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Nonspecific Effects of Exposure on Stimuli That Cannot Be Recognized

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The repeated exposure of unmasked irregular geometric shapes for very brief durations (1 or 2 ms) has been shown to generate preferences as well as judgments of familiarity for the previously exposed shapes. At the same time these stimuli are not recognized as having been presented. Such exposure also leads to judgments of brightness and darkness independent of stimulus intensity, and it is dependent on the use of unmasked stimuli. This effect is nonspecific, in contrast to stimulus-specific effects with masked stimuli, and it is not restricted to affective judgments.

Very brief exposures of the order of 50 ms and less of words and other meaningful stimuli can produce higher order discriminations such as category membership in the absence of other knowledge such as prior occurrence or word recognition (Fowler, Wolford, Slade, & Tassinary, 1981; Greenwald & Liu, 1985; Marcel, 1983). Similarly short presentations have also been shown to prime word recognition and lexical decisions. However, a special status has been claimed by Kunst-Wilson and Zajonc (1980) for affective judgments (preferences) following brief stimulus exposures. They reported that sheer prior exposure of meaningless (unfamiliar) stimuli (irregular octagons) produced preferences in the absence of recognition of the stimuli. Whereas the other experiments were concerned with the differential pickup of information that is generated specifically by the stimuli (e.g., category membership or lower- vs. uppercase), Kunst-Wilson and Zajonc's claim was that affective judgments arise out of repeated exposure without any intervening cognitive processing and that such data provided evidence for an assumed separation and independence of cognitive and affective judgments (Zajonc, 1980).

Studies of the differential and preferential accessibility of information following minimal exposure have invariably used pattern masks and have generally appealed to spreading activation following exposure as an explanatory principle. On the other hand, the Kunst-Wilson and Zajonc (1980) effect uses minimal exposure with unmasked stimuli, and it implicates an entirely different process of *direct* access to affective information without any cognitive processing. In contrast to the notion of special affective processing, this report explores a nonspecific consequence of the activation of the representation of meaningless shapes, which is not restricted to affective judgments.

Kunst-Wilson and Zajonc presented subjects with 10 irregular octagons each of which was exposed five times for 1 ms under conditions of lowered illumination and without a mask. In the test phase subjects were presented with 10 pairs of octagons—one new and one from the exposed set—for 1 s. They were required to judge either which of the pair they liked better (or preferred) or which had been shown previously. Overall recognition judgments were close to chance (47% correct), but preference judgments showed a significant preference for previously exposed stimuli (60%). The Kunst-Wilson and Zajonc effect has been replicated and extended by several investigators (e.g., Bonnano & Stilling, 1986; Seamon, Brody, & Kauff, 1983). Seamon, Marsh, and Brody (1984) showed that nonrecognition occurs only at exposures of 8 ms or less; increasing exposure times produce accurate recognition of prior occurrence (to about 80%) but no significant increase in preferential judgments (liking). They suggested that the affective preferences may be mediated by a judgment of familiarity that is produced by repeated exposures (Mandler, 1980). Bonnano and Stilling (1986) followed this suggestion and showed that subjects not only showed preference in the absence of recognition for the previously presented shapes, but also generated familiarity judgments of those stimuli that were equal to the preferences (.63 and .66, respectively).

An interpretation alternative to the notion that affective judgments are independent of cognitive ones can be derived from the theoretical proposition that the processing of information involves two factors, item activation (integration) and elaboration (Juola, Fischler, Wood, & Atkinson, 1971; Mandler, 1979; Mandler, Pearlstone, & Koopmans, 1969). The distinction has been useful in theories of recognition (Atkinson, Herrmann, & Wescourt, 1974; Jacoby, 1983; Mandler, 1980) to distinguish between phenomenal experiences of context-free familiarity versus contextual/retrieval effects (Graf & Mandler, 1984; Graf, Squire, & Mandler, 1984). In the case of unfamiliar shapes, their repeated exposure generates the initial representation (schema). In the context of minimal and unmasked presentation, the activated representations of the shapes are produced without elaboration or contextual reference. Activation effects are assumed to be context free and merely produce the greater accessibility of the activated representation.[1] Jacoby has called this phenomenon "perceptual fluency." We suggest that rapid

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[1] Bonnano and Stilling (1986) confirmed the prediction from two-factor theory that the consequences of activation (as shown by familiarity and preference judgments) were context independent.

judgments on any relevant dimension will select the more distinct of two shapes, that is, the exposed ones.

