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Affection as a Cognitive Judgmental Process: A Theoretical Assumption Put to Test Through Brain-Lateralization Methodology

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An experiment on affection employing brain-lateralization methodology is conducted based upon the tenets and previous research of logical learning theory, but which cannot be derived from the affective theories of Osgood and Zajonc. It is predicted that affective assessment will play a role in the recognition of both pictorial and verbal (language) materials, but that left-hemispheric conceptualization will rely more on affective contrasts for pictorial recognition than for verbal recognition, and right-hemispheric effects will reflect the opposite predilection. Sixty-four high school students are put through a modified Gazzaniga procedure in which after first rating pictorial or verbal materials for affective value on separate days they are asked to recognize these items on a third day. The experimental hypotheses are confirmed ($p < .01$). Thus, when a hemisphere is cognizing materials that are *not* within its primary organizational focus an increased reliance on affective discrimination takes place.

The concept of affection presents the theoretician with a challenging problem: Is this ubiquitous behavioral phenomenon to be construed as an essentially cognitive or as a physical process? Even further, what manner of cognitive or physical process is involved in affection? Osgood (1952) frames affection in cognitive terminology. Although he once suggested that affect can be due to a *judgment* rather than a feeling (Osgood, 1953, p. 571), Osgood's vast research on affect took theoretical rationale from a stimulus-response mediation formulation, supplemented by a compatible information-processing conception. Thus, *meaning* for Osgood, of which affection is a part, consists of: (1) a fractional part of the total behavior that some stimulus complex in experience might have elicited in the individual; and (2) a kind of running feedback self-stimulation that has an impact on the organized

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response eventually made by the individual, but one different from that which would have been made without the intervening fractional process mentioned in point 1 (see Snider and Osgood, 1969, pp. 9-10).

To speak of meaning and thereby affect as feedback is to place it outside the organism's capacity to judge, because positive feedback (i.e., a portion of output returning as input) is information about actions taken *after* the mechanism is already committed to a course of action. Negative feedback aligns a mechanism to an already fixed ("decided upon") goal (e.g., a target fixed by a missile's program). Feedback as paradigm for judgment can never capture the *initial* decisive act; that is, the one in which the "master" program is selected from among alternative possibilities. This is tantamount to saying that in human reason, the fixing of a major premise preliminary to a line of cognitive reasoning cannot be conceptualized through information-processing terminology, which begins its explanations based on the assumption of a master program already in place (see Weizenbaum, 1976, for an extensive treatment of this point).

Recently, Zajonc (1980) has proposed that a theory of affection need not employ the usual cognitive discriminants, relying instead upon strictly biological determinants quite independent of cognition. In doing so, he makes no distinction between affect, emotion, and feeling (p. 153), suggesting that there may be a class of stimulus features that elicit feelings in an organism without thereby stimulating cognition. Zajonc refers to these non-cognitive stimuli as *preferenda* (p. 159). He suggests that lower animals rely heavily on the evocation of affect (feeling, emotion) and the processing of mediators without the cognitive elaborations that human beings can bring into the course of events. Nature has provided the living organism 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" (p. 169).

Summing up the importance of affect to learning, Zajonc then suggests the following: "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" (p. 171). He underscores his position by entitling his paper "Feeling and Thinking: Preferences Need No Inferences" (p. 151). Though he has focused on bodily feelings rather than cognitive mediators in the style of Osgood, Zajonc has left unchanged the basic stimulus-response "elicitation" conception of how affective preferences come about. The concept of judgment is once again placed on the "response" side of the stimulus-response tandem. It is the stimulus (preferendum) as perceived that renders the judgment by way of an emotional elicitation, *not* the individual human being who may be experiencing the emotion and judging it in the act of conceptualization. There is no opportunity in this model for an affective assessment to be rendered concerning an emotion. Judgments are either emotional feelings or cognitive reactions with affection subsumed by the former conception.

In contrast to the affective theories of Osgood and Zajonc, logical learning theory (LLT) (Rychlak, 1981) employs three terms to describe the processes under consideration: emotion (i.e., feeling), affection, and cognition. Emotion is construed as an exclusively biological response, with all of the attendant difficulties we have in trying cognitively to "name" the feelings experienced in human behavior (love, envy, anxiety, resentment, etc.). Cognitive processes are those mental activities which we refer to as ideas, encodings, "information," and the like. Affection or affective assessment is viewed as a special aspect of the cognitive process, one which functions as independently from the ideations and encodings of thought as Zajonc's construct of preferenda does. Affection is held to be a truly evaluative process, a judgment or assessment rendered by the person in conceptualizing and aligning premises about experience.

Taking the concept of judgment or evaluation at face value, LLT frames the person as capable of rendering such assessment *from birth* (or, however one wishes to name the "beginning point" at which cognitive processes may be said to occur). Rather than placing the judgments in the stimuli (preferenda, environmental cues, etc.), LLT places these evaluative alignings of information to be processed in the act of cognitive conceptualization. This is not a "phenomenal field" conception. Typical gestalt-phenomenological theories rely upon sensory phenomenology; LLT is a logical phenomenology encompassing both dialectical and demonstrative forms of logic (see Rychlak, 1977, p. 303). The person is viewed as capable of judging literally *anything* conceptualized thanks to the either-or bipolarity of dialectical reasoning. Rather than viewing stimuli as enforcing "a" position or "response" on the individual, LLT holds that stimuli as informational input provide a complex of possibilities within which the person is free to *take a position on* what will be focused upon (known), believed in, denied, and so forth. And affective assessments made even as the person conceptualizes ("processes" information) influence the very meaning that experience takes on. This total process of conceptualizing-while-evaluating is subsumed by the construct of *telosponsivity* (p. 283). Rather than *responders* human beings are said to be *telosponders*.

