

ABSTRACT

The history of subliminal research consists of cycles during which investigators report a subliminal finding, others fail to replicate it, but, nevertheless, the finding is publicized and achieves some degree of acceptance among lay audiences. Such cycles have been permitted by (a) inadequately standardized empirical criteria for subliminal effects and (b) lack of consensus on theories of unconscious processes. Recent advances in methods have yielded some replicable subliminal effects and new models of unconscious processes have abandoned some of the controversial motivational assumptions of past perspectives. Nevertheless, cautious interpretation of this recent work maintains the wisdom of a skeptical appraisal of the potential for productive marketing applications.

Recent Perspectives on Unconscious Processing: Still No Marketing Applications

Anthony R. Pratkanis

University of California, Santa Cruz

Anthony G. Greenwald

University of Washington

Just before the turn of this century, Knight Dunlap (1900) asked subjects to judge the length of pairs of lines. On some trials, Dunlap cast a shadow, so faint as to be wholly imperceptible to the observer, onto the lines creating the well-known Müller-Lyer illusion. Although the illusion was supposedly imperceptible, it nonetheless biased the subjects' judgment of the length of the lines.

This first subliminal perception experiment, much like those of recent vintage, attracted the attention of early psychologists who immediately demonstrated that the effect failed to replicate (see Manro and Washburn, 1908; Titchener & Pyle, 1907). Despite the publication of contradictory evidence, Hollingworth (1913) found it necessary to discuss the implications of subliminal Müller-Lyer experiments for marketing in his book *Advertising and Selling*: “Even when suggestion is subliminal, that is, below the threshold of consciousness, it possesses action power” (p. 229).

This article contends that the episode just described defines a pattern that continues to be present: a researcher reports a subliminal effect; the effect cannot be replicated; nevertheless, the more sensational aspects of the finding receive popular treatment in textbooks and the mass media. We consider the implications of this pattern for the conduct of research on subliminal effects and the potential development of that research’s applications.

A BRIEF HISTORY OF SUBLIMINAL RESEARCH

In the 1930s and 1940s, research addressed the question, “Can subliminally presented stimuli be discriminated?” In these experiments, various geometric shapes and colors were presented subliminally (i.e., at energy levels too weak for detection). Subjects were then asked to describe what they saw (cf., Collier, 1940; Coyne et al., 1943; Miller, 1940; Vinacke, 1942). Taken on the whole, the results indicated that subliminal stimuli could be discriminated and that this ability increased as intensity of the stimulus increased (i.e., increasing nearness to the subliminal threshold). Critics could easily point to the role guessing played to account for these findings—that is, as stimulus presentation approached threshold, subjects could detect enough of the stimulus to venture a reasonable guess of the item.

In the late 1940s and 1950s, a number of lines of research associated with the “New Look” in perception claimed to demonstrate subliminal processing. One set of studies purported to show perceptual vigilance (lower recognition thresholds) for words that supported one’s values (e.g., Postman, Bruner, and McGinnies, 1948) and perceptual defense (higher recognition thresholds) for words that were taboo (e.g., Bruner and Postman, 1947; see Erdelyi, 1974 for a review). Another set of studies attempted to classically condition responses to subliminal stimuli (e.g., Lazarus and McCleary, 1951). However, by the end of the decade, multiple review articles appeared questioning the authenticity of the effects and raising multiple meth-

odological problems (see Adams, 1957; Eriksen, 1956; 1960; Goldiamond, 1958; Hilgard and Bower, 1975; McConnell, Cutler, and McNeil, 1958).

Despite the lack of consensus in the academic community concerning subliminal effects, commentators in the mass media have often proclaimed the effectiveness (and the dangers) of subliminal influences. These pronouncements are often made without reservation and without acknowledgement of the controversial status of the relevant research. Since 1957 over 140 articles have appeared in the popular press on the topic of subliminal persuasion (Pratkanis and Stoltz, 1987). Many of these articles focus on the apocryphal "Eat Popcorn/Drink Coke" study popularized by Norman Cousins in the *Saturday Review* (1957) and the analysis of subliminal persuasion developed by Vance Packard (1957) and Wilson Brian Key (1973; 1976; 1980). Such clamor prompted the Federal Communications Commission (FCC, 1974) to rule that subliminal advertising is deceptive and the use of "subliminal perception is inconsistent with the obligations of a [broadcast] licensee."

