Feeling and Thinking
Preferences Need No Inferences

R. B. ZAJONC *University of Michigan*

ABSTRACT: *Affect is considered by most contemporary theories to be postcognitive, that is, to occur only after considerable cognitive operations have been accomplished. Yet a number of experimental results on preferences, attitudes, impression formation, and decision making, as well as some clinical phenomena, suggest that affective judgments may be fairly independent of, and precede in time, the sorts of perceptual and cognitive operations commonly assumed to be the basis of these affective judgments. Affective reactions to stimuli are often the very first reactions of the organism, and for lower organisms they are the dominant reactions. Affective reactions can occur without extensive perceptual and cognitive encoding, are made with greater confidence than cognitive judgments, and can be made sooner. Experimental evidence is presented demonstrating that reliable affective discriminations (like–dislike ratings) can be made in the total absence of recognition memory (old–new judgments). Various differences between judgments based on affect and those based on perceptual and cognitive processes are examined. It is concluded that affect and cognition are under the control of separate and partially independent systems that can influence each other in a variety of ways, and that both constitute independent sources of effects in information processing.*

The intellectual contact between psychology and poetry is scarce and, when it takes place, often tends to be exploitative. If we happen to come across a poem that appears to support one of our favorite generalizations, we are tempted to cite it (not as evidence, of course, but more in the form of a testimonial). Or we might confer upon it the status of an epigraph in one of our forthcoming chapters (commonly, to the detriment of both the poem and the chapter). But when poetry disagrees with us we are apt to ignore the conflict altogether. Nevertheless, this paper begins with a poem by E. E. Cummings (1973), the first stanza of which affirms a premise tacitly rejected by psychology many decades ago:

> since feeling is first
> who pays any attention
> to the syntax of things
> will never wholly kiss you (p. 160)

In it, Cummings takes for granted that feelings are primary and, by implication, that they are fundamental. They are precedent to the intellective qualities and elements of experience, and they are nearer to its essence: They are nearer to an inner "truth."

In contrast, contemporary psychology regards feelings as last. Affect is postcognitive. It is elicited only after considerable processing of information has been accomplished (see Figure 1). An affective reaction, such as liking, disliking, preference, evaluation, or the experience of pleasure or displeasure, is based on a prior cognitive process in which a variety of content discriminations are made and features are identified, examined for their value, and weighted for their contributions. Once this analytic task has been completed, a computation of the components can generate an overall affective judgment. Before I can like something I must have some knowledge about it, and in the very least, I must have identified some of its discriminant features. Objects must be cognized before they can be evaluated.

Most of us will not be deeply distressed by discovering that our current theories are in conflict

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Requests for reprints should be sent to R. B. Zajonc, Research Center for Group Dynamics, University of Michigan, Ann Arbor, Michigan 48106.

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with a controversial poet of the 1920s. But contemporary psychology not only contradicts Cummings, it also contradicts one of its very own founding fathers. Thirty years before Cummings published his poem on feelings, Wundt (1907) wrote in a similar vein:

> When any physical process rises above the threshold of consciousness, it is the affective elements which as soon as they are strong enough, first become noticeable. They begin to force themselves energetically into the fixation point of consciousness *before anything is perceived of the ideational elements* [1]. . . . They are sometimes states of pleasurable or unpleasurable character, sometimes they are predominantly states of strained expectation. . . . Often there is vividly present . . . the special affective tone of the forgotten idea, although the idea itself still remains in the background of consciousness. . . . In a similar manner . . . the clear apperception of ideas in acts of cognition and recognition is always preceded by feelings. (pp. 243–244)

Whatever happened to Wundt's affective primacy idea? Is there compelling evidence to reject it? [2] Or to accept it, for that matter? Strictly speaking, we have no better evidence today than Wundt had in 1896. Perhaps a bit better.

In part, my concern in this paper is with Wundt's assertion. More specifically, building on the scanty evidence we now have, I have tried to develop some notions about the possible ways in which affect is processed as part of experience and have attempted to distinguish affect from processing of information that does not have affective qualities. This article is confined to those aspects of affect and feeling that are generally involved in preferences. These aspects are reflected in the answers to such questions as "Do you like this person?" "How do you feel about capital punishment?" "Which do you prefer, Brie or Camembert?" "Are you pleased with the review your recent book received?" In short, I deal with some hot cognitions (as Abelson [1963] christened them) and try to distinguish them from the cold ones. The class of feelings considered here is that involved in the general quality of behavior that underlies the approach–avoidance distinction. Thus, for the present purposes, other emotions such as surprise, anger, guilt, or shame, which have been identified in the literature and extensively analyzed by Tomkins (1962, 1963), Izard (1977), and others, are ignored.

Unlike experimental psychologists,[3] social psychologists are deeply concerned with affect and with hot cognitions. The extensive work on attitudes, research on cognitive dissonance and cog-

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[1] The italics are mine. The original is even more to the point. "Affective elements" were "Gefühlselemente," and the italicized part of the citation was "ehe noch von den Vorstellungselementen irgend etwas wahrgenommen wird" (Wundt, 1905, p. 262).

[2] It is a fact that only 12 years after the first edition of Wundt's *Grundriss* was published, Nakashima (1909a; 1909b) tested Wundt's assertion by collecting reaction times of psychophysical (pitch, hue, temperature, etc.) and affective (preference) judgments made on the same sets of stimuli. He did not find shorter reaction times for judgments of preference than for judgments of pitch, hue, temperature, etc., and thus disagreed with Wundt with regard to the primacy of feelings. But his study alone could not have buried Wundt's idea. Actually, Nakashima's data were rather inconclusive, since he failed to control for levels of discriminability associated with the two types of judgments. Thus, for example, subjects can detect very small differences in hue yet feel quite indifferent in their preference for stimuli that differ so little. Since reaction times for comparisons vary with the size of the difference, these times can be compared meaningfully only if the stimuli are preselected so that difference thresholds for the two types of judgments are the same.

[3] Contemporary cognitive psychology simply ignores affect. The words *affect, attitude, emotion, feeling,* and *sentiment* do not appear in the indexes of any of the major works on cognition (Anderson, 1976; Anderson & Bower, 1973; Bobrow & Collins, 1975; Crowder, 1976; Kintsch, 1974; Lachman, Lachman, & Butterfield, 1979; Norman & Rumelhart, 1975; Schank & Abelson, 1977; Tulving & Donaldson, 1972). Nor do these concepts appear in Neisser's (1967) original work that gave rise to the cognitive revolution in experimental psychology. And in the six volumes and the 2,133 pages of the *Handbook of Learning and Cognitive Processes* (Estes, 1975–1978), there is only one entry for *affect* and only one for *attitude.* It is worth noting that both of these entries are in Volume 3 in a contribution written by a social psychologist. In the last three volumes—those principally devoted to cognition—there are no references to affect whatsoever.

The notable exceptions are Mandler's (1975) work on thought and emotion, Neisser's 1976 essay, and Miller and Johnson-Laird's (1976) recent volume on language and perception from which the following revealing quotation is taken:

> The information-processing system that emerges from these remarks is fearfully cognitive and dispassionate. It can collect information, remember it, and work toward objectives, but it would have no emotional reaction to what is collected, remembered, or achieved. Since in this respect it is a poor model of a person, we should add at least one more predicate to this list of those that take "person" as their first argument. We will use *Feel* (person, *x*) to indicate that people have feelings as well as perceptions, memories, and intentions. It might be possible to subsume *Feel* under *Perceive* on the grounds that our feelings are a special class of perception of inner states. Or we might discuss feelings under *Remember;* the recognition that some word or object is familiar, is after all, a matter of feeling a certain way about it. Or, since we have already recognized that there is a strong affective component to our intentions, we might link *Feel* to *Intend.* . . . All these

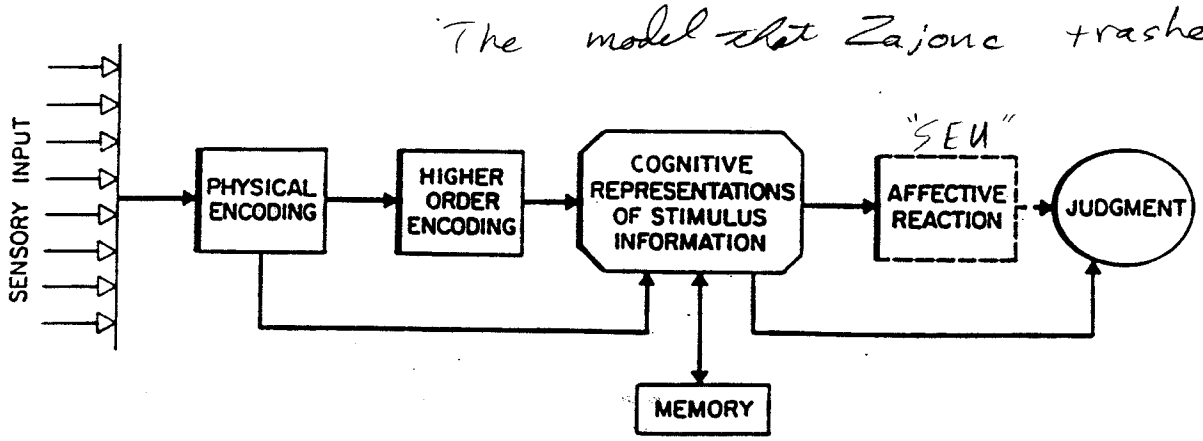

Figure 1. Typical information-processing model of affect.

nitive balance, the Schachter and Singer (1962) studies on emotion, and Heider's (1958) attempts to describe the cognitive representation of affect that characterizes interpersonal relationships are all clear manifestations of this concern.[4] There are practically no social phenomena that do not implicate affect in some important way. Affect dominates social interaction, and it is the major currency in which social intercourse is transacted. The vast majority of our daily conversations entail the exchange of information about our opinions, preferences, and evaluations. And affect in these conversations is transmitted not only by the verbal channel but by nonverbal cues as well—cues that may, in fact, carry the principal components of information about affect. It is much less important for us to know whether someone has just said "You are a friend" or "You are a fiend" than to know whether it was spoken in contempt or with affection. Argyle and his colleagues (Argyle, Salter, Nicholson, Williams, & Burgess, 1970) found that 22 times more variance is accounted for by the tone of one's voice than by the content of the utterance when people are asked to interpret utterances. In fact, even when the content of recorded utterances is nearly completely obliterated by means of electronic masking, filtering, or random splicing of the tape, subjects still can encode the emotions expressed in these utterances quite reliably (Dawes & Kramer, 1966; Scherer, Koivumaki, & Rosenthal, 1972). And we have no difficulty in identifying emotions expressed by members of unknown cultures speaking unknown languages. In a recent volume on person perception, Schneider, Hastorf, and Ellsworth (1979) noted that "inferences based on nonverbal cues are primarily inferences about relationships and feelings, and thus are among the most important inferences we make" (p. 142). One cannot be introduced to a person without experiencing some immediate feeling of attraction or repulsion and without gauging such feelings on the part of the other. We evaluate each other constantly, we evaluate each others' behavior, and we evaluate the motives and the consequences of their behavior. And you have already made up your mind about this paper!