Studies conducted on infant visual preference (e.g., Berlyne, 1958; Cohen, 1979; Fantz, 1958) are just as readily interpreted in light of a cognitive-judgmental process as they are in light of a stimulus-evocation process. Kagan (1967) has found that infants prefer to look at moderately novel stimuli, and to avoid stimuli that are either too novel or too familiar. Strauss (1978) was unable to get infants to look at just any kind of facial organization through frequent exposures. There are ample research findings to support a thesis that human beings can influence what they will learn from birth, and that this process is easily construed as some form of judgmental preference (see Sameroff and Cavanagh, 1979, for an extensive survey of this research). In holding to the latter view, LLT meets the current vogue of explaining behavior as a "person-situation" interaction (Mischel, 1977), although in this case the person is taken as an agent—that is, a director of his or her behavior—literally from birth.

The same kind of affective assessment rendered for purely conceptual understandings would therefore apply to emotions—which are also placed in conceptual categories (love, hate, anxiety, envy, etc.) by the person. Each of these "emotions" is subject to affective assessment. An adult person might find that the *same* emotion (e.g., sexual attraction) can on occasion (situation A) be affectively positive whereas on other occasions (situations B or C) it can be affectively negative (inappropriate, immoral, etc.). Whereas Osgood posits affection as a mediating cognitive process that is triggered by the inputs of experience, and Zajonc holds affection as a physical feeling that is triggered by the inputs of experience, LLT defines affection as a judgmental process brought to bear in the conceptualization of *both* emotional (physical feelings) and purely conceptual (cognitive, informational) processes; indeed, the conceptual must of necessity frame the emotional if the latter is to be known cognitively. Affective assessment helps in the individual's ordering of experience into what we call learning or knowledge (encodings, "stored" and "retrieved" information, etc.). Is there some test that can underscore the evaluative process which LLT claims takes place in human mentation? The authors decided that the brain-lateralization methodology of Gazzaniga (1970, pp. 90-93), which he adapted to the testing of normals (i.e., non-commissured brains; see Filbey and Gazzaniga, 1969) afforded such a possibility.

Before considering the brain-lateralization methodology we must provide the reader with certain theoretical claims as well as the empirical research which has validated these claims. Logical learning theory holds that individuals affectively assess, align, order, and thereby know items in experience based upon premised meanings that are brought forward to reach conclusions, gain insights, and thereby to *know* much in the manner of traditional syllogistic reasoning, the precedent-sequacious flow of logic in a computer program, and so on. The unique assumption of LLT is that based upon affection the person can and does align a "master program" (i.e., premise, point of view, biased opinion, fallacious assumption, etc.). The quality of the person's affective assessment concerning that which is being premised—whether positive or negative, liked or disliked, and so on—will predict the course of learning. In a typical experiment on affection, the LLT investigator might instruct subjects to prerate learnable items (words, consonant-vowel-consonant [CVC] trigrams, contextual phrases, designs, paintings, IQ subtests, etc.) for likability. This measure is termed the reinforcement value (RV) of the item or items in question. Reinforcement value is thus the operationalized measure of affection; it is determined idiographically in that each subject assesses learnable materials individually and arrives at a personal judgment of like/dislike (Rychlak, 1977, p. 322).

Extensive research has been conducted using the RV measure (see Rychlak, 1977, 1981). In capsule form, the findings of over 60 experiments to date suggest the following: A subject's learning style is related to the predicating assessment made of the learning task, items to be learned, evaluation of self as a person, type of encouragement received in a task, and willingness he/she has to participate in the task. As more of these learning-related factors are positive in RV (e.g., the subject likes the topic to be learned or the task to be performed, likes himself/herself as a person, etc.), the subject will be seen to learn his/her liked items in the task (words, trigrams, picture recognitions, etc.) more readily than disliked items. On the other hand, if such learning-related factors take on a negative RV in the subject's ideographic assessments (e.g., the subject dislikes the topic to be learned or the task to be performed, dislikes himself/herself as a person, etc.), the subject will be observed diminishing the *positive RV effect* or reversing it completely and actually learning *disliked* items more readily than liked items.

According to LLT, this variation in affective learning style occurs because it is the premise or predication held to at the outset of learning that influences the eventual affective cognitive processing, *not* in a stimulus-response fashion of antecedents thrusting consequents, but in a logical fashion in which the order of precedent meanings is extended sequaciously, much in the sense of a syllogistic or mathematical progression. The principle of explanation relied upon at this point in LLT is the tautology (Rychlak, 1977, pp. 277-278). Tautologies have often been described as redundancies because they supposedly repeat information, as in the example of "If a rose then a rose." This detraction arises because we tend to think of the tautology in extraspective fashion, as if the statement relating the meaning of "rose" to "rose" was written upon a blackboard. There the statement stands, repeating information and hence not relevant to learning.

