of those advertisements which are easily "available" to the average individual's sensing devices never enter into his realm of awareness and may in fact function as subliminal messages [2]. Thus, it seems essential that the marketing profession understand this phenomenon as fully as possible.

This article attempts: (1) to clarify certain concepts and definitions associated with subliminal research; (2) to propose a theoretical explanation for certain properties of the phenomenon; and (3) to report the findings of two experiments designed to test the theory and to clarify the nature of the effects which a subliminal message may have on the respondent.

CONCEPTS AND DEFINITIONS

The most prevalent term related to the phenomenon under consideration is *subliminal perception*, which refers to the registration of a stimulus below the threshold of perception. However, the concept of a perceptual threshold is subject to at least three interpretations.

* Del Hawkins is Assistant Professor of Marketing, Southern Illinois University. He is grateful to Professors W. T. Tucker and Grady Bruce for their constructive criticism in all phases of the research on which this article is based.

There is a *registration threshold* below which a stimulus is presumed to have no effect on the organism. Many early studies in the area utilized the concept of an *absolute threshold*, the length of intensity of exposure at which the stimulus is correctly identified 50% of the time. Most current investigations utilize the *recognition threshold*, the length or intensity of exposure on which a stimulus is correctly reported for the first time in a series of exposures of increasing duration or intensity.

However, none of the above thresholds represents an absolute point. Instead, all three vary with individuals, experimental conditions, characteristics of the stimuli, and transient psychological and physiological conditions of the subject. This variability has led to the concept of a range of exposure conditions bounded at one end by a stimulus intensity providing zero information to the perceiver and at the other end by an intensity providing maximum information [14]. The actual threshold under consideration falls somewhere along this continuum depending on the operation of the variables mentioned above.

The term *subception* is frequently used interchangeably with *subliminal perception*. However, a recent article aimed at providing a consistent set of definitions for this area recommended that: (1) *subception* be used "only in connection with experiments involving discrimination without awareness (employ only subliminal stimuli)"; (2) *subliminal perception* be used only for experiments "in which a supraliminal or masking stimulus is used in connection with a subliminal stimulus"; and (3) *subliminal stimulation* be used as "a general classificatory term for experiments dealing with both procedures" [11].

Obviously, the concept of awareness occupies a critical position in the study of subliminal stimulation. The

terms *awareness* and *consciousness* are often used interchangeably in studies of subliminal stimulation. However, the distinction made by Eriksen [6] equating awareness with the psychological quality of the phenomenon and consciousness with the state of physiological alertness of the individual will be utilized in this article.

Awareness and unawareness are generally treated as dichotomous categories defined in terms of the subject's ability to give a correct verbal report of the stimulus. However, there are a number of problems associated with using such an operational definition. Thus, experiments studying the same effect in the same way may vary in the adequacy of the questioning of the subject concerning his awareness of the stimulus, in his motivation to respond with the care and precision required, in the effects of the interrogation itself on the process of awareness, etc. [6]. Nonetheless, a definition of awareness in terms of verbal report is the only practical alternative for most experimental conditions.

THEORETICAL BACKGROUND

In several experiments, subliminal stimulation has been successful in increasing subjective hunger ratings [5, 16] or in influencing the emotional reaction to a neutral stimulus [12, 15]. Any theoretical explanation of these findings and the fact that the influence appears to have been limited to simple arousal must account for how the stimuli enter the system without the subject's awareness and explain why only certain effects are obtained. A theory meeting these conditions may be developed by utilizing two basic concepts proposed by Clark Hull: the reaction threshold and the fractional goal response.

Hull conceives of the threshold concept in general as a "... quantum of resistance or inertia which must be overcome by an opposing force before the latter can pass into action" [9, p. 323]. The reaction threshold is defined as the "... minimal effective reaction potential which will evoke observable reaction" [9, p. 324]. The effective reaction potential is basically a function of habit strength, the stimulus, drive, and inhibitory potential.

Hull proposes that "all minimal stimulus thresholds in psychophysics are the sum of the true initial threshold plus an artifact of undetermined magnitude which arises from the action of the oscillation function" [9, p. 325]. This function, which serves to weaken effective reaction potential, is to a considerable extent asynchronous. Hull states that "One of the ultimate physiological or submolar causes of molar behavioral oscillation lies in the variability of the molecular constituents of the nervous system, the neurons" [9, p. 309]. Thus he sees the momentary effective reaction potential as the effective reaction potential modified by the oscillation function. From this concept and that of the reaction threshold, he postulates: "The momentary effective

reaction potential must exceed the reaction threshold before a stimulus will evoke a given reaction" [9, p. 344].

Hull's second major concept to be used in explaining the effects of subliminal communications is the fractional antedating goal reaction and its associated stimulus, the fractional goal stimulus. Hilgard and Bower explain the creation of fractional antedating goal reactions [7, p. 148]:

Many of the stimuli present at the time the goal is reached are also present earlier. These include the stimuli from the drive, environmental stimuli both earlier and during reinforcement, traces from earlier stimuli persisting to the goal, as well as stimuli aroused by the animal's own movements. Hence, in repeating a sequence of acts leading to a goal... there are always enough of these stimuli conditioned to the goal response to elicit fractions to the goal response prior to reaching the goal.