Nor is the presence of affect confined to *social* perception. There are probably very few perceptions and cognitions in everyday life that do not have a significant affective component, that aren't hot, or in the very least tepid. And perhaps all

considerations testify to the systematic importance of this psychological predicate. Nevertheless, we will have little to say about *Feel* in the following pages. (pp. 111–112)

Thus, Miller and Johnson-Laird explicitly acknowledge the significance of feelings as part of experience, yet they decide to devote minimal attention to them. Their decision is noteworthy in the light of their belief that "*Feel* is an indispensable predicate for any complete psychology and that it probably lies much closer than *Perceive, Remember,* and *Intend* to the basic sources of energy that keep the whole system running" (p. 112).

Beyond these volumes there are some isolated theoretical attempts directed toward the understanding of the role of motivational and emotional factors in perception and cognition (Broadbent, 1977; Erdelyi, 1974; Posner & Snyder, 1975a).

[4] While such studies as those of Byrne (1961), Berscheid and Walster (1978), or Rubin (1973), which deal with interpersonal attraction, also have a concern with affect, they do not contain specific analyses of how affect is represented as part of experience. And in studies that compare the effects of conditions that differ on the affective dimension (such as self- vs. nonself-relevance, ego-involvement), it is generally not the affective quality per se in these conditions that is examined as the major source of variation.

perceptions contain some affect. We do not just see "a house": we see "a *handsome* house," "an *ugly* house," or "a *pretentious* house." We do not just read an article on attitude change, on cognitive dissonance, or on herbicides. We read an "exciting" article on attitude change, an "important" article on cognitive dissonance, or a "trivial" article on herbicides. And the same goes for a sunset, a lightning flash, a flower, a dimple, a hangnail, a cockroach, the taste of quinine, Saumur, the color of earth in Umbria, the sound of traffic on 42nd Street, and equally for the sound of a 1000-Hz tone and the sight of the letter Q.[5]

Feeling and Thinking

According to the prevalent models for affect (e.g., Figure 1), preferences are formed and expressed only after and only as a result of considerable prior cognitive activity. How fully and completely must objects be cognized before they can be evaluated? I argue, along with Wundt and Cummings, that to arouse affect, objects need to be cognized very little—in fact, minimally.

In order to consider this possibility more specifically it is important to distinguish between thoughts and feelings. At the genotypic level, this distinction is not an easy one to make, for it hovers dangerously near the mind–body duality. Some conceptual elements of this distinction, however, may be identified for purposes of clarity. While feelings and thoughts both involve energy and information, the first class of experiences is heavier on energy, whereas the second is heavier on information (e.g., Inhelder & Piaget, 1958; pp. 347–348). In the pure case, the analysis of feelings attends primarily to energy transformations, for example, the transformation of chemical or physical energy at the sensory level into autonomic or motor output. In contrast, the analysis of thoughts focuses principally on information transformations. In nearly all cases, however, feeling is not free of thought, nor is thought free of feelings. Considerable cognitive activity most often accompanies affect, and Schachter and Singer (1962) consider it a necessary factor of the emotional experience. Thoughts enter feelings at various stages of the affective sequence, and the converse is true for cognitions. Feelings may be aroused at any point of the cognitive process: registration, encoding, retrieval, inference, etc. But this converse relation is not totally symmetrical. I will later argue for Wundt's conjecture that affect is *always* present as a companion to thought, whereas the converse is not true for cognition. In fact, it is entirely possible that the very first stage of the organism's reaction to stimuli and the very first elements in retrieval are affective. It is further possible that we can like something or be afraid of it before we know precisely what it is and perhaps even *without* knowing what it is. And when we try to recall, recognize, or retrieve an episode, a person, a piece of music, a story, a name, in fact, anything at all, the affective quality of the original input is the first element to emerge. To be sure, the early affective reaction is gross and vague. Nevertheless, it is capable of influencing the ensuing cognitive process to a significant degree. Needless to say, after some cognitive activity has been executed, there may be new feeling to the stimulus. But the fact that cognitions *can* produce feelings—as in listening to a joke, for example, where affect comes at the end with a punch line or as a result of post-decision dissonance—need not imply that cognitions are necessary components of affect. What I want to argue is that the form of experience that we came to call feeling accompanies *all* cognitions, that it arises early in the process of registration and retrieval, albeit weakly and vaguely, and that it derives from a parallel, separate, and partly independent system in the organism.

At the phenotypic level, we can support Wundt's conjecture by spelling out in somewhat greater detail some of the ways in which affective judgments and reactions, or hot cognitions, differ from their cold cognitive counterparts, keeping in mind that the first category is represented by the prototype "I like Joe," and the second by "Joe is a boy."

Affective reactions are primary. Wundt and Cummings are joined by Bartlett and Osgood in the view that feelings come first. Bartlett (1932) observes in his book on remembering,

[5] This conjecture probably does not apply to incidental perceptions where the attentive processes are at minimum, although it is not inconceivable that the traces of these incidental perceptions still might recruit affect upon retrieval and thus become hot. In fact, Izard (1979) assumes that some emotion is *always* present in consciousness. Normally, it is the emotion of "interest" that dominates behavior. This emotion, which directs and sustains attention and exploration, is absent only when other emotions such as distress or anger "achieve consciousness" (p. 165).

> Attitude names a complex psychological state or process which it is very hard to describe in more elementary psychological terms. It is, however, as I have often indicated, very largely a matter of feeling, or affect. . . . [When] a subject is being asked to remember, very often the first thing that emerges is something of the nature of attitude. The recall is then a construction, made largely on the basis of this attitude, and its general effect is that of a justification of the attitude. (pp. 206–207)

In his analysis of environments as perceptual targets, Ittelson (1973) asserts that "the first level of response to the environment is affective. The direct emotional impact of the situation, perhaps largely a global response to the ambiance, very generally governs the directions taken by subsequent relations with the environment. It sets the motivational tone and delimits the kinds of experiences one expects and seeks" (p. 16). Preferences influence language comprehension and language production as well (Premack, 1976). Osgood (1962) was impressed with the primacy of affect in a different way:

> First, I must confess that, when we began this research over ten years ago, I had the expectation that the major factors of the semantic space would represent the ways in which our sensory apparatus divides up the world—e.g., would parallel Boring's "dimensions of consciousness." . . . The accumulating data have proved my expectation wrong . . . the dominant factors of *evaluation*, *potency* and *activity* that keep appearing certainly have a response-like character, reflecting the ways we can react to meaningful events rather than the ways we can receive them.
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> But these major factors also seem to have an *affective* as well as a response-like character. As a matter of fact, the similarity of our factors to Wundt's (1896) tridimensional theory of *feeling*—pleasantness-unpleasantness, strain-relaxation, and excitement-quiescence—has been pointed out to me." (pp. 19–20)

It is significant also that at least three social-psychological conceptions labeled "cognitive" consistency theories focus not on consistency of content but on the consistency of affect (Abelson & Rosenberg, 1958; Heider, 1958; Osgood & Tannenbaum, 1955).

Decisions are another area where thought and affect stand in tension to each other. It is generally believed that *all* decisions require some conscious or unconscious processing of pros and cons. Somehow we have come to believe, tautologically, to be sure, that if a decision has been made, then a cognitive process must have preceded it. Yet there is no evidence that this is indeed so. In fact, for most decisions, it is extremely difficult to demonstrate that there has actually been *any* prior cognitive process whatsoever. One might argue that these are cases in which one alternative so overwhelmingly dominates all the others that only a minimum of cognitive participation is required and that that is why the cognitive involvement preceding such decisions is so hard to detect. But this argument must confront the observation that if all decisions involve the evaluation of alternatives, then when choices appear quite lopsided to the decision maker, it is even more important to scrutinize the alternatives that appear inferior, for it is entirely possible that one of them possesses some hidden but overriding virtue. It is therefore not without merit to suppose that in many decisions affect plays a more important role than we are willing to admit. We sometimes delude ourselves that we proceed in a rational manner and weigh all the pros and cons of the various alternatives. But this is probably seldom the actual case. Quite often "I decided in favor of X" is no more than "I liked X." Most of the time, information collected about alternatives serves us less for making a decision than for justifying it afterward. Dissonance is prevalent just because complete and thorough computation is not performed before the decision (Festinger, 1964). We buy the cars we "like," choose the jobs and houses that we find "attractive," and then justify those choices by various reasons that might appear convincing to others who never fail to ask us, "Why this car?" or "Why this house?" We need not convince ourselves.[6] *We* know what we like.

In a study of consumer behavior, Quandt (1956) found that buyers often do not attend to the features of the article that they consider criterial for their decisions and often base their choices on features that they previously dismissed as irrelevant. And Kahneman and Tversky (1979) have demonstrated that numerous axioms of decision theory that give decisions their rational flavor are blatantly contradicted by experimental results.

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[6] Phoebe Ellsworth (Note 1) illustrates the role of affect in her own recent decision experience. In trying to decide whether to accept a position at another university, she says, "I get half way through my Irv Janis balance sheet and say, 'Oh hell, it's not coming out right! Have to find a way to get some pluses over on the other side!'"

Affect is basic. In one of her last books, which bears the provocative title of *Mind: An Essay on Human Feeling*, Susan K. Langer (1967) tried to show "that the entire psychological field—including human conception, responsible action, rationality, knowledge—is a vast and branching development of feeling" (p. 23). Affect is the first link in the evolution of complex adaptive functions that eventually differentiated animals from plants. And unlike language or cognition, affective responsiveness is universal among the animal species. A rabbit confronted by a snake has no time to consider all the perceivable attributes of the snake in the hope that he might be able to infer from them the likelihood of the snake's attack, the timing of the attack, or its direction. The rabbit cannot stop to contemplate the length of the snake's fangs or the geometry of its markings. If the rabbit is to escape, the action must be undertaken long before the completion of even a simple cognitive process—before, in fact, the rabbit has fully established and verified that a nearby movement might reveal a snake in all its coiled glory. The decision to run must be made on the basis of minimal cognitive engagement.