However, if we think of this statement and the meaning relation it frames in an introspective fashion (i.e., from the perspective of a person's phenomenal outlook), we could understand a person as framing his or her cognition in terms of "If a rose then [it has] rose qualities." The person can thereby come to enrich his or her cognitive information as life unfolds in the sense of *learning* what flowers are roses and what flowers are not, as well as many distinctions to be gleaned that were not conceptualized initially. The person begins with "If a rose, then a rose-flower; If a rose, then a rosy-redness," and so forth. The *concept* of a "rose" embodies such framing meanings from the outset. And when a flower-like object is encountered in experience it is such precedent meanings that are extended sequaciously (i.e., according to logical order, necessarily) to an understanding of "This is a rose I see, because if a rose then certain qualities obtain that *this* object possesses." Without the precedent frame of meaning (i.e., a *premise*) to be extended tautologically to "this" object the person would not recognize a rose even though something was "seen" experientially. Experience provides the grounding source of a conceptualization, but it is the person who provides the meanings framed and enlarged upon.

Logical learning theory proposes that the learning of meanings is more akin to a logical process of induction/deduction than it is akin to a mechanical process of antecedents triggering consequents. The meaning-extensions of inductions and deductions depend upon tautologizing what has been affirmed meaningfully as a precedent frame "to" the meanings that follow necessarily (tautologically, sequaciously, etc.). This precedent-sequacious style of reasoning carries over to affective cognitive processing as well. Thus, LLT suggests that an initial preferential judgment made by the subject acts as a premising frame of reference so that "If liked, then liked meanings (things, experiences, etc.) will follow" and/or "If disliked, then disliked meanings (things, experiences, etc.) will follow." The subsequent course of learning is influenced by this initial premising affective frame of reference, which extends tautologically from precedent "to" the act of learning in sequacious fashion. Since there are both liked and disliked aspects of anything in experience, it is the *relative* facility of processing liked over disliked meanings *and vice versa* that we measure in conducting research on affection.

It should be emphasized that LLT advocates have carefully tested the possibility that RV ratings can be reduced to or explained in terms of such traditional learning principles as frequency and contiguity, which in this context relate to familiarity, pronounceability, ease of learnability, and so on (see Rychlak, 1977). We have even done cross-validating factor analyses in which the same subjects rated verbal materials (CVC trigrams, paralogs, and real words) for RV (like/dislike) and various other characteristics such as word-quality, familiarity, pronounceability, estimated ease of memorizing, and so forth (see Rychlak, Flynn, and Burger, 1979). It was shown conclusively that the RV dimension does *not* load on factors which issue from such traditional frequency/contiguity measures of meaningfulness in verbal materials. Zajonc's (1968) earlier work on recognition enhancement has never proved conclusively that affection is due to mere exposure, and indeed his recent speculations on preferenda (refer above) make it possible to separate sheer frequency of contact from the implicit emotional response to an item in experience (Zajonc, 1980). We have found in a study based on LLT that meaning enhancement—that is, the number of words suggested by a target trigram exposed for brief periods—was promoted when a target trigram was *positive* in RV but *not* when it was *negative* in RV (Rychlak and Nguyen, 1979). Frequency of exposure (1, 5, or 10 times) had *no* differential effect on this enhancement of meaning.

It is fundamental to LLT that affection (operationalized as RV) helps to *make learning possible.* Affection is not the "effect" of learning but a basic "cause" of learning. The assumption is that an infant's earliest gropings to *encode* (i.e., conceptualize) experience are facilitated by affectively based choices—as to where to look, what to select as interesting "experiences," what to fear and possibly to "repress" from consideration, and so on. Gradually, as the more intellectualized verbal discriminants and stylized capacities to recognize structures are learned and developed, the relative contribution of affection to *routine* learning and performance may be expected to diminish. On this point it should be noted that first graders were found to have larger RV-positive effects in picture recognition than children from the higher elementary grades, who found this task relatively easy (Rychlak, 1975). But we have found in several studies on adults that as a task becomes easy relative to a subject's abilities, the discriminating capacity afforded by liked versus disliked cognitive conceptualizations falls off and hence the RV-effects were washed out (Jack, 1974; Laberteaux, 1968; Trybus, 1969). A study was therefore designed in which we specifically asked subjects to learn both abstract and concrete words that had been pre-rated for RV (August and Rychlak, 1978). As predicted, we found there were larger RV-effects in memorizing the abstract (difficult) than the concrete (easy) words.

This brings us to the brain-lateralization research. It has been established in this literature that by young adulthood the right hemisphere processes pictorial information and the left hemisphere processes language information in a large proportion of subjects so tested (Sperry, 1966, 1967, 1968). It would follow that if we could submit each hemisphere to a learning task in the style of previous research on RV we could place a given hemisphere in the position of having to conceptualize and affectively assess materials that are *both* routine for it and those that are *not* routine. If we can extrapolate from previous findings on LLT, we might suggest that if the left hemisphere is placed in the position of having to recognize pictorial materials it might rely more on the RV (like/dislike) discrimination than when it processes verbal materials. And, vice versa, when the right hemisphere processes verbal materials it too should reflect a larger RV-positive effect than when it processes pictorial materials. Findings of this sort would lend support to LLT's claim that affection is a cognitive process of evaluating material even as it is being "input" and "encoded" preliminary to recognition.

In the Gazzaniga (1970, pp. 90-93) procedure adapted for use on normals, subjects are asked to fixate on a point in mid-visual field, and the brief tachistoscopic exposure time (1/10 to 1/100 second) does not permit them to scan the material exposed to one half of their retina by the other half. Due to the anatomical arrangement of the retina this means that materials (pictures, words, etc.) exposed to the right visual field register *first* in the left brain hemisphere and vice versa (Geldhard, 1972, chap. 2). Of course, these neural impulses traverse the corpus callosum in milliseconds to bring the other half of the brain into play. But there is an undoubted *order of entry* factor in this sequence that has a proven effect on the processing of materials.