WHY THE DIFFICULTY IN PRODUCING RELIABLE SUBLIMINAL EFFECTS?

It is our thesis that researchers have failed to produce reliable subliminal effects for at least three reasons: (a) inconsistent use of the term subliminal, (b) lack of adequately precise and standardized methods, and (c) lack of an adequate conception of unconscious processes. As a consequences of these problems, it has not yet been possible to describe, with confidence, conditions under which subliminal effects are likely to occur. Recent research is beginning to address these problems.

Definitions of Subliminal Techniques

The term subliminal influence is widely used in popular culture. The popular conception of subliminal influence consists primarily of the assumptions that (a) pictorial advertisements sometimes contain printed words (especially "SEX") somehow hidden in patterns such as the swirls of liquid on ice cubes, (b) movies and television shows contain quickly flashed and unseen instructions designed to motivate behavior, and (c) recorded popular music contains reversed-speech messages that have antisocial content. Four diverse types of presentation techniques are often labelled subliminal.

1. *Subthreshold stimuli.*

Stimuli can be presented at energy levels that are too weak for them to be detected. Visual patterns presented at very low levels of illumination or with very low contrast are subliminal in this sense, as are auditory patterns presented at a very low signal-to-noise ratio. This technique was most popular with researchers of the 1930s and 1940s.

2. *Masked stimuli.*

Visual stimuli presented in a tachistoscope can be masked (obscured from detection) in a variety of ways. *Energy* masking consists of presenting a (masking) bright flash just before or after a briefly presented pattern. *Pattern* masking (or metacontrast or backward masking) consists of presenting a patterned (masking) stimulus just after a briefly presented stimulus. A preferred backward masking technique is *central* masking (Turvey, 1973), in which the brief masked pattern and the rapidly following pattern mask are presented to nondominant and dominant eyes, respectively.

3. *Unattended stimuli.*

A variety of procedures can be used to distract attention from a presented stimulus. For auditory stimuli, a frequently used research procedure is to give the subject the task of "shadowing" (repeating aloud) a verbal message presented to one ear, which obliges the subject to ignore a verbal message presented to the other ear. In vision, an unattended stimulus can be presented (a) peripherally in the visual field when the subject has another task that requires attention to a different location, (b) centrally in the visual field during a task that requires cognitive activity incompatible with analyzing the unattended one, and (c) as an embedded figure that is unlikely to be segregated from its figural context.

4. *Figurally transformed stimuli.*

This is potentially a very large class of techniques. It includes presenting a picture or word that is blurred to the point of unrecognizability, decomposing a pattern and rearranging the pieces, filtering higher audio frequencies from speech, or reversing speech. This category differs from the preceding one in that stimuli in this category are unidentifiable even when focal attention is directed to them.

Psychologists define subliminal as, "below the *limen*, below the

absolute threshold" (Reber, 1985, p. 742) with threshold defined as "the point along a stimulus continuum at which the energy level is just sufficient for one to detect the presence of the stimulus" (Reber, 1985, p. 773). As Synodinos (this volume) points out, the subliminal threshold can vary from individual to individual, and in the same person from moment to moment; thus, it is better represented as a statistically defined point as opposed to an absolute boundary.

This psychological definition of "subliminal" implies that the first two techniques most properly deserve to be called subliminal (in contrast to popularized versions of psychoanalysis [see below] which would include all four categories). Even though the last two techniques appear to deserve the label less, they nevertheless warrant study because of their implications for understanding nonconscious information processing. In the last decade, most of the psychological research has used the mask and unattended procedures. Our review will focus primarily on these techniques.

Methodological Problems

Subliminal research often falls prey to the problem of confounding of independent variables. In such cases, the experimenter seeks to attribute a finding to a subliminal stimulus, but other possible interpretations are readily available. For example, "New Look" studies were criticized on the grounds that value-consistent and taboo words also varied on such dimensions as familiarity, word frequency, and response bias. These factors could account for the changes in measured thresholds obtained in "New Look" studies, without appealing to a perceptual defense explanation preferred by "New Look" researchers. Recent studies have attempted to reduce the possibility of confounds by using more complex manipulations and subtler dependent variables.