It is thus significant that in categorizing facial expressions, about 50% of the variance is explained by the pleasant–unpleasant dimension (Abelson & Sermat, 1962; Hastorf, Osgood, & Ono, 1966), and the same value is obtained for the multidimensional scaling of similarities among photographs of faces (Milord, 1978). Similarly, it is a typical result in semantic differential studies that among the three factors Evaluation, Potency, and Activity, all of which Osgood considers to be affective components of meaning, it is the first that accounts for about 50% of the variance.[7] And it is no accident, according to Osgood (1969), that these three factors of the semantic space are found repeatedly among diverse sets of concepts:

> In my opinion, it is the innateness of the emotional reaction system of the human animal that underlies the universality of the affective E-P-A components of meaning. In other words, the "innateness" of E-P-A . . . is really the pan-humanes of emotional reactions, and these obviously have evolutionary significance for the survival of any species. Organisms without other specialized adaptive mechanisms (e.g., armor, coloration, poisons, etc.) which were unable to represent for themselves the good versus bad implications of things (antelope versus saber-toothed tiger), the strong versus weak of things (saber-toothed tiger versus mosquito), and the quick versus slow of things (saber-toothed tiger versus quicksand) would have little chance of survival. In the human species these "gut" reactions to things appear as the affective meaning system (the E-P-A components of total meaning), and it is these components which provide us with what might most appropriately be called the "feeling-tones" of concepts as a part of their total meaning. (p. 195)

Affective reactions are inescapable. Unlike judgments of objective stimulus properties, affective reactions that often accompany these judgments cannot always be voluntarily controlled. Most often, these experiences occur whether one wants them to or not. One might be able to control the expression of emotion but not the experience of it itself. It is for this very reason that law, science, sports, education, and other institutions of society keep devising ever new means of making judgments "objective." We wish some decisions to be more independent of these virtually inescapable reactions.

We may completely fail to notice a person's hair color or may hardly remember what it was shortly after meeting the person. But we can seldom escape the reaction that the person impressed us as pleasant or unpleasant, agreeable or disagreeable, as someone to whom we were drawn or someone by whom we were repelled. And these affective reactions—and, more important, the retrieval of affect—occur without effort. In contrast, some cognitive judgments require substantial effort. Chess contestants typically lose several pounds of their weight in the course of a tournament.

Because affective judgments are inescapable, they cannot be focused as easily as perceptual and cognitive processes. They are much more influenced by the context of the surround, and they are generally holistic. Affective reactions are thus less subject to control by attentive processes.[8]

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[7] It is therefore something of a paradox that so little attention is paid to affect in information-processing studies. Most of the tasks in experiments on information processing are verbal. Most of them involve some forms of *semantic* memory. If the semantic space is primarily an *affective* space, as Osgood argues, then the affective components and qualities of information need to be given as much attention as their phonemic, graphemic, lexical, semantic, conceptual, or pictorial counterparts.

[8] The existentialists (e.g., Sartre, 1947) ascribe a substantial voluntary component to emotion. "The existentialist does not believe in the power of passion. He will never agree that a sweeping passion is a ravaging torrent which fatally leads a man to certain acts and is therefore an excuse. He thinks that man is responsible for his passion" (pp. 27–28). Because of the participation of sensory, cognitive, and motor processes, the argument that emotions have some voluntary component is not without basis.

Affective judgments tend to be irrevocable. Once a cognitive judgment has been made—for example, that at the forthcoming social hour there will be more scotches drunk than bourbons—one can still be persuaded that it may turn out otherwise. It can be pointed out, say, that the distribution of ages of the guests is different than that we *really* like scotch better than bourbon, is greater than the supply of scotch. We can readily accept the fact that we can be wrong. But we are never wrong about what we like or dislike. Hot cognitions are seldom subjectively false. It would be much harder to persuade us that we *really* like scotch better than bourbon, given that we feel otherwise. Once formed, an evaluation is not readily revoked. Experiments on the perseverance effect, the strong primacy effects in impression formation, and the fact that attitudes are virtually impervious to persuasion by communication all attest to the robust strength and permanence of affect. Affect often persists after a complete invalidation of its original cognitive basis, as in the case of the perseverance phenomenon when a subject is told that an initial experience of success or failure has been totally fabricated by the experimenter (Ross, Lepper, & Hubbard, 1975).

The reason why affective judgments seem so irrevocable is that they "feel" valid. We are not easily moved to reverse our impression of a person or of a piece of music. We trust our reactions, we believe that they are "true" and that they accurately represent an internal state or condition. Perhaps the subjective validity of affective judgments and reactions and our confidence in these judgments derive from the Cartesian tradition [9] that allows us to doubt everything except our own feelings, especially the feelings of doubt. Perhaps it reflects a basic reality.[10]

Affective judgments implicate the self. When we evaluate an object or an event, we are describing not so much what is in the object or in the event, but something that is in ourselves. Cognitive judgments deal with qualities that reside in the stimulus: "This cat is black," "Camembert and Brie are soft-ripened cheeses." These judgments are made on I-scales that are orders of stimuli (Coombs, 1964). Affective judgments, however, are made on J-scales, that is, scales on which are located jointly the various stimuli as well as the ideal preference point of the person. "I dislike this black cat" or "I prefer Camembert to Brie" are judgments on J-scales. Thus, affective judgments are *always* about the self. They identify the state of the judge in relation to the object of judgment.

Affective reactions are difficult to verbalize. The remarkable aspect of first impressions of persons is their immediacy. When we meet a stranger, we know within a fraction of a second whether we like the person or not. The reaction is instantaneous and automatic. Perhaps the feeling is not always precise, perhaps we are not always aware of it, but the feeling is always there. If our later experience with the stranger conflicts with the first impression, we are terribly surprised. We consider it an exception. Paradoxically, this subjective validity of affective reaction, this certainty that we "know what we like," is often accompanied by our inability to verbalize the reasons for our attraction or repulsion to the person.[11] When asked why we like someone, we say that we like the person because he or she is "nice," "pleasant," or "interesting." But these adjectives describe our reactions to the person, not the person. There simply aren't very effective verbal means to communicate why we like people and objects or what it is that we like about them.

The communication of affect, therefore, relies much more on the nonverbal channels (Ekman & Friesen, 1969; Schneider, Hastorf, & Ellsworth, 1979). Yet it is remarkably efficient. And it is in the realm of nonverbal expression of feelings that their basic nature is again revealed. The universality of emotional expression strongly suggests our evolutionary continuity with other species and the fundamental nature of affect. The facial expressions of humans upon biting into a

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[9] Hume (1898), too, held that emotions (passions) cannot be false. "A passion must be accompanied with some false judgment, in order to its being unreasonable; and even then 'tis not the passion properly speaking, which is unreasonable, but the judgment" (p. 196).

[10] Because nonverbal cues exchanged in social interaction are dominated by affect, they are perceived as having such properties as trustworthiness and freedom from voluntary control (Schneider, Hastorf, & Ellsworth, 1979, pp. 123–127).

[11] Mandler (1975), Neisser (1967), and Nisbett and Wilson (1977) pointed out that individuals have no access to the cognitions that occasion, mediate, or cause their actions, that are parts of their attitudes, or that determine their preferences. On the basis of an extensive review of the social psychological literature, Nisbett and Wilson (1977) concluded that introspective reports about influences on the subjects' evaluations, decisions, and actions were so unreliable as not to be trusted.

sour apple and their expressions of surprise, anger, delight, or serenity are remarkably similar across all cultures and are not far removed from the expressions of the great apes. Perhaps we have not developed an extensive and precise verbal representation of feeling just because in the prelinguistic human this realm of experience had an adequate representation in the nonverbal channel.

The role of affective communication is particularly significant in the social interaction among animals. The effectiveness of communication of affect and the accuracy of recognition of affective expression are illustrated by the results of Pratt and Sackett (1967). They raised rhesus monkeys in conditions that allowed complete contact with peers, in conditions that allowed only visual and auditory access, and in complete isolation. The monkeys were then examined for the kinds of animals they preferred to approach. Those raised under the same conditions preferred each other twice as much as those raised under different conditions, even when the stimulus animals were total strangers to the test monkeys. While it could not be determined what sorts of cues allowed the animals to make these fine discriminations, it is very likely that the three groups developed during the course of their previous experience distinct patterns of emotional responding to new stimuli and to strange individuals, and that the animals raised under the same conditions found each other more attractive because of the familiarity of these emotional patterns.

The reliance of affect on nonverbal means of communication has, I believe, implications for the way it is processed. For if affect is not always transformed into semantic content but is instead often encoded in, for example, visceral or muscular symbols, we would expect information contained in feelings to be acquired, organized, categorized, represented, and retrieved somewhat differently than information having direct verbal referents. Recent electromyographic research provides strong evidence for the participation of muscular activity in the imagination, recall, and production of emotional states (Lang, 1979; Schwartz, Fair, Salt, Mandel, & Klerman, 1976). In light of these intuitions, it is not unreasonable to speculate that the processing of affect is closer to the acquisition and retention of motor skills than of word lists.

Affective reactions need not depend on cognition. At the turn of the century, Nakashima (1909a, 1909b) tried to find support for Wundt's affective-primacy conjecture by comparing reaction times for psychophysical judgments and for preferences. He failed. But he did find evidence that judgments of pleasantness were independent of sensory qualities and that these judgments could not have been mediated by these qualities. Similar independence, based on multidimensional scaling, has been reported more recently, for example, in studying the perceptions of and preferences for soft drinks. Cooper (1973) found that similarity scaling yielded a space dominated by a "cola-ness" dimension, whereas preference scaling generated a space dominated by popularity of the drinks. Generally, it appears that similarity judgments predict preferences only when the similarity judgments are themselves highly evaluative, as in the case of admissions officers judging college candidates (Klahr, 1969) or art-trained students judging paintings (Berlyne, 1975; O'Hare, 1976). Osgood (1962) took it as a given that the affective reaction system "is independent of any particular sensory modality" (p. 21).

If there is indeed a separation between affect and cognition, then it is not surprising that research on preferences, attitudes, attractions, impressions, aesthetic judgments, and similar affective responses—research that commonly has invoked cognitive mediators—has not been terribly successful. If overall preferences were simply a matter of calculating the combination of weighted component preferences, and if component preferences were nothing more than cognitive representations of object features marked with affect, then the problems of predicting attitudes, decisions, aesthetic judgments, or first impressions would have been solved long ago. After all, these problems have been around for nearly a century. Yet except for trivial cases or cases in which the responses are highly cognitive (e.g., Yntema & Torgerson's [1961] study of judgments of ellipses), the cognition-based solutions to these problems have rarely predicted more than 20% of the total variance.