Thus, when a subject is asked to make either a nonverbal or a verbal response to signals presented tachistoscopically in this manner, the nonverbal response comes more quickly when these signals are sent into the right hemisphere first (Filbey and Gazzaniga, 1969). It has been found that *words* projected in the left visual field of normals (going to the right hemisphere first) are not recognized as readily as words projected in the right visual field (going to the left hemisphere first) (McKeever and Huling, 1971). Normal subjects recognized more CVC *trigrams* when they were flashed into the left hemisphere first rather than the right hemisphere, and the reverse facilitation occurred when *faces* were the materials employed (Hilliard, 1973; Klein, Moscovitch, and Vigna, 1976). Finally, memorizing *digits* is easier for normals when these items are flashed into the left than the right hemisphere first (Dimond and Beaumont, 1974). All of these findings, suggestive of varying levels of difficulty for the hemisphere vis a vis different visual stimuli, are consistent with the expectations of the present research—that is, affective differences should be discernible in the functioning of normal (intact, non-commissured) brain hemispheres relative to the materials processed in a recognition task.

Method

Hypotheses

1. Subjects who are asked to affectively assess verbal (CVC trigrams) or pictorial (abstract paintings) slide contents that are exposed to *either* brain hemisphere first, will upon subsequent testing for recognition of these slides reflect a *positive RV effect*. That is, liked slides will be recognized more readily than disliked slides *overall*.

2. Within the overall findings of hypothesis 1, when the *left* hemisphere is exposed to materials *first*, there will be a *larger* RV-positive effect for *pictorial* (abstract painting) materials than for verbal (CVC trigram) materials.

3. Within the overall findings of hypothesis 1, when the *right* hemisphere is exposed to materials *first*, there will be a *larger* RV-positive effect for *verbal* (CVC trigram) materials than for pictorial (abstract painting) materials in the recognition task findings.

Rationale. The first hypothesis merely captures our expectation that RV-phenomena will be witnessed in the experimental findings. As we are using subjects of essentially average personal adjustment, we expect the RV effects to be positive. It is theoretically possible to predict reduced RV-positive effects and even reversals if we were to employ maladjusted individuals (e.g., mental patients) as subjects (see Rychlak, McKee, Schneider, and Abramson, 1971). The second hypothesis suggests that when the left hemisphere is exposed to slide materials first, due to the greater difficulty of having to process pictures than verbal items, there will be an even greater reliance on RV discriminations reflected in the former than in the latter data. That is, the difference in recognition score between liked and disliked materials will be *larger* for abstract paintings than for CVC trigrams. The third hypothesis presents the opposite case—that is, right hemispheric recognition scores will show a larger disparity for liked/disliked verbal materials (trigrams) than for pictures (paintings). The introduction (refer above) has provided the extended rationale for hypotheses two and three.

Note that the hypotheses are framed in terms of the *order* in which the brain hemispheres are "exposed to" verbal and pictorial materials. We have purposively avoided reference to the "entering" of stimulus inputs because LLT views mentation as conceptual, as lending organization to sensory input rather than simply recording the organization that is presumably sent inward as so-called *information*. In stressing the order of conceptualization we remove from consideration the role of *time's passage* in our explanation. Time is irrelevant to this account. Traditional learning theories have presumed that stimuli enter mentation processes as "external variables" of influence that determine what will or will not then be ordered into memory as signals for mediational mechanisms. Based on this "outside to inside" (Lockean) model it seems erroneous to speak of hemispheric independence in the intact brain when all we have is a succession of one hemisphere receiving already ordered *information* milliseconds before the corpus callosum sends it to the other hemisphere. On this view, for all practical purposes the information is received instantaneously by both hemispheres.

However, if mentation is viewed as a process of conceptualizing or *ordering into meaning* rather than receiving already ordered information, it may become relevant to consider which hemisphere of the brain is conceptualizing things at the outset. This is akin to taking an interest in the major premise of a line of reasoning. We sometimes forget that time is irrelevant to the "flow" of logic in the traditional syllogism (i.e., *Major premise*: All men are mortal; *Minor premise*: This is a man; *Conclusion*: This man is mortal). It is the ordering of meanings that matters in the flow of logic, and as the initiator of the sequential process, the major premise plays a crucial role in what will be cognitively known. The major premise begins the process of meaning-extension and therefore necessarily biases it. Logical learning theory refers to this beginning point in mentation as the *protopoint* (Rychlak, 1977, p. 289). Meanings are affirmed at protopoints and extended in precedent-sequacious (logically necessary) fashion to influence overt behaviors. This logical process of mentation is what we referred to above as *telosponsivity*. We have here an "inside to outside" (Kantian) model under development which acknowledges the influence of affirmed meanings as premises "for the sake of which" behavior follows. If it is now established that brain hemispheres do in fact organize (order, etc.) into contrasting specializations, we have every right to frame hypotheses about how these hemispheres might contrast in affirming affectively tinged conceptualizations at the protopoint.

Some consideration should be given to the alternative theories discussed in the introduction. Would they make the above predictions? Osgood's theory would have difficulty confronting the fact that we are predicting a *greater* reliance on affective discriminants in the materials that are *difficult* to recognize. If, as Osgood contends, affect is a fractional part of the stimulus complex, it would seem to follow that the more definite, clear, and precise this stimulation is in the first place, the more likely would it be that affection would facilitate cognition. To expect greater affective influence when this fractional portion is taken from a difficult (unusual, vague, "weak," unclear, etc.) stimulus complex seems to fly in the face of Osgoodian theory. Zajonc's view on preferenda allows no basis on which to expect that such sub-cognitive responses would have the cognitive influences that we are predicting. Hence, it is our feeling that LLT has propounded a distinctive series of hypotheses in the present research, and that even if our findings can somehow be rationalized through another point of view it is unlikely that the present research would have *in fact* been generated from any other theoretical orientation now extant in psychology.