A second problem concerns the operationalization of thresholds. Despite the belief of the researcher, in many studies the presumed subthreshold presentations may have permitted subjects to perceive at least a portion of the stimulus on at least some of the trials. For example, there is some question whether Dunlap's imperceptible shadow was truly unseen. A recent explication of this problem appears in Cheesman and Merikle's (1985) distinction between subjective thresholds (based on subjects' self-reports of awareness) and objective thresholds (based on subject's attempt to discriminate among stimuli in a forced choice task). Only recently has this threshold problem been described well enough to permit the development of methods that can assure imperceptibility of stimuli claimed to be subliminal (see also Synodinos, this volume).

The Problem of Theoretical Interpretation

Until recently, the only major theory of the unconscious was Freudian psychoanalytic theory. According to this theory, the unconscious is an active, dynamic processor of information, censoring some information from consciousness and motivating behavior outside of awareness. Key (1973) uses such a conception in his analysis of "subliminal seduction." He assumes that the unconscious collects and processes information independent of awareness; advertisers use subliminal or hidden messages to appeal directly to the psychosexual aspects of the unconscious processor which in turn motivates behavior. Recent subliminal research has not found reliable evidence for these hypothesized motivational effects.

RECENT SUBLIMINAL FINDINGS

Subliminal research in the 1980s has investigated six types of effects: lexical decision-making, evaluative decision-making, social judgments, preference change, covariation learning, and motivational changes. Research on lexical and evaluative decision-making and on covariation learning has used primarily masking procedures; research on social judgment and preference change has used primarily unattended techniques; and research looking at motivational effects has employed a variety of operations. These effects can also be ordered by the amount of demands placed on the individual, from simple cognitive tasks that tend to be automatic to the evaluation of stimuli to the motivation of complex behavior. This ordering maps onto the reliability of the research findings, with more controversy concerning replicability of effects involving complex behavior.

Lexical Decision-making

In 1971 Meyer and Schvaneveldt demonstrated that judging a letter-string to be a word is facilitated by preceding it with a semantically associated word (or prime). Three later studies demonstrated that word judgments could be facilitated by a prime presented below presumed detection thresholds (see Balota, 1983; Fowler et al., 1981; Marcel, 1983). In these studies, subjects received a series of trials consisting of a centrally masked prime followed by a letter-string. The subjects' task was to judge whether or not the letter-string was a word. In all three studies, the interval between prime and mask was adjusted for each subject so that the subject failed to discriminate masked-prime trials from those on which no prime was

presented. The results indicated that lexical decision-making was faster when preceded by a semantically associated prime (DOCTOR-NURSE) presented at subliminal levels compared to the presentation of an unrelated prime (DOCTOR-BREAD). These three studies may have used a subjective threshold criterion (see Cheesman and Merikle, 1985, and Holender, 1986 for critical reviews).

Evaluative Decision-Making

Greenwald, Klinger, and Liu (in press) used a task in which subjects received a central-masked prime, followed by a visible target word. The subject was asked to indicate whether the target word was evaluatively good or bad in meaning. Greenwald et al. used high-frequency word primes that were either negative (e.g., evil, sad, ugly) or positive (happy, love, peace) in meaning. Similarly, the target was either an evaluatively negative (stress, detest, malaria) or positive (fame, comedy, rescue) word. In three studies, subjects performed the evaluative decision-task significantly faster when the target word was preceded by an evaluatively congruent prime (i.e., positive prime and target or negative prime and target) as opposed to an evaluatively incongruent prime.

Greenwald et al. used a stringent criterion for establishing the subliminal threshold by: (a) requiring subjects' performance to be at or below chance levels on a detection task consisting of the simultaneous presentation of a word and pattern mask (to nondominant and dominant eyes, respectively) with the subject being asked to identify whether the word was presented to the right or left of a centered fixation point; and (b) performing this position-discrimination task at the beginning, middle, and end of the experimental session. With these procedures, Greenwald et al. presumably approximated the objective threshold, as defined by Cheesman and Merikle (1985).