The dismal failure in achieving substantial attitude change through various forms of communication or persuasion is another indication that affect is fairly independent and often impervious to cognition. If attitudes consist of information units that have affect or utilities attached to them, then to change an individual's attitude, what could be simpler than providing the individual with alternative information units that have the same sort

of affect as that attached to the desired attitude? If a person believes that Candidate A is honest, we can simply give the person information proving that A is not honest. Or, we could change the centrality or the weight of honesty. Yet this approach has been the least successful in attitude change. Even the most convincing arguments on the merits of spinach won't reduce a child's aversion to this vegetable. Direct persuasion effects have been so weak that researchers have instead turned to more pernicious avenues of attitude change, such as insufficient justification, persuasion through distraction, the foot-in-the-door technique, or the bogus pipeline.

It is unlikely that calculations based on discriminable component features and their affective values will reliably predict our overall affective reactions to objects and events. These reactions do not seem to be composites of such elements. An affective reaction to a person we meet emerges long before any of these features can be identified, let alone evaluated. The assumption that component affect, utilities, or values attach themselves *to the very same* features that the subject attends to in a typical detection, recognition, discrimination, or categorization task is likely to be wrong.[12] The analysis of preferences is not simply an analysis of cold cognitive representations that have become hot, that is, cognitive representations that have some affect attached to them.[13] The stimulus features that serve us so well in discriminating, recognizing, and categorizing objects and events may not be useful at all in evaluating these objects. If this is indeed the case, then there must exist a class of features that can combine more readily with affect and thereby allow us to make these evaluations, to experience attraction, repulsion, pleasure, conflict, and other forms of affect, and to allow us to have these affective reactions quite early after the onset of the sensory input. These features might be quite gross, vague, and global. Thus, they might be insufficient as a basis for most cognitive judgments—judgments even as primitive as recognition, for example. In order to distinguish this class of features from simple discriminanda, I call them *preferenda* (Zajonc, Note 2).

I cannot be very specific about preferenda. If they exist they must be constituted of interactions between some gross object features and internal states of the individual—states that can be altered while the object remains unchanged, as, for example, when liking for a stimulus increases with repeated experience. Color preferences are a case in point. Similarity scaling of color yields three dimensions—brightness, hue, and saturation—that explain almost all of the variance in similarity judgments. But on the basis of Nakashima's (1909a) research and according to unpublished work of Premack and Kintsch (Note 3), the scaling of color for preference would not reveal these three factors. If we did not know from other sources that brightness, hue, and saturation exhaust the entire range of differences among colors, then we would not discover them by means of preference scaling. Abstract preferences for color and color preferences for classes of objects, such as hair, cars, or houses, are still more problematic if we insist on using brightness, hue, and saturation in quantifying them. And the same applies to face recognition: Physical features do not serve as discriminanda for faces (Milord, 1978; Patterson & Baddeley, 1977). It is therefore an interesting problem to discover what it is in color that "holds" affect if it isn't brightness, hue, and saturation and what it is in a face that "holds" affect if it isn't physical features. The answer to this problem is probably that *some* physical aspects, perhaps vague, gross, or configural, are involved, but not alone. Preferenda must consist of an interaction of these global features with some internal state or condition of the individual.

Affective reactions may become separated from content. It sometimes happens that we are reminded of a movie or of a book whose contents we are unable to recall. Yet the affect present when leaving the movie or our general impression of the book are readily accessible. Or we are reminded of an interpersonal conflict of long ago. The cause of the conflict, the positions taken, the matter at issue, who said what, may have all been forgotten, and yet the affect that was present during the incident may be readily retrieved. Such experiences, together with such clinical phenomena

[12] I did not have the slightest doubt of this assumption, however, when I wrote my dissertation (Zajonc, 1955), which employed it without question.

[13] The term *hot cognition* has been used fairly indiscriminately, although it generally refers to cases when affect *accompanies* or *qualifies* information. "I have a malignant tumor" is a hot cognition. However, the emotional experience of listening to one's favorite piece of music performed by one's favorite artist is less likely to receive the label of *hot cognition*. It is even less meaningful to speak of *hot cognitions* when affect becomes separated from the original cognitions.

as free-floating anxiety, hysteria, or posthypnotically induced moods, all point to the possibility that some aspects of affective processes might well be separate and partly independent of cold cognitions. Occasions when they are not include those when an affective experience has been communicated to someone else or when it has been thought of a great deal. On such occasions an elaborate cognitive representation of affect occurs that may be processed very much like any other type of information. It is important to observe, however, that not all affective experiences are accompanied by verbal or other cognitive representations and that when they are, such representations are imprecise and ambiguous.

Preferences Need No Inferences: Empirical Evidence

The prevalent approach to the study of preferences and related affective phenomena holds that affective reactions follow a prior cognitive process: Before I can like something I must first know what it is. According to this prevalent view, therefore, such cold cognitive processes as recognition or categorization are primary in aesthetic judgments, in attitudes, in impression formation, and in decision making: They come first. If we say, for example, that we like John *because* he is intelligent, rich, and compassionate, it follows that we must have gained some impression of John's intelligence, wealth, and compassion, and combined them, before we formed an attraction to him. This must be especially so in the case of judgments of novel stimuli before the component units become fused into an integrated structure. Thus, if the complexity of polygons is an important basis of their attractiveness, then polygons that are judged pleasing (or displeasing) must have previously been somehow examined for their complexity. Otherwise, the calculus of preferences makes little sense.[14]

The first indication that affect may not require extensive participation of cold cognitive processes appeared in studies of the exposure effect, that is, the phenomenon of increasing preference for objects that can be induced by virtue of mere repeated exposure (Harrison, 1977; Zajonc, 1968). While the empirical results that established the phenomenon were quite consistent, their explanation continued to be very elusive. Theories that attempted to account for the mere exposure effect, such as Harrison's (1968) response competition hypothesis or Berlyne's (1970) optimal arousal theory, treated affect as resulting from a prior cognitive process. Both theories contained the remnants of Titchener's (1910) thesis on familiarity. In explaining the preference for familiar objects, Titchener attributed a critical role to recognition, which he thought gave the individual a "glow of warmth, a sense of ownership, a feeling of intimacy" (p. 411). The majority of subsequent findings bearing on the explanation of the exposure effect, however, have revealed that recognition must play a relatively minor role, as must the subjective feeling of recognition.

Matlin (1971) was the first to discover that the role of recognition in the exposure effect may have been overstated. During an initial experimental session, she presented Turkish-like words either three times or six times. Subsequently, these words, together with others that were not shown at all, were rated for liking and also for familiarity. That is, for each word the subjects had to decide whether they saw it previously in the exposure series and to report how much they liked it. Table 1 shows Matlin's results. Liking is averaged as a function of objective familiarity and as a function of subjective familiarity. Note that there is an effect due to subjective familiarity, that is, when the subjects thought a stimulus was old they rated it more positively than when they thought it was new. However, the *objective* history of the individual's experience with the stimulus is just as effective in influencing liking. Stim-

TABLE 1

Average Stimulus Affect Ratings as a Function of Objective Familiarity (Old–New) and Subjective Familiarity ("Old"–"New")

Objective familiarity	Subjective familiarity "Old"	Subjective familiarity "New"	*M*
Old	4.90	4.20	4.47
New	4.20	3.90	4.01
M	4.55	4.05	

Note. Data are from Matlin (1971).

[14] Affective reactions to objects that have been encountered and evaluated many times may become automated, thus gaining some independence from the component processes (Shiffrin & Schneider, 1977). As such, they may have different properties than *first* reactions. It is those first affective reactions (that is, those elicited when individuals are asked to evaluate objects totally novel to them) that I wish to consider at this point.

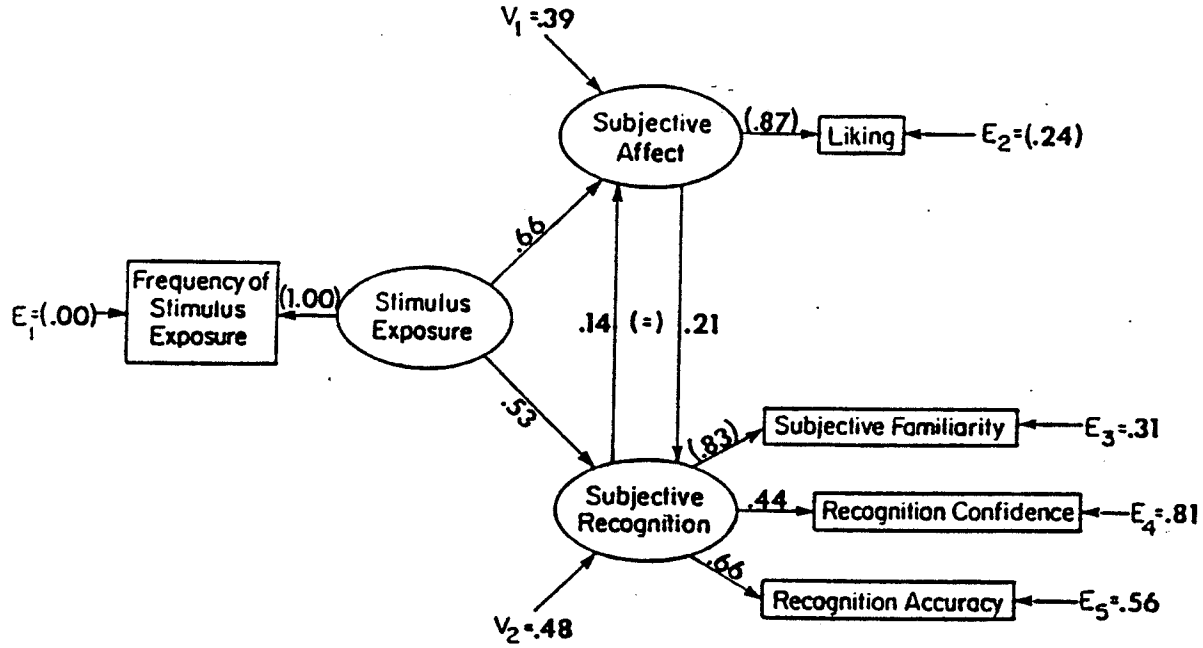

Figure 2. Causal model for independent affect; goodness of fit is $\chi^2(5) = 39.0$. V = variable; E = error. (From "Exposure Effects May Not Depend on Stimulus Recognition" by R. L. Moreland and R. B. Zajonc, *Journal of Personality and Social Psychology*, 1979, *37*, 1085–1089. Copyright 1979 by the American Psychological Association. Reprinted by permission.)

uli that the subjects had actually seen were liked better than stimuli not seen, independently of whether the subjects thought of them as "old" or "new."