Subjects

Sixty-four high school students (evenly divided by sex) were put through the experimental procedure. All of these students were at least 16 years of age and right handed. Participation in the experiment was voluntary and the usual informed consent procedures were followed. Due to scheduling problems the sex distribution within each experimental condition was not evenly divided, but there was always a satisfactory representation of both sexes in a given condition.

Procedure

Subjects were tested individually in the tachistoscopic procedure taken from Gazzaniga (1970, pp. 90-93). A subject was seated at a table on which a chin-rest apparatus was fixed at a constant distance from a white projection screen (45.5 cm × 40.5 cm) taped securely to the wall. In the center of this screen a (3 mm) *dot* was evident, which would represent the fixation point for subjects as they put their chins on the rest to keep their visual distance from the screen constant. The chin-rest was adjustable, so that each subject's eye-level was kept on the same plane as the dot. The tachistoscopic (Stoelting

Robot-Matic) projector was fitted into a special stand which kept its projection-level in this same plane, thereby reducing the distortion of slides flashed to the visual field on either the righthand or lefthand side of the fixation dot.

If the slide projection was to the right visual field, the tachistoscopic stand was positioned to the right of the subject, at a predetermined distance from the chin-rest, and vice versa (i.e., all subjects had identical presentation angles in their slide flashings). Based on knowledge of the retinal organization it is possible to state how far to the right or left of the fixation dot a projection of slide materials must be made to ensure that either the right or the left brain hemisphere confronts them first. The formula for determining this distance is as follows:

$$\tan \frac{\phi}{2} = \frac{e}{2R}$$

ϕ = visual angle (expressed in degrees)

$\frac{\phi}{2}$ = distance (in degrees) of target from fovea (on retina)

e = width of base angle (e/2 = distance of target off fixation dot)

R = distance from eyeball to line e

With subject's eyeball 108 centimeters from the screen, a projection approximately five centimeters to either side of the fixation dot ensures that the subject will be taking in materials from the left visual field by the right hemisphere first, and vice versa. This assumes that the dot is being fixated, of course, and to ensure that subjects complied with instructions the experimenter sat facing a subject, off to one side of the projection screen. It is very easy to establish the subject's visual fixation on the dot in the warm-up procedure followed. Any deviation from this fixation is readily observed. Thus, with each flash of a slide the experimenter monitored eye-movement with full knowledge of where the subject's fixation point on the dot should be. Eye-movement during the slide presentations was *never* observed, due no doubt to the tachistoscopic rate of presentation (see comparable findings by Geffen, Bradshaw, and Wallace, 1971; White, 1969).

Materials were presented at the rate of 1/5 second, which is a longer exposure time than the 1/10 to 1/100 second rate employed by Gazzaniga. However, as Cohen (1972) has demonstrated, subjects tend to employ printed words or trigrams as pictorial material unless specifically asked to *read* the item projected. The present research used slides of CVC trigrams selected from the 45-55 percent level of Archer's (1960) norms, thereby removing association value as a confounding variable. Pretesting established that if subjects were given 1/5 second exposures of the trigrams, they were capable of following the instruction to *read* these word fragments and rate their impressions accordingly. Pictorial materials were abstract paintings, selected from the colored-slide collection of the New York Museum of Modern Art.

A subject's RV rating of the material flashed was conveyed to the experimenter via a single-pole, double-throw, spring contact switch that controlled two lights. This switch was also on the table, alongside the chin rest. Throwing this switch one way activated a green light (signifying "like") and throwing it in the reverse direction activated a red light (signifying "dislike"). After the switch had been thrown the pole returned to an upright position. The red and green lights were installed behind and above the subject, so that as the experimenter faced a subject (monitoring subject's eye fixation on the dot) the red and green lights were also in the line of experimenter's vision. Subjects used the hand identical to the visual field in which material was being projected to throw the switch (i.e., contra the hemisphere exposed to the material first). The direction of *like* versus *dislike* signaling was randomized by rotating the placement of the contact switch among the subjects.

Subjects were put through three experimental sessions on successive days, at the identical hour. They were randomly assigned by sex to four experimental conditions: Trigrams-Right Hemisphere, Trigrams-Left Hemisphere, Paintings-Right Hemisphere, and Paintings-Left Hemisphere. These conditions signify materials used and the hemisphere that was first exposed to the flashed materials. On the first two experimental days 30 trigrams or paintings (identical for all subjects) were flashed at the 1/5 second rate, with five seconds between flashes. Subjects assessed these materials using the control switch and the experimenter recorded their judgments.

It is customary in RV research to use only materials that are reliably liked and/or disliked across two rating sessions (usually with 24 hours intervening) in the actual learning task. Hence, in the present design the experimenter randomly selected four trigrams (or paintings) that had been liked on the first and second experimental days, and four trigrams (or paintings) that had been disliked on both days. In addition, four ambivalent trigrams (or paintings) (i.e., liked on one day, disliked on the other) were randomly selected as material that had been seen before, but not to be entered into data analysis. The RV-effect is determined by contrasting the liked with the disliked materials.