Prior exposure can produce both preference and familiarity in the absence of recognition. We now demonstrate that these effects are not specific to any feature of the stimulus, but depend on the sheer activation of the representation of the random shapes. This goes beyond the suggestion that familiarity may mediate preference judgments. The hypothesis is that the prior exposure generates and activates the stimulus representations, and that such activation may then be related to any judgment about the stimuli that is stimulus relevant. The notion of relevance is introduced only to indicate that subjects are unlikely to attempt to relate the activation of the representation to questions about such irrelevant dimensions as, for example, taste or odor. We show that judgments of brightness and darkness are equally facilitated by prior minimal exposures.

Method

Subjects

Subjects were 48 undergraduate students who served as subjects in 4 experimental groups in fulfillment of a research requirement.

Materials

A total of 20 irregular octagons—solid black on 4 × 6 in. (10.16 × 15.24 cm) white cards—were selected from the set generated by Vanderplas and Garvin (1959). Of those, 10 octagons were randomly assigned to the exposure phase, and 10 test pairs were constructed by randomly pairing exposed and unexposed octagons. For the exposure phase of the experiments, the octagons were presented for 2 ms followed by a dark field in a Gerbrands T-3B-2 three-field tachistoscope set at maximum luminance. Illumination was lowered by a neutral density and a red gelatin filter (Kodak Wratten filters Nos. 96 and 25). The octagons were from 1.85° to 4.62° of visual angle in width and 3.70° to 5.54° in height. The centers of the test pairs were separated by 5.08° to 6.46° of visual angles. Position of the exposed (target) octagons was half the time on the right and half on the left side of the test pairs.

Procedure and Design

Four independent groups of 12 subjects each were tested for recognition, preference (liking), brightness judgments, and darkness judgments, respectively.

The subjects were instructed that during the first part stimuli would be presented in the tachistoscope at durations so brief that they might not actually see what was being presented, but that they were to pay close attention to the flashes and to say "yes" each time they saw the flash. No fewer than 10 practice trials with a blank red field were given to each subject in order to ensure dark adaptation. They were then presented with the 10 target octagons repeated five times in different random orders. Following the exposure phase, subjects were given the test phase in which pairs of exposed and unexposed (old and new) octagons were presented in the tachistoscope for 1 s.

The procedure was identical for all conditions, except for the test instructions. For the recognition test, subjects were instructed to choose the octagon that they recognized as having seen before; in the preference condition they were asked which shape they liked better; and in the brightness and darkness conditions they were instructed to report which of the two shapes seemed brighter or darker, respectively. For the liking, brightness, and darkness conditions, subjects were instructed to base their reports on the immediate impression of the two shapes. Because the brightness and darkness judgments could be influenced by the relative sizes of the different random shapes and also could be thought of as objectively correct or incorrect, subjects were instructed to ignore size and to make rapid responses without being concerned about being correct. Following the preference and recognition judgments, subjects were also required to make recognition and preference (liking) judgments, respectively, in a second test series immediately following the first.

Table 1
Mean Percentages and Standard Deviations for Four Experimental Groups

	First presentation		Second presentation	
Group	*M*	*SD*	*M*	*SD*
Recognition	46.7	16.7	52.5	19.6
Liking	61.7	18.9	56.7	15.0
Brightness	60.0	10.4		
Darkness	60.1	13.1		

Results and Discussion

The results in Table 1 show mean percentages and standard deviations for recognition and for identification of target shapes as preferred, brighter, and darker than the unexposed shapes. The first two rows are the replication of the Kunst-Wilson and Zajonc (1980) experiment. For the first and second test combined, preference percentages were significantly greater (59.2) than recognition (49.6), $F(1, 22) = 5.71$, $MS_e = 193.0$, $p < .05$. The preference judgment is also significantly different from chance (.50), whereas the recognition judgment obviously is not. The brightness and darkness results (60.0 and 60.8) were compared with the first test on preference (61.7) and recognition (46.7). Planned comparisons confirm ($p < .01$) that preference, brightness, and darkness judgments are significantly different from the chance recognition results and do not differ significantly among each other.