Social Judgments

Considerable research indicates that a supraliminal prime of a social category can influence subsequent judgments (cf., Herr, 1986; in press, Higgins, King, and Mavin, 1982; Higgins, Rhole, and Jones, 1977; Srull and Wyer, 1979; 1980). For example Srull and Wyer (1979) primed the categories of hostility (Experiment 1) and kindness (Experiment 2) by having subjects perform a sentence completion task involving hostile and kind words. Next (in an ostensibly unrelated experiment), subjects rated an ambiguous stimulus person named "Donald." In the first experiment (involving hostile primes),

subjects perceived Donald to be more hostile and, in the second study (involving kind primes), Donald was perceived to be kinder than in a neutral prime treatment. Srull and Wyer (1979; 1980) have shown that the effects of a prime can persist for at least a period of 24 hours.

Bargh and Pietromonaco (1982) extended these results by showing that the Srull and Wyer (1979) results can be obtained using an unattended prime. In their study, subjects viewed either 0, 20, or 80 hostile words across a total of 100 trials. Each trial consisted of a 100 msec. presentation of the prime followed by a 100 msec. mask of XXXXs, presented in one of four locations around the center of a video screen. Bargh and Pietromonaco used the procedure of asking subjects to guess what words were flashed to establish that the priming stimuli were unattended. After the priming manipulation, subjects then rated the ambiguous Donald. Consistent with Srull and Wyer's findings, Donald was rated significantly more negative when subjects received 80 unattended hostile primes (compared to the 0 and 20 prime treatments).

The Bargh and Pietromonaco results have been replicated by Lewicki (1986) and by Devine (in press) who found that Donald was rated as more hostile after subjects received unattended race-related terms (assumed to be hostile in meaning) as primes. In a similar vein, Gabrielcik and Fazio (1984) found unattended words containing the letter "T" increased judgments of the frequency of occurrence of the letter "T" in the English language. Eich (1984) found that subjects were more likely to use a less common spelling of a homophone (i.e., fare as opposed to fair) after hearing the less common interpretation presented in an unattended context. The unattended priming of social judgment is similar to Bevan's (1964) research showing that a subliminal stimulus (such as a shock or sound) influenced the judgment of a supraliminal stimulus (i.e., shock was perceived as more intense and a sound as louder with the presence of a subliminal stimulus).

Unattended Mere Exposure Effects

The mere exposure effect refers to an increase in liking (positive affect) for stimuli that receive repeated exposures (Zajonc, 1968). Recently some studies have been published purporting to produce a mere exposure effect with unattended stimuli. Wilson (1979) used a dichotic listening procedure in which a series of tones was presented to an unattended channel (ear) while the subject listened for errors in a story (Experiment 1) or shadowed (repeated out loud) a story (Experiment 2) presented to the other, attended ear. Wilson found

increased liking (but not recognition) for the series of tones presented to the unattended channel.

In a conceptual replication, Kunst-Wilson and Zajonc (1980) presented, for a duration of one msec., twenty different black, irregular-shaped octagons on a white background. The subject's task was to acknowledge seeing a flash on the screen. In the second part of the study, subjects viewed pairs of slides containing a previously presented and unrepresented octagon and were asked which one of the pair they liked better and which one they thought they had seen previously. The results revealed that subjects were more positive towards the octagons presented in the first part of the study and that recognition accuracy was slightly below chance accuracy. The presentation conditions in these studies do not achieve the objective threshold defined by Cheesman and Merikle (1985). However, the goal of these studies was not to insure subliminal presentation of stimuli, but to show that recognition was independent of affective judgments. The Kunst-Wilson and Zajonc study has been replicated by Seamon, Brody, and Kauff (1983) in four separate experiments using octagons as stimuli and by Bornstein, Leone, and Galley (1987) in three separate studies using octagons, photographs of strangers, and photographs of casual acquaintances. Mandler, Nakamura, and Van Zandt (1987) showed that the Kunst-Wilson and Zajonc presentation procedures also, and somewhat inexplicably, increased judgments (in different groups of subjects) of both the brightness and darkness of the octagon stimuli.