The fractional goal response is credited with producing a continuous stimulus (the fractional goal stimulus) characteristic of the consumption of the goal substance. Although Hull generally avoids references to consciousness or awareness, he does state [9, p. 151]:

The fact that the fractional goal reaction occurs in an antedating manner at the beginning of the behavior chain or sequence *constitutes on the part of the organism a molar foresight or knowledge of the not-here and the not-now.*

By using Hull's concepts of the reaction threshold and the fractional goal stimulus, an explanation of a stimulus' ability to influence behavior without the subject's awareness can be developed. The first essential proposal is that there exists a reaction threshold for stimulating the afferent nervous system and the fractional goal response related to the stimulus that is lower than the reaction threshold for awareness. Two types of evidence lend credence to this proposal. The first is physiological investigations which have demonstrated that "... the frequency of the neural waves or impulses emitted by a receptor is slow with weak stimulation and fast with strong stimulation" [8, p. 41]. Thus, while a subliminal stimulus may not produce frequent enough impulses to trigger the reaction of awareness, they may be frequent enough to evoke other responses which have a lower reaction threshold, such as a well-established fractional goal response. The second type of support comes from the frequent finding that subjects can learn to recognize previously "subliminal" levels of stimulation, which indicates that levels capable of activating the receptor mechanisms do not necessarily result in awareness of the nature of the stimulus.

METHODOLOGY

Two experiments were conducted to test the validity of the theoretical explanation described above and to

ascertain the extent to which messages received subliminally by the subject (whether or not such was the intention of the sender) are effective in influencing behavior. Both experiments relied on a three-channel tachistoscope¹ to present the messages subliminally. This is an electronic device for illuminating a maximum of three stimulus cards in a preselected pattern for predetermined time intervals, and is capable of mixing the three images optically to produce the appearance of a single image [13].

Experiment I

The major purposes of this experiment were to: (1) determine whether subjective thirst ratings could be influenced by a subliminal stimulus as predicted by the theory; (2) compare the effects of the subliminal and supraliminal presentation of the same stimulus; and (3) compare the effects of the subliminal presentation of a simple thirst stimulus with a more complex form of the same stimulus.

Four experimental groups of 24 subjects each were differentiated by the subliminal message they received. The presentation of the subliminal stimuli took place during a cover experiment which had the stated purpose of establishing recognition thresholds for various brand names. Group I, the control group, received the nonsense syllable NYTP at the subliminal exposure time of 2.7 milliseconds (a pretest with different subjects indicated only slightly better than chance forced-choice recognition of "something" or "nothing" when either the stimulus card or a blank card was shown). Group II received the same subliminal nonsense syllable but was "forced" to recognize and repeat aloud five times the word COKE in the cover experiment (the other three groups were recognizing automotive brand names). Group III was subliminally presented with the word COKE and Group IV with the subliminal command DRINK COKE. The basic stimulus word COKE was used on the assumption that it has acquired a generic meaning beyond the specific product Coca-Cola and would thus elicit fractional drinking responses from the majority of the subjects.

Each group was presented with its particular subliminal message 40 times over approximately 15 minutes. Each member of Group II saw and verbally stated the word COKE five times. Following these presentations, the subjects were questioned to insure that the messages were indeed subliminal. They then completed a fake Perceptual Health Inventory which, among other things, obtained the subject's estimate of the time-lapse since his last fluid intake and a subjective thirst-rating on a seven-point scale ranging from "not at all thirsty" to "very thirsty."

¹ Model GB manufactured by Scientific Prototype Corporation, New York, New York.

Findings

The basic analysis was to compare the subjective thirst ratings between the various groups, checking to ensure that any differences obtained could not be credited to a differential time lapse since the last reported fluid intake. The thirst rating scale data were treated as ordinal data, and nonparametric Mann-Whitney U tests were run between the appropriate experimental groups. Likewise, since the time lapse estimates were assumed to be related to increases in thirst by a direct but unknown function, they were also treated as ordinal data and compared by means of the Mann-Whitney U test. The five hypotheses based on the theory proposed earlier and the results of the U tests are summarized below. All except the last comparison are one-tailed tests.

1. The subliminal presentation of the stimulus word COKE will produce significantly higher thirst ratings than the subliminal presentation of a nonsense syllable.
Thirst rating: $p = .022$
Time lapse: $p > .10$
2. The subliminal presentation of the stimulus command DRINK COKE will produce significantly higher thirst ratings than the subliminal presentation of a nonsense syllable.
Thirst rating: $p = .059$
Time lapse: $p > .10$
3. The subliminal presentation of the stimulus command DRINK COKE will not produce significantly higher thirst ratings than the subliminal presentation of the stimulus word COKE.
Thirst rating: Slight difference in the opposite direction from that used to refute the hypothesis.
Time lapse: $p = .035$
4. The supraliminal presentation of the stimulus word COKE will produce significantly higher thirst ratings than the subliminal presentation of a nonsense syllable.
Thirst rating: $p = .093$
Time lapse: $p > .10$
5. Exploratory. A comparison of the effects of the supraliminal presentation of COKE with the subliminal presentation of the same stimulus.
Thirst rating: $p > .10$
Time lapse: $p > .10$

These findings indicate that: (1) a simple subliminal stimulus can serve to arouse a basic drive such as thirst; (2) a subliminal command to drink the beverage apparently will not greatly increase the influence of the message, and (3) a frequently presented, familiar subliminal cue may be as effective as the infrequent supraliminal presentation of the same cue in arousing a basic drive.