Similar results were obtained recently by Moreland and Zajonc (1977, 1979), using Japanese ideographs. Subjects were given 0, 1, 3, 9, and 27 prior exposures, counterbalanced, of course, with the stimuli. Following these exposures, the subjects made a variety of recognition and liking judgments. A number of findings are of interest. Many stimuli shown in the first series, some of them 27 times, were not recognized as familiar when shown later. Taking only those stimuli that were so judged, and relating the rated attractiveness of these stimuli to their actual number of exposures, we obtained correlations of .43 in one experiment and of .50 in another. An objective history of exposure influenced liking of stimuli for which the subjects could not have felt a "glow of warmth" or a "sense of ownership."

We also performed another type of analysis. Because we had a sufficient number of measures, we were able to use linear structural equation analyses to evaluate various causal models of our data. We used the LISREL III program (see Jöreskog & Sörbom, 1977) to calculate maximum likelihood estimates for causal models that assign different roles to the recognition factor. The program distinguishes between latent variables (constructs) and their observed indicators (measures). By estimating the unknown coefficients in a system of simultaneous equations for any particular model, the program describes the pattern of relations among the latent variables, distinguishing causal effects from unexplained variation in each case.

The results of this analysis are shown in Figure 2. Latent variables are shown in ellipses, while measures of those variables are shown in rectangles. The coefficients linking the ellipses with the boxes represent the validities with which particular latent variables were assessed by their measures. Path coefficients linking the latent variables to each other represent causal relations. Unexplained variation in the latent variables (V_1 and V_2) and error in the various measures (E_1 through E_5) are also shown. Some parameters (shown in parentheses) had to be set equal to some a priori value in the maximum likelihood solution so that variance in all of the latent variables could be identified.

The first model tested was one postulating that stimulus exposure has two mutually independent effects, one cognitive and one affective, or one cold and one hot. We supposed that under the

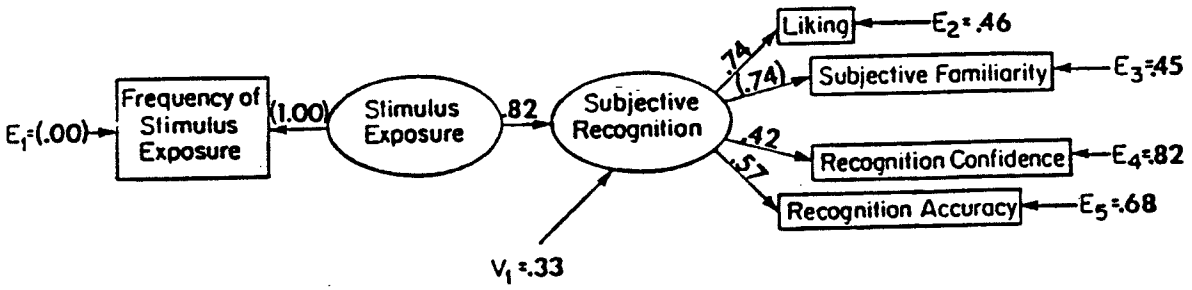

Figure 3. Causal model for mediated affect; goodness of fit is $\chi^2(6) = 83.6$. V = variable; E = error. (From "Exposure Effects May Not Depend on Stimulus Recognition" by R. L. Moreland and R. B. Zajonc, *Journal of Personality and Social Psychology*, 1979, *37*, 1085–1089. Copyright 1979 by the American Psychological Association. Reprinted by permission.)

impact of repeated exposure, people gain an increasing ability to recognize the stimulus—They achieve a feeling of subjective familiarity and an awareness of recognition, which authors since Titchener have thought to be the necessary conditions for an increased positive affect toward the stimulus. This is the purely cold effect that is capable of generating the eventual "glow of warmth." However, we wanted to know as well whether, quite independently of this cold cognitive effect, there is also an affective change, or hot effect—that is, whether subjects acquire a more positive attitude toward the object as exposure increases, independently of recognition. They do. While the path coefficient from stimulus exposure to subjective recognition is substantial (.53), indicating that recognition improves with exposure, there also is a hot effect: There is a strong path from stimulus exposure to subjective affect that is *independent of recognition* (.66).

We can compare this model with one that is entirely cold, that is, with one that requires the entire process to be mediated by cognitive factors, by the discriminanda. This model, shown in Figure 3, says essentially that whatever affective changes take place as a result of exposure are entirely mediated by stimulus recognition. The result of requiring affect to be mediated by recognition is a substantial reduction in the efficiency of prediction. The χ^2 in the previous model was 39.0 ($df = 5$) and in this model is 83.6 ($df = 6$), generating a significant ($p < .01$) difference between the two models of $\chi^2(1) = 44.6$.

The experiments just described all involved presentation of stimuli under optimal conditions; that is, there was nothing to prevent the subjects from registering what was shown and from memorizing the information presented to them. Subjective recognition and the likelihood of recognition were controlled by statistical techniques. And the results showing that stimulus recognition was not a necessary condition for the exposure effect were correlational.

Much firmer evidence, however, that hot cognition is quite short on cognition was collected by W. R. Wilson (1975), who controlled for recognition experimentally by means of an ingenious technique. He employed the method of dichotic listening in order to reduce recognition to a chance level. Random sequences of tones, such as those constructed by Vitz (1964), were presented to one ear, and a story was simultaneously presented to the other. Subjects were asked to track the story on a written page to verify whether what they heard corresponded to the printed text. The melodies were played five times each. The subjects were subsequently given a recognition memory test in which the earlier melodies and other melodies that they had never heard were played. But now there was no interference from the other channel, and no other task was required of the subject. The subjects also rated all the melodies for liking, some subjects giving their recognition memory judgments before, others after, the ratings for liking. The procedure succeeded in reducing recognition memory nearly to the chance level. The accuracy of recognition was 59% in one experiment and only 53% in another.

Table 2 shows the results of these experiments. Again, as in the case of previous results, liking varies with subjective recognition. But apart from this effect, liking also varies with the objective history of stimulus exposure. With recognition reduced nearly to the chance level, differential affective reaction to the stimuli is obtained as a consequence of mere repeated exposure. Random melodies

presented five times were liked better than melodies never heard, even though the subjects could not discriminate the former from the latter for familiarity.

In a follow-up of these studies, Kunst-Wilson (who is the same person as W. R. Wilson) and I tried to reproduce the effect in a visual mode (Kunst-Wilson & Zajonc, 1980). Random polygons were constructed and presented for an extremely brief time interval—in fact, only 1 millisecond. Subsequently, the subjects rated the polygons for liking and were tested for their recognition memory. Judgments were made in paired comparisons to avoid possible response bias. Again, recognition was at a chance level: 48%. However, of the stimuli that were liked, 60% were old and 40% were new. Sixteen of 24 subjects liked objectively old stimuli better than new stimuli, but only 5 of 24 recognized them as such at better than chance level. And of the 24 subjects, 17 showed better discrimination between objectively old and objectively new stimuli in their affective judgments than in their recognition responses, while only 4 showed such superiority of recognition over affective judgments. Thus, the subjects were able to distinguish between the old and new stimuli if they used liking as their response, but they were not able to distinguish between them if they had to identify them as "old" or "new." This result may be taken as evidence that a class of features (preferenda) exists that allows individuals to experience affect toward objects but does not allow them to accomplish cognitive tasks as simple as those in recognition memory tests.

TABLE 2

Average Stimulus Affect Ratings as a Function of Objective Familiarity (Old–New) and Subjective Familiarity ("Old"–"New")

Objective familiarity	Subjective familiarity "Old"	Subjective familiarity "New"	*M*
Old			
Experiment I	4.20	4.03	4.12
Experiment II	3.51	3.85	3.66
New			
Experiment I	3.75	3.07	3.30
Experiment II	3.03	3.02	3.03
M			
Experiment I	4.02	3.52	
Experiment II	3.29	3.40	

Note. Data are from Wilson (1975).

These experiments establish, I believe, that affective reactions to a stimulus may be acquired by virtue of experience with that stimulus even if not accompanied by such an elementary cold cognitive process as conscious recognition. Thus, a theory that assumes that subjective experiences of novelty and familiarity mediate the affective response acquired during the course of exposures must contend with the results showing that with the subjective experience of novelty held constant, systematic variations in affect can be obtained just by means of an objective manipulation of exposure.

However, one should not assume that no form of recognition occurred. Obviously, some discrimination, however primitive or minimal, must have taken place, even though it must have been at a level not accessible to the subject's awareness. It is somewhat surprising that any effect at all was obtained with exposures as short as 1 millisecond, but it should be noted that the stimuli were high contrast (black on white) and that no mask was used. Detectable effects with 1-millisecond exposures were also obtained by Shevrin and Fritzler (1968) and by Shevrin, Smith, and Fritzler (1971). These authors reported differential evoked potentials and word associations to critical and control stimuli presented for 1 millisecond—stimuli that the subject could neither recognize nor identify. Even more pertinent is the work of Marcel (Note 4). He presented over a large number of trials either a single word or a blank always followed by a mask. The exposure duration of the word was varied. The subjects were then asked whether anything had been presented before the mask. If they answered yes, two words were then presented to them under optimal conditions. The subjects were then asked which of these two words was more *visually* similar to the one shown before the mask. Finally, they were asked which of these same two words was more *semantically* similar to the stimulus shown before the mask. With decreasing stimulus exposure, all three types of judgments tended to become less accurate, and eventually all three reached the chance level. But the first to become totally unreliable were judgments regarding the actual presence of the stimulus words. The second type of judgment to be reduced to a chance level by the decreasing exposures was that concerned with physical similarity. And when the subjects were totally unable to rise above chance in com-

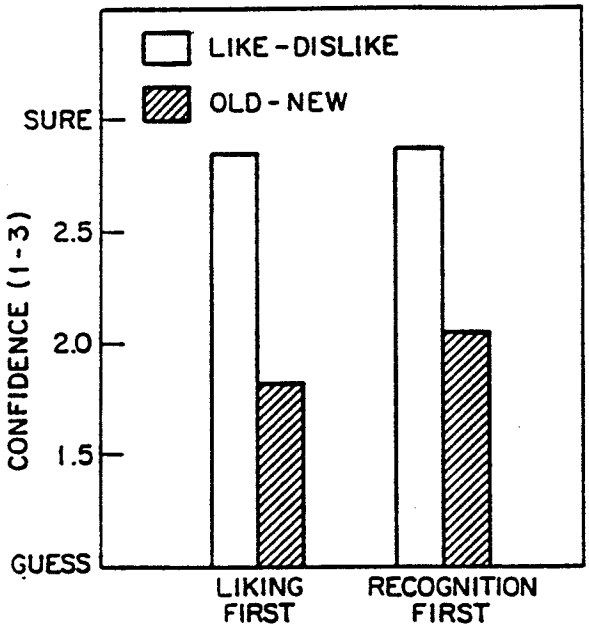

Figure 4. Confidence in liking and recognition judgments. (Drawn from data reported by Kunst-Wilson & Zajonc, 1980.)

paring physical similarities of the words, they were still judging their semantic similarities quite reliably.