These 12 trigrams (or paintings) (i.e., 4 liked, 4 disliked, 4 ambivalent) were randomly mixed among 12 other trigram (or painting) slides that the subject had *not* confronted over the first two experimental sessions. On the third day, this list of 24 slides was presented and subjects were asked to indicate which trigrams (or paintings) they recognized as having been presented before in the experiment. The procedure for judging recognition on the third day was to have subjects place their chin on the rest and fixate the area just above the center dot. The slides were then flashed in this area, *directly in the line of vision*. Using the same hand as on the first two days, subjects operated the switch to indicate whether they had seen (green light) or not seen (red light) the trigram (or painting) on the first two days. Slide exposure time was again 1/5 second, and presentations were on a five second cycle. Direction of moving the bar on the contact switch was also randomized. The experimenter sat in the same location as before.

It should be noted that the procedure employed on the third day of flashing slides directly in the subject's line of vision was adopted after extensive pretesting had suggested that we were getting the expected RV effect regardless of whether slides were flashed off to the side or presented directly. Theoretical considerations prompted an adoption of the latter alternative. That is, LLT would suggest that as a telosponse, affective assessment is brought to bear at the *protopoint* (i.e., point of affirmation, conceptualization, etc.; refer above). Subsequent to this initial conceptualization, it should make no difference where the material is presented for the task of recognition. The assessment rendered at the protopoint essentially serves as a major premise for the sake of which the trigram or painting is ordered meaningfully in memory (refer above to hypotheses discussion). Given this theoretical stand, it seemed a more stringent test of the theory, one not tied to the specifics of experimental design, to allow subjects to scan the flashed materials normally in making their recognition judgments. The dependent variable in this sense appeared to be less apparatus-bound.

Results

Two scores were employed in the data analysis. The first was termed the *preference* score, which reflected the number of trigrams or paintings that a subject reliably liked, and also those that he/she reliably disliked during the presentation of the 30 slides over the first two experimental days. Hence, the preference score could range from 0 to 30 for both liked content (trigrams, paintings) and disliked content (trigrams, paintings). In order to continue the recognition phase of the experiment a subject had to reliably rate at least four slide presentations in both the RV-positive (liked) and RV-negative (disliked) categories. No subjects were dropped because of this requirement.

The second score employed enabled us to test the hypotheses. It was based upon the subject's third-day performance and hence is termed the *recognition* score. This score could range from 0 to 4 as it reflected the number of trigrams or paintings that a subject reported as having been seen before in the experiment. As with the preference score, there were two values of the recognition score, one for liked materials (trigrams, paintings) and one for disliked materials (trigrams, paintings). Both the preference and recognition scores were entered into a factorial ANOVA having the properties of a 2 (sex) × 2 (trigrams versus paintings) × 2 (left versus right hemispheres first exposed to slides) × 2 (positive versus negative RV). The first three variables are between-subjects and the last variable (RV) is a within-subjects repeated measure.

Considering the preference scores first, two main effects and *no* interactions were found. More paintings were reliably rated [*Mean* (M) = 11.21, *Standard Deviation* (*SD*) = 3.23] than trigrams (M = 8.01, *SD* = 3.10, *F* = 62.54, *df* = 1/56, *p*<.01). Secondly, there were more reliably liked materials (trigrams and paintings) (M = 10.69, *SD* = 3.45) than disliked materials (M = 8.52, *SD* = 3.34) reported by all subjects (*F* = 10.17, *df* = 1/56, *p*<.01).

Turning to the test of the experimental hypotheses, the factorial ANOVA done on the recognition scores revealed two main effects and one second-order interaction reaching statistical significance. More paintings (M = 3.04,

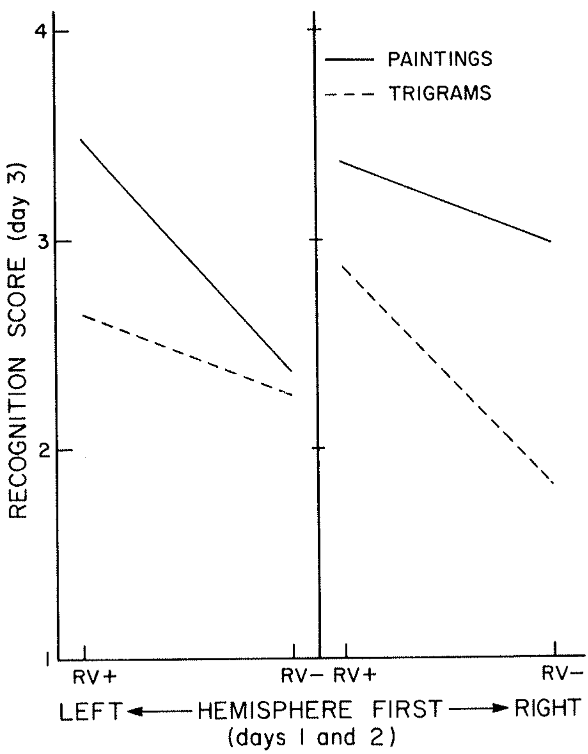

Figure 1: Mean recognition scores for paintings (solid line) and trigrams (broken line) graphed according to whether subjects first confronted these materials in preferential (RV) rating on days 1 and 2 through left or right brain hemispheres (presented on left-hand and right-hand sides of the figure, respectively). The graph lines drawn against recognition scores (ordinate) depict the RV-positive effects found on day 3 for four experimental groups of 16 subjects each. The second-order interaction on these data reached significance (*p*<.01).