Subliminal Learning of Covariation

Lewicki (1986) reports a set of four studies purporting to demonstrate that subjects can learn covariation patterns, even under conditions where one of the covarying stimuli is presented subliminally. In these studies, subjects viewed letter-strings (such as "A358A") or "A823A") for thirty msec. followed by a mask. Each letter-string was always associated with a specific display pattern of 36 numbers presented supraliminally immediately after the letter-string and mask. The subjects' task was to locate the position of a number in the display pattern. This task could more easily be accomplished if the subject used the subliminally presented letter-string to identify the pattern of numbers. A detection task indicated that pilot subjects could not accurately identify (in a forced choice task) the letter-strings. Midway through the experimental trials, the letter-string/pattern association was changed for half of the subjects. The results for the last set of trials indicated that subjects who received the same letter-string/pattern association in both sets of trials per-

formed the number location task faster than those subjects for whom the letter-string/pattern association was switched. Although the results are intriguing, there has as yet been no attempt to independently verify the Lewicki findings.

Subliminal Seduction and Motivation

Since 1957 there have been numerous claims that subliminal messages can have dramatic motivational and behavioral effects (e.g., inducing purchase of an unwanted product or decreasing the frequency of employee theft). In 1982 Moore reviewed research claiming to demonstrate such effects and found the evidence wanting. Recently, there have been renewed claims that subliminal messages can effect complex behavior. Such claims include: (a) behavior changes (e.g., weight loss, better concentration, more relaxation) induced by mass-marketed, subliminal audio-cassette tapes; (b) the corruption of youth by reversed-speech messages in rock and roll music (i.e., messages that can be heard when a recording is played backwards); and (c) therapeutic successes and changes in unconscious wishes as a result of subliminal messages, most notably the subliminal psychodynamic activation (SPA) technique of Silverman and his colleagues (see Silverman & Weinberger, 1985). Moore (this volume) and Merikle (this volume) review research purporting to demonstrate these claims and draw the conclusion that there continues to be no evidence to support the proposition that subliminal messages influence motivation and complex behavior.

NEW CONCEPTIONS OF THE UNCONSCIOUS

In this section, we describe four theories of unconscious processing developed to account for the more reliable subliminal findings. As a class of theories, these models abandon the motivational assumptions present in the psychoanalytic view of the unconscious. In its place, the unconscious is conceptualized as a set of rules for processing information and a system for providing a preliminary analysis of a stimulus (see Broadbent's [1977] hidden preattentive process). These conceptualizations of the unconscious share another attribute: they are a preliminary attempt to account for some of the findings described in the previous section and, as such, will no doubt be developed and modified as research progresses.

Independence of Affect and Cognition

Zajonc (1980) argues that affect and cognition are partially

independent systems and that affective reactions can often precede cognitive processes such as recognition and feature discrimination. Nonconscious processes refer to affective reactions that precede or are independent of cognitive processes. Such affective reactions are simple, quick judgments that a stimulus is either good or bad as opposed to the elaborate, hidden processing of the psychoanalytic unconscious. Zajonc bases his model on a variety of research findings including, most importantly, the unattended mere exposure effect and findings by Moreland and Zajonc (1977). The Zajonc model has been criticized by Birnbaum and Mellers on statistical grounds, (1979a,b, but see also Moreland and Zajonc, 1979), by Lazarus (1981; 1982) on conceptual principles, and by Seamon, Brody, and Kauff (1983) who offer a reinterpretation of the unattended mere exposure findings using common cognitive processes.

Models of Category Activation

The first explanations of priming experiments were in terms of associative networks and spreading activation models (Collins and Quillian, 1969; Anderson and Bower, 1972; Wyer and Carlston, 1979). According to such models, concepts (such as words and persons) are represented in memory by nodes in a network of associations. Priming can activate a concept node, thereby increasing the probability of using it (and neighboring nodes) in subsequent tasks. The process of concept activation is not typically accessible to awareness and can thus be considered an unconscious process. Although network models have widespread appeal, they have difficulty explaining the persistence of priming effects. In such cases, categories would need to be activated for long periods of time, a period during which many other nodes could be activated resulting in a nearly totally activated network. To account for this difficulty, Wyer and Srull (1981) have proposed a bin model as a replacement for network (node and link) structures.