Marcel's results are reminiscent of those reported by Broadbent and Gregory (1967), who found that unpleasant words (such as "blood") were more often misperceived as other unpleasant words (such as "death") than as equally probable neutral words. Marcel's results, moreover, are of particular interest if we consider the consistent findings from the semantic differential literature showing that meaning is very highly saturated with affect. If it is indeed affect that allows subjects to make a semantic match in the absence of conscious recognition, then deciding which of two given words is *emotionally* more similar to a stimulus word should be at least as easy as deciding which is semantically more similar. This experiment, in fact, is now being carried out by Moreland and myself.

Another consequence derives from the prevalent approach to affect and cognition. Prevalent theories, especially the one developed by the late Daniel Berlyne (1967), generally assume that the affective reaction occurs in response to the level of arousal, which in turn is mediated by collative variables such as complexity, novelty, or congruity. If complexity, congruity, and novelty mediate liking, in that objects and events are liked just because they are optimally complex or simple, novel or familiar, then the judgments of objects along these dimensions should, in general, be more stable, more consistent, and made sooner than affective judgments. At the very least, these judgments should not be slower, more inconsistent, unstable, or inefficient than affective ratings. In particular, we would expect that recognition judgments, for example, which reflect the operation of the collative variable of novelty, should be made with greater confidence than liking judgments. Figure 4 shows the results from our previous study with Kunst-Wilson using 1-millisecond exposures. The results show that compared to liking judgments, recognition judgments are made with much less confidence. The differences are, in fact, huge—more than 6 times their standard errors. Even if we take only the recognition judgments on which the subject was correct, this effect remains true.[15]

One more bit of data. According to the prevalent view, attending to discriminanda alone should be easier and quicker than attending to discriminanda tagged with values. Since the latter involve more information, more detail must be attended to, and the subject would consequently

[15] We suspected that these results may be due to the fact that the subjects knew they could be wrong on the old-new judgments, and awareness of this fact might have induced caution in them. But they could not be "wrong" on their liking judgments. These latter judgments express opinions, and people generally feel free to hold any opinions whatsoever. We tried, therefore, to "objectify" affective judgments and to "subjectify" recognition judgments in order to determine whether the confidence ratings would be reversed. To obtain "objectified" affective ratings, subsequent to stimulus exposures, we asked subjects in another experiment to rate the polygons for their "aesthetic value." We told them also in this connection that our polygons had all been rated for aesthetic value by art critics. To obtain "subjectified" recognition judgments, we told the subjects that one of the two polygons in each slide might appear more "familiar" than the other and asked the subjects to indicate which one did in fact appear more familiar. Thus, the subjects could now be "wrong" in their affective judgments, whereas recognition became much more a matter of subjective impression. The results did not change a great deal. Confidence was a little greater for subjective familiarity judgments than for the old-new judgments and a little weaker for aesthetic judgments than for judgments of outright liking. But these differences were quite small. The means were 2.01 and 2.41 for familiarity and aesthetic judgments, whereas they were 1.60 and 2.29 for recognition and liking.

require more processing time. If familiarity mediates the affective reaction generated as the result of repeated exposures, then judgments of familiarity should be made quicker than judgments of liking. If anything, however, our results showed the opposite. Although of only borderline significance, affective judgments of polygons were made faster than recognition judgments.

Feeling and Thought: Two Systems?

About 10 years ago, Hyde and Jenkins (1969) carried out an experiment in which subjects were tested for recall of word lists to which they were exposed under different conditions. Some subjects were simply exposed to the words with the instruction to pay close attention. Of three other groups, one was instructed to count the number of letters in each word, another to report the presence of the letter E, and a third to rate each word for pleasantness. In some groups the subjects were warned that they would be tested for recall; in others they were not warned. Hyde and Jenkins's results were quite strong. Among both the subjects who were warned about a future recall test and those who were not warned, those asked to rate pleasantness showed the best recall. Hyde and Jenkins took their data to mean that items are "arranged" differently in storage depending on the context prevailing during acquisition. The superior performance of subjects who rated the words for pleasantness was due to the fact that these subjects acquired the words as "units of meaning" and could therefore recruit for them supportive components of associative structures. When words are examined for number of letters or the presence of the letter E, such "structures are not activated and the recall is unorganized" (Hyde & Jenkins, 1969, p. 480).

Since, as we have seen earlier, the semantic content of verbal material is saturated with affect, the facilitation that occurred as a result of prior pleasantness ratings in the Hyde and Jenkins experiment could have strong affective components. Two conditions of a recent experiment by Rogers, Kuiper, and Kirker (1977) are of particular interest in this respect. In all conditions, their subjects were tested for recall of previously shown adjectives. In one condition, the subjects had to check the adjectives to see if they were printed in the same or different type as a sample print (structural), and in another whether they rhymed with comparison words (phonemic). But in two conditions the subjects were required to engage in extensive semantic processing of the adjectives: In one they checked the adjectives to see if they meant the same as comparison words (semantic) and in another to see whether they described the subject (self-reference). Note that while these last two conditions both activate semantic structures within which the adjectives are imbedded, the self-reference condition brings the subject into a cognitive domain greatly charged with affect. Rogers, Kuiper, and Kirker's findings are especially significant in view of the virtual discontinuity of the self-reference effects. Of the 10 self-reference adjectives, 2.84 were correctly recalled. In contrast, only .34, .68, and 1.33 adjectives were correctly recalled in the structural, phonemic, and semantic treatments, respectively.

Another group of similar studies that used recognition memory rather than recall also suggests strong participation of affect in information processing. Formulating their experimental problem in depth-of-processing terms (Craik & Lockhart, 1972), Bower and Karlin (1974) showed photographs of faces to subjects with instructions to judge the photographs for gender, honesty, or likeability. Following exposures, subjects were tested for recognition memory in two experiments. The hit rate was higher when the subjects rated photographs for honesty or likeability than when they reported gender. Strnad and Mueller (1977) replicated Bower and Karlin's results in a between-subjects design, and Warrington and Ackroyd (1975) found parallel effects when comparing these effects for faces and words, also in a between-subjects design. According to Bower and Karlin (1974), deeper processing facilitates recognition because it forces the subject to attend to a greater variety of detail. "Judgment of honesty of face would appear to require comparison to an idiosyncratic set of vague prototype-criteria regarding the patterning of features such as distance between the eyes, size of pupils, curvature of the mouth, thickness of lips, and so on" (p. 756). They went on to say that "if you want to remember a person's face, try to make a number of difficult personal judgments about his face when you are first meeting him" (pp. 756–757). Patterson and Baddeley (1977) asked subjects to do just that: In one condition their subjects rated photographs of faces for the length of nose, distance between the eyes, roundness of face, or fullness of lips. In another condition the ratings

were vague and less detailed but much more likely to recruit affect: nice–nasty, reliable–unreliable, intelligent–dull, and lively–stolid. Recognition memory, as reflected by d' and by hit- and false-alarm rates, was clearly superior for what Patterson and Baddeley called "personality" ratings. Patterson and Baddeley (1977) thus disagreed with Bower and Karlin and concluded that their own "results clearly did not implicate analysis of facial features as a critical or optimal basis for face recognition" (p. 411). Instead, they believed that should they "ever find an optimum strategy for encoding of faces, analysis of individual features is unlikely to be its focus" (p. 417).

There seems to be general agreement that when judgments of pleasantness are made of faces or of adjectives, individuals engage in forms of deeper information processing. What is not agreed upon is the type of content that is accessed at these deeper levels. Patterson and Baddeley (1977) doubt that face recognition is based on the sorts of discriminanda that we would intuitively suspect of serving recognition. But if these discriminanda are not the basis of face recognition, what is? Is face recognition, then, based on preferenda? Recall in this respect that the scaling of faces for similarity yields pleasantness as the major factor, explaining about 50% of the variance, whereas physical features play a relatively minor role. Clearly, the contribution of affect to face recognition has been underestimated. Early face discrimination is based primarily on affective reactions. Infants smile at an approaching face as early as 10 weeks of age, and at 12 weeks they smile differently at familiar and unfamiliar faces (Izard, 1978).

Curiously enough, none of the above studies mention the possible role of affect in processing face information. And none of the studies on recognition memory of faces collected reaction time data to verify whether the assumed deeper processing was accompanied by longer response latencies. However, in one recent study, Keenan and Bailett (1979) used methods similar to those of Rogers, Kuiper, and Kirker (1977) but instead administered recognition memory tests. They report results that have an important bearing on the form of information processing that may emerge when affect is involved. As in the previous studies, a number of adjectives were presented, and the subjects were required to check them against a number of criteria. For example, subjects were asked whether the given adjective described themselves, a best friend, a parent, another friend, a teacher or boss, a favorite TV character, or Jimmy Carter. Also asked for some adjectives was a semantic encoding question: "Means the same as _____?" Following the initial series, subjects were given a recognition memory task in which the original adjectives were interspersed among an equal number of similar distractor items. Keenan and Bailett's results are very clear. Self-reference generated by far the highest recognition performance (over 90%), whereas reference to Jimmy Carter produced a recognition rate of less than 65%. The other recognition rates were arranged according to the social signficance that the target had for the subject: best friend, parent, friend, and teacher.

If the superior recognition memory for the self-reference items was due to deeper processing, one would expect that response times for these items would be longer than response times for items processed at shallow levels. However, the results were quite the opposite and very strikingly so. Encoding times for self-reference items were by far the shortest. The longest reaction time was found for items referred to Jimmy Carter (note that the experiment was run in 1977 when Carter was not quite as well known as he is now). Moreover, the other targets had response times that varied directly with the proportion of correct recognitions.

Keenan and Bailett (1979) attempt a variety of cognitive interpretations, but at the conclusion of what is truly a valiant effort, they offer the possibility that in the course of processing self-referent information, "the crucial dimension underlying memory is not what the subject knows or the amount of knowledge that is used in encoding the item, but rather what the subject feels about what he knows" (p. 25). It is no longer clear that deeper processing necessarily requires more time. Structures that are highly integrated and that have been frequently "tuned in" may process information quite rapidly. The relation between reaction time and depth of processing cannot be predicted, therefore, for all tasks (Baddeley, 1978). Keenan and Bailett's study may be taken as evidence against the levels-of-processing approach. But it may also be taken as evidence that the participation of affect in processing information of some types may increase efficiency to a remarkable degree. The beneficial role of

affect in memory is dramatically illustrated in a paired-associates study in which Sadalla and Loftness (1972) asked subjects to form pleasant, unpleasant, and nonemotional images for each pair and found considerably poorer performance for the neutral pairs than for either the pleasant or the unpleasant pairs.