$SD = .90$) than trigrams ($M = 2.42$, $SD = .81$) were recognized by all subjects ($F = 13.94$, $df = 1/56$, $p < .01$). Also, in support of our first hypothesis, more liked ($M = 3.11$, $SD = .67$) than disliked ($M = 2.35$, $SD = .97$) materials (trigrams and paintings) were recognized by all subjects ($F = 7.16$, $df = 1/56$, $p < .01$). The second-order interaction occurred between hemispheric presentation during days 1 and 2, materials, and RV ($F = 7.16$, $df = 1/56$, $p < .01$). Figure 1 presents the recognition scores for paintings (solid line) and trigrams (broken line) graphed according to whether subjects first confronted these materials in making RV ratings on days 1 and 2 through the left (left-hand side) or right (right-hand side) hemisphere.

Note in Figure 1 that the main effects already cited are reflected. There are higher mean scores for paintings (solid line) than for trigrams (broken line), and the slope of the interaction lines all suggest the postive RV-effect in recognition on day 3. This latter finding supports hypothesis 1. Hypothesis 2 predicts that the slope of the positive RV-effect should be greater for paintings than trigrams when the left hemisphere is exposed to materials first. Note in Figure 1 (left-hand side) that this is the case. When paintings were rated on days 1 and 2 by submission to the *left* hemisphere first, the slope of the line between RV-positive ($M = 3.48$, $SD = .63$) and RV-negative ($M = 2.37$, $SD = 1.09$) is more pronounced than when trigrams were submitted. In the latter instance the RV-positive ($M = 2.73$, $SD = .50$) versus RV-negative ($M = 2.25$, $SD = .93$) disparity is narrowed. Simple effects tests established that the difference between means for paintings in the left hemisphere was significant ($p < .01$), but the difference between means for trigrams was not (N.S.).

Hypothesis 3 predicts that the slope of the positive RV-effect should be greater for trigrams than paintings when the right hemisphere is exposed to materials first. Once again, Figure 1 (right-hand side) reflects this array of means. When trigrams were rated on days 1 and 2 by submission to the *right* hemisphere first, the slope of the line between RV-positive ($M = 2.87$, $SD = .72$) and RV-negative ($M = 1.82$, $SD = .75$) is more pronounced than when the right hemisphere is first exposed to paintings. In the latter instance the RV-positive ($M = 3.37$, $SD = .50$) versus RV-negative ($M = 2.94$, $SD = .93$) disparity is narrowed. Once again, simple effects tests found the difference between means for trigrams in the right hemisphere to be significant ($p < .01$), whereas the difference between means for paintings was not (N.S.).

Discussion

All three experimental hypotheses have been supported by the data collection. When subjects are administered a series of materials with an exposure rate of 1/5 second, we observe affective assessment playing a role in the subsequent recognition of these materials that is consistent with past findings in the LLT literature. Furthermore, within the known organization of the adult brain hemispheres, this predictable patterning of affective assessment is seen to aid in the *relative* discrimination facilitating recognition. The left hemisphere seems to fall back on the affective discrimination more when it processes pictorial than verbal (language) materials and the right hemisphere does the same when processing verbal (language) as opposed to pictorial materials. The writers take this as further evidence of a basic conceptual ability possessed by human beings to judge, evaluate, assess, and so forth, *independent* of (a) cognitive content (information) and (b) emotion (feeling). It is not that the brain is simply "organized" hemispherically, but that this organization reflects an *active* process of patterning whatever is "being organized." Affection is part and parcel of this organizational process.

In the past, LLT has been criticized for not accepting the theoretical likelihood that the RV measure actually taps an emotional "response" to environmental stimuli that has been "wired into" the organism from birth (the cybernetic analogue once again; see introduction). Yet, the rapidity with which the brain-lateralization methodology exposes stimuli to subjects (1/5 second) works against the understanding we have of just how long emotional processes take to be biologically stimulated into responsivity. This is at least one of the reasons why Zajonc postulates a role for preferenda in behavior—autonomic reactivity does not take place in milliseconds. Furthermore, it stretches credulity to think that a subject's emotional state is being tugged from positive to negative hedonic tone and vice versa every other second, as is called for in the affective assessments of the Gazzaniga procedure. It seems more parsimonious to believe as LLT contends that affection is part of, or a special case of, the human cognitive process.

It remains to be seen how useful the concept of preferenda will prove to be. If we accept this concept in light of the present data we would have to believe that the cognitive organization of the brain on which we relied in order to make our predictions and design our study was irrelevant to the observed results. That is, since preferenda are sub-cognitive stimuli, what takes place in the cognitive organization of the brain should have no necessary tie to the "feeling tones" elicited. There is then no basis on which to suggest that the observed contrasts in the slope of our lines (Figure 1) should take place.

The traditional or standard explanation of how an RV effect might take place would be to continue a frequency/contiguity thesis type of argument. Presumably the Osgoodian theory, which brings in feedback, would also rely on some such explanation. This view would suggest that there is always a standing bank of *stored information* against which the framing program and the ongoing feedback is presumably balancing things off affectively. Despite the evidence cited in the introduction reflecting the fact that we have been unable to "reduce" RV to such frequency/contiguity measures as association value, pronounceability, familiarity and the like (refer above), the critic is still likely to seek evidence in our data that (a) people like what they do because they have had positive reinforcements (exposures, etc.) to these materials in the past, and hence (b) the hemispheric contrasts are therefore the result of past shapings rather than the cause of them.