Unconscious as Procedural Knowledge

Lewicki (1986) views the unconscious as a set of nonconscious procedures (which he terms internal processing algorithms or IPA's). An IPA is nonconsciously acquired and deployed knowledge about covariation between two or more objects or events. Lewicki's subliminal covariation study (described in the previous section) demonstrated the acquisition of an IPA. IPAs can be involved in the performance of automatic processes (e.g., driving a car), speech production, face recognition, and social judgments. Lewicki (1986) reported

a series of 34 experiments demonstrating that: (1) information about covariation can be detected, processed, and stored outside of awareness; (2) such knowledge of covariation (IPA) can influence cognitive processes (again, outside of awareness); and (3) even after an IPA has been stored and frequently used, it often cannot be accessed and controlled by the individual. (See Jacoby and Kelley's, 1987 distinction between memory as an object and as a tool for another view of the unconscious as procedural knowledge).

Levels of Representation

Greenwald (1988a) has described unconscious processing as a portion of a system of levels of representation (LOR). In a LOR system, representations for each of several systems (levels) are constructed from units of an immediately subordinate, but qualitatively distinct, system. Each level succeeds in representing properties of the environment that are not captured by lower levels (i.e., emergent properties of the LOR system). Human representation is described as a set of five hierarchical levels of representation: (1) features (primitive sensory qualities such as brightness, loudness, and sharpness), (2) objects (grouping of features to form a distinctive object), (3) categories (groupings of objects that share properties), (4) propositions (linking objects to other objects and actions) and (5) schemata (collections of propositions).

In terms of this LOR model, unconscious processes can be conceived either as coordinate with conscious processes (i.e., the unconscious as a five-level system parallel to, but dissociated from, conscious processes) or as subordinate to conscious processes (i.e., identifying unconscious processes with lower, and conscious processes with higher, levels). According to the coordinate view, which is compatible with psychoanalytic theory, the unconscious and conscious systems employ the same types of representations and are capable of the same sophisticated types of mental operations. In contrast, the subordinate view, which is compatible with much of modern cognitive psychology, attributes to unconscious processes only the limited cognitive capabilities that are associated with lower levels of representation. In terms of the subordinate view, the stimuli in a subliminal priming study may be processed only at the low levels (e.g., analysis of semantic, evaluative, or pattern features) that can be achieved without conscious awareness. (See Greenwald, 1988b for a discussion of how the LOR analysis can be used to describe self-deception and dissociative phenomena theorized by psychoanalysts.)

MARKETING IMPLICATIONS: NOTHING THAT IS REALLY WORTH USING

This review does little to change the recommendations of Moore (1982), Ogilvy (1983), Saegert (1987), and various textbook writers (Aaker and Myers, 1987; Engel, Blackwell, and Miniard, 1986; Mowen, 1987) that subliminal procedures offer little or nothing of value to the marketing practitioner. There continues to be no reliable evidence in support of the more sensational claims for the power of subliminal influence. Further, those subliminal findings that appear to be replicable (a) tend to involve only low levels of cognitive processing, levels that are of little value to the marketer, (b) are difficult to implement in mass media settings, and (c) might just as (or more) easily be implemented using supraliminal techniques.

However, recent work on unconscious processes can be used to offer advice to the practitioner and to those concerned with marketing ethics. The practitioner should be alerted to the continued lack of evidence regarding strong motivational effects of subliminal presentations. This lack of results brings into question the utility of the psychoanalytic conceptions of the unconscious (i.e., those relying heavily on psychosexual motivation and the coordinate unconscious) for determining a marketing plan.

The consistent evidence that information can be processed outside of awareness and that people possess nonconscious procedural knowledge (e.g., Lewicki's IPAs) raises ethical concerns about persuasion practices that take advantage of the consumer's reliance on such rules. Marketers often attempt to change consumer behavior by evoking heuristic decision rules based on price, brand loyalty, store image, and package design—rules that consumers commonly use, but with little or no awareness of doing so. (See Cialdini, 1985, and Farquhar and Pratkanis, 1987, for more examples of such influence tactics). Our review suggests that those concerned with marketing ethics would have more societal impact if they discussed such questions as, "Under what conditions are the use of such tactics legitimate?" and "What can be done about the unethical abuse of non-conscious processes?" as opposed to continually worrying about the sensational, but apparently nonexistent, processes of subliminal persuasion and seduction.

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Requests for reprints should be addressed to Anthony R. Pratkanis, Board of Psychology, University of California, Santa Cruz, CA 95064.

The authors thank Sandra Bao, Thomas M. Buffet, Barry McLaughlin, Timothy E. Moore, Marlene E. Turner, and two anonymous reviewers for their comments on an earlier version.

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