It is this type of result that suggests the possibility of some separation between affect and cognition. Consider the task in those experiments where the subject is asked to verify if a given adjective, say "honest," describes him or her. It is most unlikely that the process of this verification involves checking the item for its presence in a list, as some information-processing models would have it. For one thing, no evidence suggests even vaguely that the self is represented as a list of trait adjectives (Markus, 1977). For another, the question is probably not interpreted by the subject to mean "Is the trait 'honest' true of you?" but more likely to mean "Is the trait 'honest' consistent with your perception of yourself?" If this is indeed the interpretation that the subject imposes upon the task, then we must inquire what may be meant by "consistent with your perception of yourself?" To some extent this consistency may involve absence of content that is mutually contradictory; for example, the person could not be both tall and short. But more important, some form of affective consistency is probably involved. That is, the self as used in this task is probably some global and general impression suffused with affective quality. What is matched is primarily the affective quality of the item with the affective quality of the impression. Of course, the shorter processing times for self-referent items may be due to the fact that we have more integrated and better structured impressions of ourselves and of people who are important to us. But it is equally true that the self is a target charged with strong, widespread, and clear affect, and an emotional match would therefore be quite easy for the subject to verify. There is a need in these studies to separate the elaboration and integration of the cognitive structure from the affect that pervades it, but such a control procedure is difficult, for the two properties are highly correlated.

That the affective qualities in impression formation are processed differently and perhaps separately from the cognitive content that "carries" that impression is shown both by Anderson and Hubert (1963) and by Posner and Snyder (1975b). In a typical impression formation task, the first authors found strong primacy effects for impressions (i.e., the overall affective rating of the person was influenced more by early trait adjectives in the list) and an equally strong recency effect for the recall of the adjectives. Anderson and Hubert (1963) suggested that "the impression response is based on a different memory system than that which underlies the verbal recall" (p. 388). They did not go on to specify how these two systems might differ except to say that "as each adjective is received, its meaning is extracted and combined with the current impression, thus yielding a changed impression. Once this is done, memory for the adjective *per se* is no longer necessary for the impression process" (pp. 390–391).

Dreben, Fiske, and Hastie (1979) found similar order effects for impressions, and Hamilton, Katz, and Leirer (in press) obtained better recall when subjects organized items into an impression of a person than when subjects regarded these items as discrete units. More important for the dual-process hypothesis, however, is the finding of Dreben, Fiske, and Hastie that the weights calculated for the adjectives did not predict their recall. That is, the adjectives assumed to be contributing the most to impression are not necessarily also the ones that are best recalled. Following his cognitive response theory, Greenwald (1980) suggested that cues effective in helping the individual retrieve content may not be the same ones that are effective in helping retrieve the evaluative aspects of the content. It is not unreasonable to suppose that the major difference between these two types of cues may be the difference between discriminanda and preferenda. And it is perhaps the difference between these cues that is also involved in the perseverance effect (Ross, Lepper, & Hubbard, 1975), in that details of initial information about success (or failure) are used only to construct an overall impression of one's own task competence and are soon discarded. Thus, in debriefing, when the experimenter tells the subjects that their success (or failure) was rigged, this new information may no longer be capable of making contact with the original input (which by then has been recoded and discarded) and may therefore have little effect on its original affective consequences.

Posner and Snyder (1975b) also argue for a dual memory. In their experiments, subjects are shown a sentence such as "James is honest, loyal,

and mature," and in a subsequent display a probe word such as "foolish" is flashed. Two tasks are studied. In one the subject is asked to verify if the word itself was among those in the preceding sentence. In another, the required match is between the emotional tone of the word and that of the preceding sentence. The interesting result these authors obtain is that, as the length of the list increases, reaction times increase for word matching and decrease for emotional tone matching. Posner and Snyder (1975b) agree with Anderson and Hubert about the two memory systems for the component adjectives and for the overall impression, but they doubt that the "emotional information concerning impression is handled in any different way than other semantic dimensions in the memory system" (p. 80). Their doubts should be weakened by a recent impression-formation experiment in which the pattern of recall of individual adjectives was effectively manipulated in the hope of thereby affecting the primacy of impressions. Riskey (1979) was able to change the recall of adjectives, but the primacy of impressions nevertheless remained unchanged.

While these authors propose separate systems, it is always separate *cognitive* systems that they propose. In contrast, the separation being considered here is between an affective and a cognitive system—a separation that distinguishes between discriminanda and preferenda and that takes us back to Wundt and Bartlett, who speculated that the overall impression or attitude has an existence of its own, independent of the components that contributed to its emergence. The question that cannot be answered with the data thus far collected is whether the affect–content separation is simply a matter of separate storage (as Anderson and Hubert, on the one hand, and Posner and Snyder, on the other, have proposed) or whether there isn't some separation already at the point of registration and encoding. The rapid processing times of affect suggest a more complete separation of the two processes at several junctures.

One is necessarily reminded in this context of the dual coding hypothesis proposed by Paivio (1975) for the processing of pictures and words. Paivio (1978a) suggested a number of differences between the processing of these types of content, for example, that representations of pictures emerge as perceptual isomorphs or analogs (imagens), whereas parallel units in the verbal system are linguistic components (logogens). He also proposed that pictorial information is organized in a synchronous and spatially parallel manner, whereas verbal information is discrete and sequential. Finally, he suggested that the processing of pictures is more likely to be the business of the right-brain hemisphere, whereas the processing of words is the business of the left. Paivio's proposal for a dual coding theory kindled a controversy of some vigor. While Anderson (1978) has recently argued that the controversy cannot be resolved with what we now know about these processes, it has nevertheless stimulated some exciting empirical and theoretical work (e.g., Banks & Flora, 1977; Kerst & Howard, 1977; Kosslyn & Pomerantz, 1977; Paivio, 1978b; Pylyshyn, 1973; Shepard, 1978).

Most relevant for my discussion, however, is Paivio's (1978c) finding that reaction times for pleasant–unpleasant ratings are faster for pictures than for words. Paivio takes this result to indicate that "the analog information involved in pleasantness and value judgments is more closely associated with the image system than with the verbal system" (p. 207). This

> analog pleasantness information is "carried by" affective and motor processes that are closely associated with visual memory representations of things. Such processes presumably originate as reactions to things and persist as affective or motor memories that can be activated by pictures of the referent objects, or, more indirectly, by their names when accompanied by the appropriate contextual cues. More specifically, pleasantness and value judgments might be based on continuously variable interoceptive reactions and approach or avoidance tendencies that are activated jointly by the comparison stimuli and the task instructions. (p. 207)

However, the specific responses of the autonomic nervous system are not readily discriminable, since there are not many receptors to register the fine changes in autonomic processes (Averill, 1969; Mandler, Mandler, Kremen, & Sholiton, 1961). Moreover, interoceptive process and motor memories are slower than the affective responses they are presumed to activate.

It is a fact, of course, that *all* sorts of judgments are faster and more efficient for pictures than for words, and this may be so just because pictures are able to evoke an affective reaction more directly and faster than words. An affective reaction aroused early in the encoding process—earlier than it is possible for the interoceptive and motor memories to become effective—might facilitate a complex cognitive encoding sequence by an initial categorization along affective lines, which,

as we have seen, requires minimal stimulus information. Such facilitation through early affective sorting that relies not only on discriminanda but on preferenda as well may also induce a constructive process that can more readily recruit stored content by searching for congruent affective tags.[16]

This review suggests that a separation between affect and cognition may well have a psychological and a biological basis.[17] Recall that in contrast with cold cognitions, affective responses are effortless, inescapable, irrevocable, holistic, more difficult to verbalize, yet easy to communicate and to understand. Consider also that the processing of affect is probably an even stronger candidate for the right hemisphere than the processing of pictures (Carmon & Nachson, 1973: Dimond, Farrington, & Johnson, 1976; Ley & Bryden, 1979; Milner, 1968; Safer & Leventhal, 1977; Schwartz, Davidson, & Maer, 1975). In the context of this review it is especially interesting (a) that face recognition is superior when the stimuli are presented in the left visual field (De Renzi & Spinnler, 1966; Moscovitch, Scullion, & Christie, 1976), and (b) that the recognition of emotional expressions shows the same right-brain superiority (Suberi & McKeever, 1977).

It has also been suggested to me by Richard J. Katz (Note 5) that there exists a network in the central nervous system, the *locus coeruleus*, which is ideally suited for the kind of partially independent processing of affect that I have suggested here. The potential sensitivity of the locus coeruleus to preferenda can be inferred from a number of interesting properties and features of this system. Above all, it is excited differently by novel and by familiar stimuli. Second, self-stimulation studies have demonstrated that the locus coeruleus is sensitive to incentives. It is further known that it is capable of innervating sensory areas (such as the colliculi and geniculate bodies), emotional areas (the amygdala and hypothalamus), mnestic areas (the hippocampus), and the cerebral cortices. Most important, however, is the fact that the locus coeruleus is capable of very fast responding. Finally, Katz also noted that the enkephalenergic system, which controls the action of enkephalins (naturally occurring opiates) and is situated at the locus coeruleus, is also involved in reinforcement and in different reactions to novelty and familiarity. All of this means, at the very least, that what I have proposed about the processing of affect is not inconsistent with recent knowledge about the relevant neurophysiological mechanisms. It means that the organism is equipped with a neurochemical apparatus capable of telling the new from the old and the good from the bad, of remembering the old, the good, and the bad, and of making all these decisions rapidly without having to wait for the slow feedback from the autonomic system.

Affective reactions are primary in ontogeny. The infant knows to cry and to smile long before it acquires any semblance of verbal skills (Izard, 1978, 1979). Meltzoff and Moore (1977) report that human infants can imitate emotional expressions at 12 days of age, long before they acquire language. And good–bad is one of the very first discriminations that children learn.

More important, however, affect is clearly primary in philogeny. Affect was there before we evolved language and our present form of thinking. The limbic system that controls emotional reactions was there before we evolved language and

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[16] Another area of research in which affect may be implicated (although it had not been so suspected) is the frequency-judgment paradigm. Typically, in these experiments subjects are shown stimuli in different frequencies, and two types of judgments are collected afterwards. In one condition, the subjects are shown the old stimuli interspersed among new ones and are asked to report for each item whether it is new or old. In the other condition, the subjects must say how often each stimulus occurred. It turns out that the frequency judgment generates greater accuracy than the binary recognition memory judgment (e.g., Proctor, 1977; Proctor & Ambler, 1975).