It seems almost impossible to rebut this line of argument, so ingrained is it in the traditional explanations of psychology. To suggest that "past experience" may well involve subject-contributed influences based upon a judgmental process within the very act of cognition seems to be rejected out of hand by the traditionalist. There are historic reasons, relating to psychology's commitment to "proper" (19th-century) scientific description that can explain why this reticence to accept what is essentially a teleological theory takes place (see Rychlak, 1977). Logical learning theory defends an agential view of human behavior. The *telosponse* construct is a modern example of final-cause description, a form of description that has been dropped from psychology thanks to its early identification with vitalistic theory (Rychlak, 1979). Though this was a proper move, the continuing commitment to mechanistic theory in psychology in the face of solid evidence to the opposite is nothing short of amazing. Thus, we would point out to colleagues who insist upon restricting learning to a presumed "reinforcement history" explanation that modern findings on reinforcement are hardly convincing of a *stimulus-manipulated* human organism.

It is now beyond question that only when a subject is *aware* of the *relationship* (order, pattern, etc.) between the conditioned and unconditioned stimuli in classical conditioning, or the *relationship* between the operant response and contingent reinforcers in operant conditioning, *and* is willing to cooperate in what these relationships suggest, does so-called conditioning take place (Brewer, 1974; Page, 1972). Even so, the belief in a past that is conditioned through frequency of contact persists. A critic reading virtually any study on the role of RV in learning dismisses two decades of work on this question (see Rychlak, 1977, chap. 9) and opines: "People like what they have had past contact with, and so to find that they recognize more liked than disliked paintings or trigrams is hardly surprising." Yet the evidence is *not* as simple and straightforward as this critic presumes. For example, though an *enhancement effect* (liking familiar items) has been found in many studies, it has also been noted that enhancement occurs *only* to originally liked and/or neutral materials. Materials that are disliked at the outset are *not* enhanced (Brickman, Redfield, Harrison, and Crandall, 1972) nor are they likely to take on increased associative meaningfulness when normals are used as subjects (Rychlak and Nguyen, 1979).

If we wish now to disregard such findings and the problems with conditioning theory generally and to insist that people obviously tend to prefer that with which they are familiar, we are left with the question of how this might be said to come about. Citing a common relationship (correlation) between contact and affection does not thereby constitute a theoretical explanation of what is taking place. It is just as plausible to assume that people select from among various alternatives those things with which they will seek contact as it is to assume that contact alone thrusts likability on them without their selective efforts. And even if circumstances force the person into frequent contact with certain items of experience, it is also plausible to view the resultant recognition and recall of affectively positive items in that experience as due to the self-selection of the (normal) person concerned.

Frequency and contiguity are explanatory principles that are extremely difficult to forego in psychology. They follow implicitly from an assumption that the ultimate cause of a preference is due to an independent stimulus in the person's cognizance. Thus, a traditionalist is likely to reason as follows: "Surely we must presume that the subject's affective preference is determined by the nature of the stimulus—its sound, form, typical or novel aspects, and so forth. What else could there be but such factors, many of which can be named by the subject as the reason for his or her preference?" Note that we have inevitably come upon the question of *determinism* in behavioral description. There is concern lest psychology lose its scientific determinism in allowing telic accounts to be advanced. But we do *not* forego a deterministic explanation by suggesting that affection is a judgment at the level of premising, in which the affective quality of a stimulus is framed by the person rather than by the stimulus. If we believe that the stimulus determines an affective judgment, then there is no basis for saying that the person could *either* like or dislike the stimulus-item in question. The resultant theoretical formulation is a mechanism. Recall from the introduction that experience, so fraught with stimuli, provides the grounding source of conceptualization but not the meanings framed as patterns and extended tautologically—which is the province of the telosponsive intellect.

We can derive determinisms from any one of *four* causal meanings: material-cause determinism, efficient-cause determinism, formal-cause determinism, and final-cause determinism (see Rychlak, 1977, p. 243). Indeed, we can "mix and match" such determinisms in the *same* theoretical account. If we believe that stimulus characteristics per se trigger affections, then we are relying upon some admixture of material- and efficient-cause determinism. The person is being construed as a receiver and mediator of influences from the stimulus, in relation to which the person may be "wired" by heredity to respond positively and/or negatively given certain stimulus-characteristics. On the other hand, if we believe that the person is innately capable of telosponding, of rendering conceptual premises that also evaluate affectively, then we are relying upon a formal- and final-cause determinism. What is "wired" in the latter sense is an innate capacity to judge and *not* "the" judgment that is to be rendered given this or that stimulus complex.

The predictable outcome of our experiments on affection does not dictate that we view the stimuli as controlling the assessments leveled. Determinism is just as "deterministic" if we presume that the human being premises meanings, and extends these into his or her realm of understanding in an intentional manner. We can still predict behavior even after we drop our exclusive reliance on the thrusts of an efficient-cause determinism. So, we must assure colleagues, who see their science slipping away from a rigorous base if frequency and contiguity principles are set aside in favor of a tautological principle of explanation, that there is nothing to be concerned about! Theoretically, affective assessments do not have to be determined by the stimulus, but rather by the person's conceptualization and affective assessment of the stimulus as it is framed meaningfully in ongoing telosponsivity. This selective capacity to attend, observe, and learn free of a unidirectional control by stimulus input is no more mysterious than the natural endowment to *encode, store, retrieve*, and *feedback* information. The writers believe that the selective capacity of affection must be accommodated in our theoretical explanations of behavior, because they are obviously at work in cognition and they permit us to understand the human being in a way that no purely mechanistic/cybernetic formulation makes possible.

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