We had not originally tested the possibility that "dislike" judgments would show the nonspecific activation effect. The reason is that disliking is a complex judgment, often based on the absence of a liking response. Linguistically, liking is the unmarked and disliking the marked end of the imputed continuum (see also Mandler, 1982). In fact, some pilot subjects reported that they decided which shape they liked and then chose the other one. Our expectation was that disliking judgments would produce an equivocal result. However, another group of 12 subjects was subsequently added.[2] We changed the instructions slightly by emphasizing that the choices should be made as quickly as possible on the basis of immediate impressions. The result was that the exposed shapes were chosen 53.3% (SD = 16.7) as being more disliked. The result is not significantly different from the 61.7% for liking or the 46.7% for recognition. However, if disliking is simply the symmetrical complement of liking then using the complement for the liking group should predict the disliking result or at least be compatible with

[2] This group was added at the suggestion of R. Zajonc who, in reviewing the original article, thought that it was needed in order to avoid an "asymmetric design."

it. We computed the complementary value for each of the subjects in the liking group. The 53.3% for the dislike group is significantly greater than the 38.3% (1 − 61.7%) mean of the reversed liking group, $t(1, 22) = 2.05$, $p = .05$. Despite our misgivings about the dislike judgments, the results are in the direction of the nonspecific activation hypothesis.

The data are unequivocal in showing that judgments of brightness, as well as the opposite judgments of darkness, are generated with the same likelihood as preferences (liking) in the absence of stimulus recognition. We conclude that any relevant dimensions can be related to the activation of the stimulus representation. In contrast to Kunst-Wilson and Zajonc (1980), these experiments do not permit any conclusion of specific affective discriminations, that is, that specific "affective" aspects of stimuli (preferanda) have direct access to mental contents in the absence of "cognitive" processing. If one reasonably assumes that brightness and darkness judgments are "cognitive," that is, that they require processing of information, then the data show both affective and cognitive effects, albeit in the absence of recognition. Nor can it be assumed that affective (preference) processes underlie the various judgments. If preferences bias the stimuli toward brightness judgments—as might be argued—they should not equally bias the stimuli toward darkness judgments. The preference judgment is therefore understandable within the context of current information processing theory, which stresses the activation of and subsequent access to underlying representations, and no special affective processes need to be invoked.

Whereas we have shown the same absence of recognition that has been a feature of previous experiments in this genre, there are some doubts about the recognition performance. Subjects are invariably told at the time of presentation that they are unlikely to "see" the stimuli. When they are subsequently asked whether they can recognize them, they will be very likely to assume *a priori* that they cannot. In a pilot study that used a *yes/no* recognition procedure with 300 ms exposures of masked stimuli, we changed the instructions under one condition to indicate to subjects that even though the stimuli were indistinct, they should pay close attention to them. Under these conditions there was both an increase in hit rates (.48 to .58) and a decrease in false alarm rates (.50 to .17) over the "standard" condition, with d' values of −.05 and 1.15 respectively. Thus, the absence of nonchance recognition scores in these experiments may be due to the instructions (criteria) used. In any case, two-factor theory implies that increased exposure time should make possible elaborative processing and therefore generate full recognition experiences rather than mere familiarity judgments, an effect shown by Seamon et al. (1984).

The dissociation between lower (perceptual) and higher (conceptual) stimulus information demonstrated in the Marcel experiments (1983) requires that the stimulus be presented followed by a pattern mask. It is assumed that the mask distorts the specific and detailed perceptual, visual information of the representation of the item (Johnston & McClelland, 1980), but leaves unaffected other information such as category membership. In contrast, a series of preliminary studies of the exposure effect showed that the effect was absent whenever a pattern mask was used (Mandler & Shebo, 1982). Thus, the exposure effect that we have explored depends on the integrity of the activated perceptual pattern which is then related to any dimension of judgment (liking or brightness or darkness) imposed on it.

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