Two findings are of interest in the present context. First, subjects have remarkable confidence in their frequency judgments (Howell, 1971). Second, warning the subjects that they will be estimating frequencies of events (vs. simply recalling them) and varying the length of the list both influence free recall but have little if any effect on frequency estimation (Howell, 1973). It thus appears that frequency judgments behave like affective judgments. It is possible, therefore, that frequency estimation is more likely to invoke an underlying affective reaction (which accrues from repeated stimulus exposures) than the binary recognition memory task. It may be hotter. Since frequency judgment makes exposure effects salient and since it requires finer discrimination than recognition memory, it may recruit affect as an auxiliary source of information. In fact, it has been suggested that recognition memory responses and frequency estimation are not made from the same sources of information (Wells, 1974), although what these sources are and how they differ from each other is not altogether clear (Hintzman, 1976).

[17] Multiple processing systems and multiple channel conceptions are today more the rule than the exception in the study of sensory processes (Graham & Nachmias, 1971; Trevarthen, 1968).

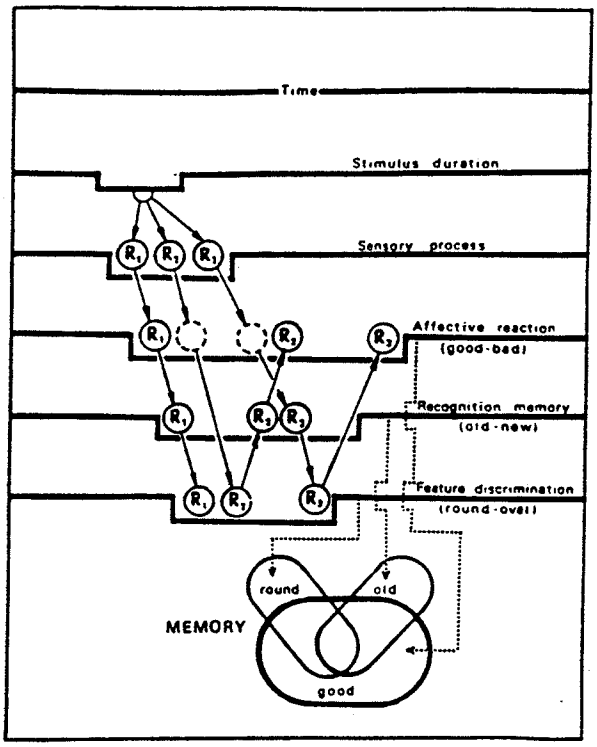

Figure 5. Time course of the stimulus, sensation, affect, and cold cognitions (R = response).

our present form of thinking. It was there before the neocortex, and it occupies a large proportion of the brain mass in lower animals. Before we evolved language and our cognitive capacities, which are so deeply dependent on language, it was the affective system alone upon which the organism relied for its adaptation. The organism's responses to the stimuli in its environment were selected according to their affective antecedents and according to their affective consequences. Thus, if the most recent version of homo sapiens specifies that affective reactions are mediated by prior cognitive processes—as contemporary cognitive views would have it—then at some point in the course of evolution, affect must have lost its autonomy and acquired an intermediary in the form of cold cognition. This scenario seems most unlikely. When nature has a direct and autonomous mechanism that functions efficiently—and there is no reason to suppose that the affective system was anything else—it does not make it indirect and entirely dependent on a newly evolved function. It is rather more likely that the affective system retained its autonomy, relinquishing its exclusive control over behavior slowly and grudgingly. At most, the formerly sovereign affective system may have accepted an alliance with the newly evolved system to carry out some adaptive functions jointly. These conjectures make a two-system view more plausible than one that relegates affect to a secondary role mediated and dominated by cognition.

Because it is so heavily rooted in verbal skills, the cognitive system in humans has properties that are quite distinct from those of affect. Above all, the cognitive system is infinitely more diverse and flexible than the affective system. Anything at all can be said and thought with various degrees of precision, and these things can be said and thought in an infinite variety of ways. But there are only a handful of emotions and feelings that can be felt, and they can be felt only in some few, very constrained ways. And for reasons that must be rooted in the partial separation of the two systems, affect can be communicated much more efficiently and accurately than thought in spite of the fact that its vocabulary is quite limited. It was a wise designer who provided separately for each of these processes instead of presenting us with a multiple-purpose appliance that, like the rotisserie-broiler-oven-toaster, performs none of its functions well.

Conclusion

It is too early to write a model for affect and for the various ways that it interacts with cold cognitions. The important pieces of evidence are still missing. However, we can begin to specify the facts that such a model must accommodate. Figure 5 summarizes these facts by schematizing the time course of the stimulus together with the ensuing sensory process, the affective response, and some simple aspects of the cognitive process (recognition and feature identification). A stimulus is presented for a fixed time interval. The stimulus triggers a number of processes that can vary in their onset times and offset times. I have shown these processes as ranges of their onset times, ignoring the offset times altogether for the present purposes. (I have also ignored the fact that under some conditions, stimulus onset can be anticipated by the response process.) The onset times of these four processes are influenced by stimulus conditions and by subject states (e.g., previous experience with stimuli of the given class, exposure to immediately preceding stimuli that may generate contrast or assimilation, knowledge, mood states, priming, or expectation.

Note that a variety of temporal relations holds among affect, recognition, and feature identification. Of course, sensory process must have the earliest onset. Its onset times, too, differ depending on the stimulus, level of attention of the organism, the peripheral processes that are activated, context, etc. Also, an affective reaction always directly follows the sensory input. In R_1 this reaction is strong and salient, and it might dominate the ensuing cognitive process. In R_2 and R_3, affect (shown in broken circles) is also aroused immediately following the sensory process, but it is weak and does not significantly influence the subsequent stages of the cognitive process. But for affect, recognition, and feature discrimination, all combinations are possible. I have given examples of three of the six possible response patterns. In R_1, affect is first, recognition occurs later, and feature discrimination is last. The primacy of affect over recognition in R_1 reflects our own data (Kunst-Wilson & Zajonc, in press) and the results of typical subliminal perception experiments (e.g., Blum & Barbour, 1979; Shevrin & Fritzler, 1968). The difference between recognition and feature discrimination that favors the former reflects the results of Patterson and Baddeley (1977), who, it will be recalled, found that subjects could recognize photographs better when they judged them on "personality" characteristics than when they judged them on specific physical features. The results of Marcel (1976) and of Keenan and Bailett (1979) also suggest that recognition can precede feature identification.[18]

R_2 presents the case typically considered by information-processing models: The cognitive process begins with the individual first discriminating a critical feature that allows recognition. And finally it is recognition that gives rise to the affective response. In R_3, recognition precedes feature identification, as is the case when letters that form words are recognized better than letters that do not form words (Johnston & McClelland, 1974) or when meaning is apprehended while the word itself cannot be identified, as in the paralexic response of certain aphasic patients (Marshall & Newcombe, 1966).

Figure 5 shows the lower temporal limits of these reactions. Except for the sensory process, affect is assumed to be capable of the earliest onset. How can that be?

Perhaps the following analysis, speculative to be sure, may point to some possible answers. Decisions about affect require the least information and are often based on a different decision scheme than either recognition or feature identification. Each of the three, affect, recognition, and feature identification, is a form of categorization. Affective reactions of the type considered here are for the most part unidimensional and sometimes just binary: safe–dangerous, good–bad, or nice–nasty. Such binary decisions can under some circumstances be made quite reliably, even in the absence of reliable bases. Moore and Shannon (1956) have shown that reliable circuits can be constructed using arbitrarily unreliable relays, provided the relays form parallel circuits that are mutually redundant. Zajonc and Smoke (1959) applied this principle to group performance, and Smoke and Zajonc (1962) to group decisions. That is, given certain group decision processes, groups can make judgments much more reliably than the average group member. An analogous situation may well exist for affect where the stimulus triggers several parallel responses and the decision scheme can well be a minimal quorum.[19] Recognition, however, even though it also constitutes a binary choice (old–new), does not have a similar advantage because the redundancy of the component criteria (e.g., features of configural properties) is seldom as high as in the case of affect. Moreover, minimal quorum is seldom a decision basis. In fact, in experimental work on recognition memory, great care is taken to assure that criterial features are fairly independent of each other. Just because a photograph shows the face of a male is not sufficient for calling it "old" or rejecting it as "new," unless previous exposures have shown only female faces.

Each of the responses in Figure 5 can facilitate the ones succeeding it. An affective reaction can thus act to precategorize the stimulus for the subject trying to decide whether it is "old" or "new." And recognition may facilitate feature identification by a similar prior selection process. Each operation reduces the universe of alternatives for the next choice. It is therefore entirely possible for stimuli that have a strong effective potential to evoke affective reactions rapidly, to be recognized sooner than neutral stimuli, and to be remembered better. Thus, Figure 5 also shows

[18] Similar effects are obtained in vision (e.g., Graham & Nachmias, 1971).

[19] In the case of decisions or parallel signalling circuits such as may be involved in affective reactions, the minimal quorum is equivalent to a veto decision or its inverse.

the representations in memory that are left by the three processes (affect, recognition, and feature identification). To the extent that these traces are redundant, the likelihood of a later retrieval would be facilitated.

I began this paper with a quotation from Wundt, and it must be apparent that another spirit has emerged as I have developed my arguments—that of Freud. The separation of affect and cognition, the dominance and primacy of affective reactions, and their ability to influence responses when ordinary perceptual recognition is at chance level are all very much in the spirit of Freud, the champion of the unconscious. In terms of my formulation, there seem to be at least two different forms of unconscious processes. One emerges where behavior, such as that occurring in discrimination among stimuli, is entirely under the influence of affective factors without the participation of cognitive processes. Included here are such phenomena as perceptual defense and vigilance, subliminal perception and discrimination, state dependent recall, and mood and context effects. Another form of unconscious process is implicated in highly overlearned, and thus automated, sequences of information processing; this form includes cognitive acts but has collapsed them into larger molar chunks that may conceal their original component links (cf. Shiffrin & Schneider, 1977). And there may be other forms of process in which the separation between affect and cognition prevents the individual from apprehending the potential connection between them.

Because the language of my paper has been stronger than can be justified by the logic of the argument or the weight of the evidence, I hasten to affirm that one of my purposes was to convince you that affect should not be treated as unalterably last and invariably postcognitive. The evolutionary origins of affective reactions that point to their survival value, their distinctive freedom from attentive control, their speed, the importance of affective discriminations for the individual, the extreme forms of action that affect can recruit—all of these suggest something special about affect. People do not get married or divorced, commit murder or suicide, or lay down their lives for freedom upon a detailed cognitive analysis of the pros and cons of their actions. If we stop to consider just how much variance in the course of our lives is controlled by cognitive processes and how much by affect, and how much the one and the other influence the important outcomes in our lives, we cannot but agree that affective phenomena deserve far more attention than they have received from cognitive psychologists and a closer cognitive scrutiny from social psychologists.

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