Experiment II

With the results of the first experiment indicating that subliminal messages can affect drive level, an ex-

periment was designed to determine if choice behavior could be influenced by forming an association between two subliminal stimuli, one with positive and the other with neutral valence. Such an association would seem essential for any form of brand-specific promotion by subliminal messages.

The presentation of the subliminal stimuli took place during a cover experiment with the stated purpose of evaluating a series of outdoor scenes for use in an advertising campaign. The subliminal message, which was shown for 2.7 milliseconds as in the earlier study, consisted of the brand name (a single letter) of one of two identical bottles of perfume superimposed upon a seductive picture of a young woman. The seductive, semi-nude female was selected as the representative popular advertising theme for cosmetics, especially perfumes.

After each of the 20 male subjects had been exposed to the "advertisement" 35 times, he was asked, as a "pretest for another experiment," to sample each of two identical perfumes. Each bottle was identified by one letter on the label (F or L). Half of the subjects had been exposed to subliminal "advertisements" for Brand F and half for Brand L. The subjects then responded to the following question:

Imagine that you have just picked up your blind date. She is exceedingly attractive and sexy. As she approaches, you notice her perfume. It is one of the two brands that you have just sampled. It is Brand _____.

This particular type of question was utilized because it allowed a degree of projection and thus may have freed the respondent from any inhibitory guilt feelings that may have been aroused by directly stating a preference for the brand associated with the nude. However, a chi-square analysis (in the table), showed no evidence of influence by the message.

A preliminary test on female subjects was conducted to determine if further efforts on this particular experiment would be worthwhile. Ten female subjects were shown messages promoting Brand F in the same manner as the male subjects. Six chose the promoted brand in response to the following question: "Which of the two perfumes that you have just sampled would you expect Brigitte Bardot to prefer _____?" Such a selection has a chance occurrence probability of .377; therefore, it did not appear that a larger sample would prove useful and the experiment was ended. Apparently, this particular message was not being associated with the brand name, or, if it was, did not exert a significant influence on brand preference.

DISCUSSION

Berelson and Steiner, after reviewing the research on subliminal stimulation, concluded [3, p. 95] that there is:

SUBLIMINAL BRAND PROMOTION AND BRAND SELECTION

Brand chosen	Brand promoted		Total
	F	L	
F	3	5	8
L	7	5	12
Total	10	10	20

$\chi^2 = .208. \quad p > .50.$

...no scientific evidence that subliminal stimulation can initiate subsequent action, to say nothing of commercially or politically significant action. And there is nothing to suggest that such action can be produced "against the subject's will," or more effectively than through normal recognized messages.

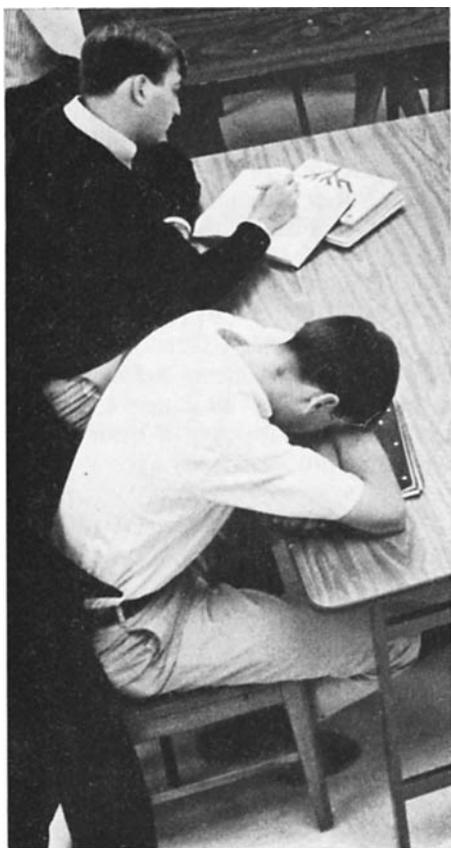
This study does not support the first part of their conclusion. To the extent that the arousal of a drive can be expected to result in subsequent action to reduce that drive, subliminal stimulation can be said to initiate subsequent action. However, such action is of a general nature and not necessarily associated with the specific content of the subliminal message.

The question of whether associations with behavioral consequences can be induced with subliminal stimuli remains open. Perhaps a larger number of exposures or a more skillfully composed subliminal message could influence choice behavior. The present experiment merely demonstrates that such effects may be quite difficult (if even possible) to achieve and suggests that the associations that result in brand images may depend entirely on supraliminal stimuli, even if not necessarily on conscious cognitive processes.

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